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**Human happiness versus urban biodiversity?
Public perception of designed urban planting in a warming climate**

By:

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Abstract

This study focused on public perception and preference in relation to a range of typologies of woodland, shrub and herbaceous designed urban planting defined by planting structure and species character. An initial on-site questionnaire was conducted with a large sample of respondents, (n = 1410), at 31 sites in England, followed by in-depth interviews with a much smaller self-selecting sub-set of the original respondents, (n = 34). Findings indicated that planting structure, species character and flowering all had a significant bearing on perceptions of the attractiveness, neatness and the biodiversity of the planting. Respondents' background socio-demographic factors, beliefs and values had a lesser influence on their reactions to the planting, and were also related to self-reported well-being. Relationships between perceived attractiveness, perceived biodiversity and well-being were identified.

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Part One

1. Introduction

That urban greenspace is capable of promoting psychological and physical well – being contributing to human happiness has been well – documented in diverse locations and culturally different populations, (Ulrich et al., 1991; Tzoulas et al., 2010; Vejre et al., 2010,). To date however, most of the research into human perception of designed urban environments has dealt with designed planting in a very generic sense, (Kaplan and Kaplan, 1989), principally seeing it as part of background ‘nature’. Velarde et al., (2007) refer to, ‘the predominance of studies using only coarse categories of landscapes’, and the separation of most landscapes into, ‘natural’, or ‘urban’. For landscape architecture that designs actual plant communities a much more nuanced understanding of how the form, composition and character of plantings of trees, shrubs and herbaceous plants are perceived and preferred is desperately needed. This study provides that understanding. Focusing on public perception and preference in relation a range of typologies of woodland, shrub and herbaceous planting defined by structure and species character, it is the first to consider such fine – grained categories of natural landscape in such breadth and depth.

Over the past 50 years there has been a marked change in the form of designed plantings. This is mainly due to fashion, with a movement towards less formality and more naturalistic planting. The work of designers such as Piet Oudolf, responsible for the planting design of the Highline in New York illustrates this, (Oudolf & Kingsbury, 2013). This is also possible because a different range of plants is now climatically capable of growing in a warming climate, and in particular, within urban landscapes, (Korn, 2013). Evidence already exists for the poleward shift in climatic and related ecological systems, (Parmesan, 2006), so this will increasingly be the case in the future. It seems likely that perceptions of what is attractive in designed vegetation are not fixed, but change across space and time, in response to both cultural cues and to the perception of what is normative at that point in time. Climatic change might be assumed to have a major impact on this process; what was seen as normal in cooler climatic periods might be seen very differently in the future, as for example Southern England shifts to being near Mediterranean. Sustainable planting is not based purely on human preference or climatic suitability, but increasingly deals with notions of how effective that planting is for supporting native invertebrate biodiversity. Until recently the only guide to this has been whether the vegetation is composed of native as opposed to non – native species, with the assumption that the former provided more benefits. Work over the past decade, (Shapiro, 2002, Gaston et al., 2004, Smith et al., 2006a) has challenged this assumption. Linked to this, there has been a growing interest in links between human well – being and biodiversity, (Fuller et al., 2007, Dallimer et al., 2012), yet this work has neglected the role of perceived attractiveness and the aesthetic qualities of the study area. This is important to the landscape architect seeking to provide more scenic beauty in the landscape as well as more green.

This study focuses on determining the relationships between perceived attractiveness, perceived biodiversity and well – being in relation to public preference, and aims to develop greater understanding of how all these factors interact. In landscape preference studies perceived attractiveness has often been taken as representation of ‘preference’, yet there has

for some time been body of evidence to suggest that scenic beauty judgements are not the same as scenic preferences, (Arthur et al., 1977). Some studies, (Ulrich et al., 1983,) suggested that well – being arises from a positive aesthetic response to a natural environment, and that the correlation between these factors is strong, (Laumann et al., 2001; Van den Berg, 2003), yet other researchers found no relationship between perceived attractiveness and human well – being, (Martens et al., 2011).

In terms of scale and research methods, the majority of previous studies have focused on preference at the broad landscape scale, with participants observing photographs (Shafer & Brush, 1976, Ulrich, 1986, Purcell & Lamb, 1998, Herzog et al., 2003), slides, (Daniel & Boster, 1976), or videotapes, (Brush et al., 2000), of landscape views, or at the microscale, where individual plant components or traits such as leaf colour have been considered, (Williams, 2002; Williams and Cary, 2002; Kendal et al., 2012). Some have focused on just one vegetation community or type, such as woodlands, (Jorgensen et al., 2002; Jorgensen et al., 2007; Martens et al.; 2011; Van den Berg et al., 2014), street trees, (Hitchmough & Bonugli, 1997; Todorova et al., 2004), or herbaceous planting, (Strumse, 1996; Akbar et al., 2003; Lindemann – Matthies & Bose, 2007; Lindemann – Matthies et al., 2010), using very small participant sample sizes of for example, 30, (Jorgensen et al., 2002), 81, (Todorova et al., 2004), 90, (Dearden, 1984), 96, (Martens et al., 2011), 102, (Van den Berg et al., 2014). In many cases the participants have been extremely homogeneous socio – demographically, with researchers drawing on their own often white, middle class university students, (Strumse, 1996; Zheng et al., 2011; Van den Berg et al., 2014). This work provides an alternative perspective more appropriate to landscape architecture and other social sciences. The first part of the study involved a large number, (useable sample size, n= 1410) of relatively socio – demographically diverse research participants walking through and observing contrasting areas of woodland shrub and herbaceous planting, during different seasons, at 31 different sites throughout England. Each participant took part in one walk only. Participants completed a questionnaire as they walked, commenting on the planting at a human experiential scale. This is important for landscape architecture which needs to respond to how ordinary people experience and perceive the urban landscape. The use of an on-site walk is relatively innovative and provides a more holistic, immersive experience, (Scott and Canter, 1997), than approaches relying on digitally manipulated photographs, (Jorgensen et al., 2002; Todorova et al., 2004), photographs, (Purcell and Lamb, 1998) or video, (Van den Berg et al., 2014). The approach has been used previously, (Chenoweth, 1984, Shafer et al., 2000; Martens et al., 2011,), yet this was a more ambitious wide – reaching study. The second part of the study involved in – depth semi – structured interviews with a small (n= 34) sample of the original questionnaire respondents. Interviews took place at the original 31 sites throughout England.

2. Literature Review

A number of frameworks, for example, (Zube et al., 1982; Daniel & Vining, 1983), have been used to synthesise the relevant literature in this field. These authors agreed broadly on a classification based on the categories; ‘expert’, ‘psychophysical’, ‘cognitive’ and ‘experiential’. The four paradigms were recognised by Zube et al., (1982) in a review of over 160 articles published in 20 journals from 1965 to 1980.

In this study the relevant literature is discussed thematically, with summative comments linking the literature to the research questions generated. The review starts with early (1960’s

& 1970's) descriptive inventories of scenic beauty, (e.g., Litton, 1968; Craik, 1972), followed by a discussion of the evolutionary approach, (e.g., Appleton, 1975; Heerwagen & Orians, 1995), and cultural interpretations (e.g., Tuan, 1974; Van den Berg, 1998). Work on place attachment is discussed, (e.g., Manzo, 2005; Ward Thompson et al., 2008), followed by a discussion of the contemporary synthesising paradigm, (Kuhn, 1962), (e.g., Jorgensen, 2007; Van den Berg et al., 2014). The latter approach acknowledges the role of both evolutionary and cultural influences on perception and preference. This part of the literature review all relates to the first research question considering the relative importance of the planting stimulus and people's background factors in determining their perceptions and preferences.

The important body of work on restorative landscapes, (e.g., Kaplan & Kaplan, 1989; Kaplan 1995) is then discussed, as are other (Fishbein & Ajzen, 1975; Ajzen & Madden, 1985) and more recent (e.g. Ives & Kendal, 2014) studies focusing on the importance of individual and group values. This literature is relevant to the second main research question, which focuses on beliefs and values. Also relevant here is the literature addressing public perception of designed urban planting in the context of a warming twenty first century climate, (e.g., Hitchmough, 2011; Kendal et al., 2012).

The final part of the literature review relates to the third and final research question. This discusses the growing body of work considering links between biodiversity and well – being, (e.g., Fuller et al., 2007; Dallimer et al., 2012).

2.1. Descriptive Inventories of Scenic Beauty

Early attempts to assess the scenic beauty or aesthetic resources of a landscape took the form of either qualitative or quantitative landscape inventories conducted by landscape professionals such as landscape architects, without recourse to public perception or opinion. These started as a response to legislation during the 1960's stating that natural areas such as the National Forests of the USA needed to be managed with concern for intangible 'products' such as, 'esthetics, wildlife and recreation' as well as tangible, marketable ones such as timber, (Arthur et al., 1977). Qualitative descriptive inventories were conducted by professionals who identified and described 'scenic elements' such as landforms and visual effects. Litton, (1968) developed a system whereby design components such as 'unity', 'dominance', 'colour', 'contrast' and 'depth of field' were described. Other non – quantitative approaches focused on the relationship between variety and perceived scenic beauty. Many different concepts were encapsulated by the term 'variety', (Arthur, et al., 1977); 'complexity', 'change', 'uniqueness', and 'number of edges'. Both the number of edges between landscape features, (Kiemstedt, 1971) and more general indications of 'change' (Newby, 1973), were related to human need for 'variety'. Quantitative approaches attempted to give scores to particular landscape elements, (Craik, 1972), or physical attributes, (USDA Forest Service, 1972), allowing comparison of the scenic value of one landscape against the other.

The considerable limitations of these methods were recognised, (Arthur, et al., 1977). The assumption that the impression of the 'whole' landscape was a sum of the value of its components was questioned, and secondly, the assumption that scenic beauty is embedded in the landscape was challenged. Arthur et al., (1977) observed that, 'scenic beauty depends on the observer as well as what is being observed.' It was also shown then, (Cook, 1972), as more

recently, (Ozguner et al., 2007), that landscape professionals' criteria for attractiveness or beauty may not be shared by the general public.

2.2. Evolutionary and cultural theories of landscape perception and preference

By the 1970's, an awareness of the limitations of landscape evaluation by professionals, as well as a growing public interest in conservation and preservation of natural beauty, resulted in the development of models of assessment of visual landscape quality focusing on public perception and preference. Most early theories relied on reference to common human evolutionary history, (Appleton, 1975; Zube, 1984), whereas alternative cultural theories accepted the role of the cultural background and personal characteristics of the individual, (for example, Tuan, 1974; Dearden, 1984; Van den Berg et al., 1998).

2.2.1. Evolutionary Interpretations

Evolutionary theories are centred on the interpretation that aesthetic landscape preferences are based on the common human biological need for survival, and that the landscapes providing the optimal attributes for survival will be the most preferred, (Tveit et al., 2007). As this applies to all humans in the same way, this interpretation argues for a common set of preferred landscape characteristics across all people irrespective of ethnicity, gender, age or past experience. The prospect – refuge theory, (Appleton, 1975) and information – processing theory, (Kaplan & Kaplan, 1989) are examples of this approach. The former emphasises the role of the human as both prey, and therefore need for, 'refuge', and predator, also needing 'prospect' to see without being seen. Landscapes offering both are seen as aesthetically pleasing (Appleton, 1975) because they provide optimal conditions for survival. The informational framework, (Kaplan and Kaplan, 1989) suggests that people need both information and the ability to process it to survive. Landscapes which are easy to 'read' are universally perceived as more aesthetically pleasing, because they score highly for both those criteria and therefore enhance the likelihood of survival.

Other evolutionary interpretations focus on smaller scale features, such as the traits of particular plants. Habitat theories of landscape preference have argued that people prefer plants with characteristics indicating high resource availability necessary for survival, such as large flowers and green foliage (Heerwagen & Orians, 1995) and dislike characteristics that indicate poor quality habitat such as narrow foliage, (Williams & Cary, 2002). Other studies have provided evidence consistent with these theories; green is a preferred foliage colour (Kaufman & Laur, 2004, 2008), that only some people prefer grey foliage, (Kendal et al., 2008), that people prefer bigger leaves (Williams, 2002), and that foliage colour can be an important factor in consumers' plant choices (Townsend – Brascamp, & Marr, 1994; Berghage & Wolnick, 2000). A study considering preferences for and attitudes towards street flowers and trees in Sapporo, Japan (Todorova et al., 2004), revealed that low and ordered compositions of brightly coloured flowers were preferred when considering ground level vegetation. Evolutionary theorists argue that these perceptions and preferences are part of our inherited genetic characteristics, so are still valid today, (Tveit et al., 2007).

2.2.2. Cultural Interpretations

Contrasting cultural theories of landscape preference recognise that patterns of perception and preference go beyond a universal affective response to the landscape stimulus, and vary according to background factors, personal characteristics (Tveit et al., 2007), and past experience of the observer. Tuan, (1974) proposed the topophilia hypothesis, which

emphasised the role of age, gender, occupation, hobbies, academic background and familiarity in shaping landscape preferences. (Van den Berg et al., 1998) challenged the 'consensus assumption', of evolutionary theory, (see for example, Daniel & Boster, 1976; Welman & Buhyoff, 1980, as well as examples above). As described, this assumed a commonality of response to landscape stimulus across gender, age, social and cultural group, yet evidence existed, (Dearden 1981; Zube, 1987), which showed that much of this research had been conducted with socio – demographically homogeneous groups of respondents dominated by white middle class university students, using a selection of uniform landscapes such as spectacular mountain views, or those containing water elements.

Focusing on three distinctive groups; farmers, resident non – farmers and visitors to an area in the Netherlands, Van den Berg et al., (1998) showed farmers' beauty ratings differed significantly from those of both residents and visitors. Differences in beauty ratings between residents and visitors were marginally significant. It was concluded that both familiarity and educational level had a bearing on group differences. These findings were consistent with those from an earlier study, (Dearden, 1984), which focused on the influence of four sets of variables on landscape preferences; training in the planning profession, environmental awareness, familiarity according to general landscape type and various socio – economic factors. Results indicated a positive correlation between familiarity and landscape preference, with no significant relationships between any of the socio – economic variables, (gender, age, income, education and occupation) and preference. This study was conducted with a relatively small total sample size of 90 respondents, comprising 30 land – use planners, 30 members of an active environmental lobby club, and 30 members of the general public. Another study, (Strumse, 1996) focused on the role of demographic differences in the visual preferences for agrarian landscapes in Western Norway. The sample size was again relatively small, (198), and in this case more homogeneous in that all participants were Norwegian students. In this case the strongest predictors of preference across landscape categories were present population density, gender, organisational membership and expertise. Focusing on gender, women's preference scores in the 'flowers' landscape category were higher than those of men.

i) Gender

There is a growing body of literature confirming gender differences in landscape perception and preference. Consistent with findings above, (Strumse, 1996), research conducted in Sapporo, Japan (Todorova et al., 2004) revealed that women expressed more positive reactions to the aesthetic and psychological value of street flowers than did men. In a more recent study of 'species richness, structural diversity and species composition' in relation to meadow planting, (Lindemann – Matthies & Bose, 2007), when asked to create their own idealized meadow, women assembled more species – rich meadows than men. Jorgensen et al, (2002) and Jorgensen et al., (2007), identified gender differences in preference and perceptions of fear in woodland areas, and greater place attachment has been attributed to women than men, (Hidalgo & Hernandez, 2001).

Although 'gender' is a background socio – demographic variable, some researchers focusing on differences in landscape preference or environmental concern between groups revert to evolutionary theory when attempting to justify these differences. Strumse, (1996) attributes women's high preference scores for the 'flowers' category, (above) to evolutionary factors which predispose women to a superior perception and memory of vegetation complexity than men, (Silverman & Eals, 1992). This is explained with reference to the gender division of labour

in the Plio - Pleistocene, (Tooby & DeVore, 1987), when women foraged for berries and fruits and men hunted game. A more recent comprehensive critical analysis of this theory, (Ecuyer – Dab & Robert, 2007) has revealed a body of evidence to support it, yet an alternative interpretation focuses on the stronger pro – environmental beliefs and values held by women, (Xiao & McCright, 2015). These might be explained with reference to gender socialisation theory, (Chodorow, 1978; Gilligan, 1982), rather than with reference to evolutionary theory, (Xiao & McCright, 2015). Simplistically, boys might be socialised to be more competitive, independent and unemotional, whereas girls are encouraged to be more empathetic and cooperative. These childhood differences in socialisation might then be a source of differences in attitudes to the environment.

ii) Ethnicity

The relationship between ethnicity and perceptions of greenspace has been the focus of a considerable body of research conducted in the UK, Netherlands, Germany and Denmark. Two main approaches can be identified; ‘images of nature and landscape preferences’, and ‘embodied experiences of greenspace’, (Kloek et al., 2013). Some studies have been quantitative, using questionnaires, whereas much of the work has been qualitative, using different methods of interviewing and focus groups, with more recent work, (Finney & Rishbeth, 2006, Tolia – Kelly, 2008), using innovative approaches including inviting participants to make photographs or paintings, (Kloek et al., 2013). Studies focusing on ‘images of nature and landscape preferences’, often revealed that in a normative dimension, i.e., when considering the value of nature, immigrant groups had a more functional view of nature than did members of the native population, who were more likely to hold a wilderness view. This was the case in two Dutch studies of Turkish and Moroccan immigrants, (Buijs et al., 2009, Kloek et al., 2010) as well as a German case study of Turkish migrants, (Jay & Schraml, 2009). A number of studies from different countries, (for example Buijs et al., 2009, Countryside Agency, 2005), indicated that immigrants from Mediterranean countries preferred more managed places over wilderness areas. These offered opportunities for collective, group use, (Kloek et al., 2013). Normative differences between immigrant and native populations have been explained with reference to two factors, firstly, religious background, i.e., Islam, where nature is shown to be manicured and ordered, and the ideal image of paradise is a ‘cultivated oasis shielded from the desert’, (Schouten, 2005). Other researchers attribute the functional interpretation of nature recognized amongst immigrant populations to their rural geographical background. In the Netherlands many first generation Moroccan and Turkish immigrants spent their childhoods in small rural settlements, (Schmeik & ten Wolde, 1998). In comparison with people living in urban areas, those in rural areas often have a more functional perspective on nature, associating the rural landscape with agriculture and food production. (de Boer & Schulting, 2002). Studies considering ‘embodied experiences of greenspace’ amongst immigrant groups have focused on sensory effects, childhood memories and place attachment, (Kloek et al., 2013), with results often indicating two main categories of embodied experience specific to immigrants; nostalgia and fear, (Madge, 1997, Rishbeth & Finney, 2006). Feelings of nostalgia for the country of origin might be triggered by contact with particular animals, and plants, activities and social use of outdoor space, (Rishbeth & Finney, 2006), whereas fear was related to both nature itself including insects, as well as other people and racial attacks.

iii) Landscape and environmental expertise

Some researchers acknowledging the role of background factors in landscape preference have focused specifically on the attitudes of different landscape – related professionals or members of environmental groups. This is significant in landscape architecture, because it is important to distinguish between perhaps unrepresentative views that might be held by a small professional elite group, and those of the wider public who are the consumers of the products of the landscape profession. Research quoted above, (Dearden, 1984), identified no significant relationship between professional training in planning and landscape preference, leading him to conclude that professional training was not a significant influence on preference for different landscape types. There was a significant relationship between membership of the environmentally – aware Sierra Club and preference, with members demonstrating a higher preference for wilderness scenes. In contrast, work by Strumse, (1996) also cited above, identified significant differences in landscape preference between a group of students from landscape – related disciplines, (n=94), and one from introductory courses in psychology, (n = 104). The landscape ‘experts’ demonstrated lower preferences for a ‘Green, Grassy Fields’ category of landscape, showing mowed fields, leading the author to conclude that this was the result of critical attitudes related to the perceived lower biodiversity value of this scene. It is a challenge to draw any meaningful comparison between the results of these studies, however, in that they focus on different ‘experts’ and sample sizes are different. Apart from the ‘expert’/‘non – expert’ distinction, the other socio – demographic characteristics of participants in the second study were more homogeneous than in the first, in that all participants were university students. Two more recent studies, (Ozguner et al., 2007, Zheng et al., 2011), have focused on the perceptions of different landscape – related professionals. The first study focused on, ‘attitudes of different landscape professionals towards naturalistic versus formal urban landscapes in the UK’, and was based on responses from 265 participants drawn from three separate groups; local authority parks and recreation departments, private landscape practitioners and conservation trusts. Consistent with findings above, (Dearden, 1984), the naturalistic style was very popular with members of conservation trusts, yet less so amongst the other two groups. Both private landscape practitioners and local authority parks department workers acknowledged the need for both naturalistic and more traditional formal landscape styles should co – exist in an urban environment. The study by Zheng et al., (2011), also showed a higher preference for natural landscapes amongst wildlife science students than those in agricultural economics, horticulture and social sciences, who were more likely to choose a neat, more intensively maintained landscape around their homes. Again, a limitation of this research was its reliance on university students as participants, yet in this case the sample size was larger, (n=360).

2.3. Place attachment and landscape perception and preference

‘Place attachment’ refers to, ‘a positive bond that develops between groups or individuals and their environment’, (Altman & Low, 1992; Williams et al., 1992). Place attachment studies emphasise, ‘that places are more than geographical settings with definitive physical and textual characteristics; they are fluid, changeable, dynamic contexts of social intersection and memory, (Stokowski, 2002).

Early studies of place attachment focused almost exclusively on social dimensions of attachment at the expense of the physical, (Hidalgo & Hernandez, 2001). Consideration of place attachment had most commonly been studied in relation to residence, the use of the

term 'home' in a literal or metaphorical sense, and the neighbourhood, (Manzo, 2005). There has, however, been an increasing awareness of place attachment in relation to natural settings beyond the 'home' and immediate neighbourhood, and a growing awareness that people develop emotional bonds with a whole range of places and that different experiences create both individual or group meaning, (Manzo, 2005), including urban greenspaces, (Jorgensen et al., 2007). Some studies focused specifically on the spiritual meaning of places such as wilderness areas, (Frederickson & Anderson, 1999). Gustafson, (2001b) focused on mapping place meaning, exploring relationships with a range of places, and Kyle et al., (2004) focused on the 'effects of place attachment on users' perceptions of social and environmental conditions' along the Appalachian Trail in the USA. This body of work brought an increasing awareness of the psychological and emotional role of outdoor 'natural' settings in enriching human experience. Some studies focused on the significance of place to the individual, whereas others considered group attachments amongst ethnic groups, (see earlier). The study by Jorgensen et al., (2007) focused on the contribution of woodland to place identity in Birchwood, Warrington New Town, UK. This revealed a communal place identity arising from signs of individual and group care in the landscape, yet also individual place attachment arising from restorative experiences within wilder urban greenspaces. It also indicated socio – demographic differences in response to the woods in Birchwood, with women and the elderly more likely to feel vulnerable when alone there. Other research, (Hidalgo & Hernandez, 2011), suggests that there are age and gender differences in place attachment too. This study of residents from different neighbourhoods of Santa Cruz de Tenerife, Spain, (n=177), showed that women showed greater attachment to place than men, and that attachment to place increased with age. Another study, (Ward – Thompson et al., 2008), focused on the importance of childhood place attachment to woodland and greenspace settings in terms of adult likelihood to visit these types of settings. Findings showed that individuals who visited these places as children were more likely to use them alone as adults, and that adult awareness of their physical and emotional benefits reflected childhood experiences. Many participants freely volunteered their memorable childhood experiences. Findings are particularly convincing because they are drawn from large socio – demographically diverse sample groups from two geographically disparate but related studies, in Central Scotland (n = 339), and the East Midlands of England, (n = 459). Using constructivist research methods, Ward Thompson et al., (2008) conducted initial focus groups which informed the design of a questionnaire which was conducted in high streets, shopping centres (Central Scotland) and at a range of green space sites, (East Midlands, England).

2.4. A Synthesising Approach

The current dominant 'paradigm', (Kuhn, 1962), in landscape perception and preference theory is a synthesising integrative one which acknowledges the role of both evolutionary and cultural influences, (Hartig, 1993, Tveit et al., 2006, Ives and Kendal, 2014). This accepts that due to common human evolutionary history some landscape features are preferred across cultures, yet cultural and individual differences result in divergences. Much recent work has taken this stance. Literature demonstrating an awareness of the role of both evolutionary and cultural factors relevant to this research has focused on human reactions to a particular vegetation community, for example woodland, (Jorgensen et al., 2002; Jorgensen et al., 2007; Martens et al., 2011; Van den Berg et al., 2014), or herbaceous vegetation, (Strumse, 1996; Lindemann – Matthies & Bose, 2007; Lindemann – Matthies et al., 2010), or planting in a particular context, for example, street trees, (Hitchmough & Bonugli, 1997;) street trees and

flowers, (Todorova et al., 2004), and roadside vegetation, (Akbar et al., 2003). Other studies have focused on the individual's personality traits and different styles of planting, (Van den Berg & Winsum – Westra, 2010), or microscale 'plant traits', (Kendal et al., 2012).

Considering public perception in relation to specifically woodland environments, a study of public attitudes to local urban green spaces, (Burgess et al., 1988), found that people valued wilder looking woodland areas more than conventional ones containing mown grass and arboretum – style isolated trees, yet a later study, (Parsons, 1995) indicated that more open woodland edge treatments were preferred to denser ones. Findings from a Sheffield study by Jorgensen et al., (2002), cited earlier, confirmed this. The study also revealed gender differences in respondents' reactions, with women recording significantly lower preference and safety scores than men, suggesting that women felt less safe than men in the type of park or greenspace depicted. This study relied on a small sample size, (n=30), of 13 male and 17 female respondents. Jorgensen, (2004), later acknowledged that preference for multi – layered woodland planting may be, 'determined by view distance and visual penetration rather than an inherent dislike of this type of vegetation', i.e., people felt safer within a woodland area as long as there were clear sight lines through the trees. A later study of 'woodland as a setting for housing – appreciation and fear and the contribution to residential satisfaction and place identity' in Birchwood, Warrington, (Jorgensen et al., 2007), also cited earlier, revealed an ambivalent attitudes to the 'ecological woodland style' planted here, with 76% respondents showing appreciation of the way their streets looked, yet mixed attitudes to trees and shrubs on and adjacent to these residential streets. On one hand these afforded a 'sense of containment and security', yet on the other they could 'hide potential assailants', and facilitate anti – social behaviour. Specific context in relation to respondents' homes might then be a significant factor influencing preference; whereas people may want access to 'wilder woodlands' near to where they live, they might prefer neater, more manicured landscapes in the immediate vicinity of their homes, echoing work by Nassauer, (1988, 1995) that the street aesthetic is one of care, (Jorgensen, 2007). Two more recent studies cited earlier, (Martens et al., 2011; Van den Berg et al., 2014), focused on restoration in relation to different woodland environments.

Relevant research focusing on perception and preference in relation to herbaceous planting from this same synthesising perspective includes a two – stage study conducted in Switzerland to determine the relative role of species richness, structural diversity and species diversity in public preference for designed urban meadows, (Lindemann – Matthies & Bose, 2007). Participants were asked to 'create' their own meadows. Some, (n = 152), assembled their own meadow patch and others, (n= 143), created 'imaginary' idealised meadows. These participants either assembled or imagined meadow areas with a high degree of horizontal structural diversity and variety in plant height. Findings revealed gender differences, with women assembling more species – rich meadows than men. This suggested either women have a superior ability to perceive then recall complex arrays of vegetation than men, (Silverman & Eals, 1992), or that they have a greater affinity for plant species richness, as suggested by the study cited earlier, (Strumse, 1996), where women rated flower – rich biologically diverse meadows more highly than did men.

Other relevant work acknowledging the role of both evolutionary and cultural factors includes that addressing planting in a specific context, particularly urban streets and road verges. Considering street trees, a study conducted in Ayr, SW Scotland, (Hitchmough & Bonugli, 1997)

aimed to assess the role of socio – economic factors in predicting the attitudes of residents living in currently treeless streets to street trees. This was the first UK study of this type, as previous work had focused on the USA, (e.g. Hull, 1992; Summit & Sommer, 1999). Results showed differences according to residents' income, age and gender. Residents of the two more affluent streets were most positive about street trees, whereas residents of a low income street with more elderly residents were less positive. Male respondents were significantly more positive about street trees than females. A study considering 'preferences for and attitudes towards street flowers and trees' (Todorova et al., 2004) looked at street trees in another contrasting physical and cultural context, ie., Sapporo, Japan', focusing particularly on the inclusion of flowers in street planting. Results of this study indicated that the trees were the factor with the greatest influence on perception, yet that amongst several possible elements for the space below the trees, (soil, grass, hedge and flowers), low, ordered compositions of brightly coloured flowers were the most preferred. This preference for flowers is consistent with findings from the Sheffield study of woodland edge treatments, cited earlier, (Jorgensen et al., 2002), where the treatment, 'no understorey with flowers', was the most preferred overall. In the Japanese study, there were also some gender differences, with women expressing more positive reactions to the aesthetic and psychological value of street flowers than did men. This is also consistent with findings from a Norwegian study cited above, (Strumse, 1996). In contrast, Akbar et al., (2003) focused on respondents' 'assessment of scenic beauty of the roadside vegetation in northern England'. 83 % respondents of the small study (n= 183) indicated that they valued the scenic qualities of roadside environments. Respondents showed a preference for grass swards with flowering herbs adjacent to roads, with trees further away, yet in this case there was no analysis of outcomes according to background variables such as gender, age or income.

Considering individual personality traits and differences in preference for three garden styles, 'manicured', 'romantic', and 'wild', Van den Berg & Winsum – Westra, (2010), made use of measures of the 'Personal Need For Structure', (Neuberg & Newsom, 1993), as a predictor of preferences for allotment gardens in the Netherlands. This two stage research, (n=150, n=123) indicated that those participants with a high PNS as opposed to a low PNS gave higher beauty ratings for manicured gardens, lower for wild ones and were more likely to own a manicured and romantic one and less likely to own a wild one. Findings from this work highlighted the relationship individual personality traits and preference.

Recent work, (Kendal et al., 2012) focuses on public preference at the microscale, investigating people's preference for specific garden plants. This study acknowledges the role of both the 'plant traits', background socio – demographic factors as well as the possible role of individual personality traits. The postal study was conducted in Ballarat, SE Australia. As Australia was formerly colonised by Europeans, attitudes to 'native' and 'non – native' plants are complex, (see later). Findings indicated that respondents' preferences were related to both visual (eg. Flowering, leaf size, habit, and evidence of clipping) and non – visual (e.g. nativeness) plant traits, with particularly strong positive or negative reactions to native plants. This is likely to be related to both the aesthetic qualities of these plants, as well as the complex colonial reasons discussed later, (Kendal et al., 2012). In this case overall socio – economic and demographic factors were relatively poor predictors of preference.

The literature reviewed so far leads to the first research question, which asks how public perception and preference are related to the varying characteristics of the planting itself,

(structure, species character and flowering). This question also addresses the extent to which reactions are influenced by people’s background factors such as gender and ethnicity, and whether they are a member of the landscape profession or not. The final part of the question addresses the roles of place attachment and physical context in people’s perceptions. Evolutionary theories of landscape perception, as discussed in 2.2.1. emphasise the importance of the planting stimulus and downplay the role of background factors, suggesting that certain landscape stimuli provoke a universal response regardless of age, gender or ethnicity. Cultural theories tend to suggest the dominance of background factors. Many more recent studies adopting ‘the synthesizing approach’ discussed in 2.4., acknowledge that both evolutionary and background factors might have a role in defining perception and preference. This research will examine these ideas in great breadth and depth in relation to people’s reactions to designed woodland, shrub and herbaceous planting.

2.5. The Importance of beliefs and values

For some time, researchers (Fishbein & Ajzen, 1975; Ajzen & Madden, 1985), have recognised the importance of individual beliefs and values in shaping and influencing attitudes and human behaviour. The most recent work, (Ives & Kendal, 2014) recognises the importance of both individual and shared beliefs and values in shaping and influencing landscape preferences. It also highlights the limited value of earlier theoretical work on social values (e.g., Dietz et al., 2005) to the landscape practitioner. Ives & Kendal, (2014) present understandings from earlier research in a way that is both relevant and of practical value to conservation scientists and landscape managers.

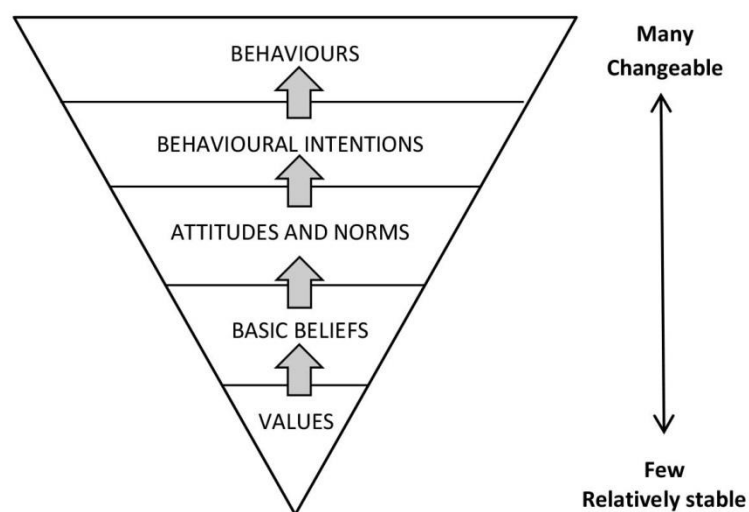


Figure 2: A Visual Representation of the cognitive hierarchy, adapted from Fulton et al., 1996, from Kendal et al., (2012). Concepts towards the bottom are more stable and fewer in number than those towards the top.

Public perception and preference or ‘attitude’ can be linked to behaviour, norms, beliefs and values, with reference to the cognitive hierarchy, (Figure 2), adapted from Fulton et al., (1996). The ‘attitudes’ level of the hierarchy encompasses human perception and preference. Attitudes are, ‘statements of people’s positive or negative evaluations of a specific object or situation, and are typically expressed as likes or dislikes, or preferences’, beliefs are ‘statements of people’s understanding of the world’, (Ives & Kendal, 2014), norms are ‘common understandings about how people ought to behave in a certain context’, (Dietz et al.,

2005). A distinction is made between 'underlying values', or 'value orientations', and 'assigned values'. Underlying values are the deep human characteristics that help shape people's judgements about the world around them, i.e., their perceptions and preferences, and 'assigned values' describe the worth an individual or group places on another object, (Ives & Kendal, 2014).

The diagram shows that people's individual or group values, (few and relatively stable), influence their basic beliefs, which in turn have a bearing on their attitudes and norms. Attitudes and norms are more changeable and fickle than more deeply held beliefs. Ives & Kendal, (2014), acknowledge multiple pathways between these values and attitudes, beliefs and behaviours relevant to ecological management and conservation, demonstrating why values are so important. Research on underlying values in psychology has to date made the distinction between 'Biospheric', (nature-centred) environmental value – orientations, 'Social Altruistic' (human-centred) and 'Egoistic' (self-centred). Significantly, research has shown that these value systems can be used to predict pro – environmental behaviours, (Stern et al., 1995; Schultz, 2001). Different people might value a particular urban park or greenspace for a range of reasons linked to their value orientation; those with a biospheric value orientation might value the biodiversity, those with a social altruistic orientation might appreciate opportunities to socialise there, and those with an egoistical orientation might appreciate a particular recreational facility they or their children use. Research has also shown that diverse underlying and assigned values are held by different stakeholders (eg. landscape architects, environmentalists, resource users) and the general public, (Ford et al, 2009; Seymour et al.,2011), and that individuals might hold conflicting value sets, (Ojala & Lidskog, 2011). Better understanding these value systems and the attitudes and perceptions they generate can help inform future management decisions, (Kendal et al., 2012), so public planting and greenspace can be designed in response to public desire.

The links between attitudes, norms and behaviours recognised here are consistent with earlier findings, (Nassauer, 2009, 2011) concerning 'care' and people's attitudes and behaviours with respect to the immediate landscape around their homes and beyond. Nassauer, (2009), acknowledges that 'care' is a cultural norm and that residents maintain their own gardens in order to 'keep up' with their neighbours who share this norm. It is also suggested, (Nassauer, 2011) that this relationship might be extended beyond the home and neighbourhood area, so the 'deep pervasive cultural norm' of care might influence people's global environmental behaviour and stewardship.

2.6. Individual psychological needs and Attention Restoration Theory (ART)

As well as focusing on individual or multiple background factors such as gender and ethnicity, much landscape preference research has considered the psychological needs of the individual, and the potentially restorative nature of natural environments. The roots of work on individual psychological needs lie with authors such as Ward & Russell, (1981), who sought to understand how people 'internally represented' the physical place within which they found themselves. Attention restoration theory (ART) proposes that if an individual is engaged in a task which requires directed concentration for a prolonged period of time, the mechanisms involved in sustaining that process will become fatigued, (Kaplan & Kaplan, 1989; Kaplan, 1995, 2001). The theory states that recovery from this fatigued condition is most likely to be afforded by exposure to settings with four key properties or components; firstly, 'being away', or escaping the routine environment requiring directed attention which might have induced the fatigue,

(Kaplan, 2001). As many people work within urban environments and focus on urban issues, natural settings facilitate, 'being away', (Knopf, 1987). The second component is, 'extent', a setting with sufficient structure and content to occupy the mind and allow directed attention to rest, and thirdly, 'fascination', or 'effortless attention'. Importantly, the theory distinguishes between 'settings which may be so fascinating that they rivet one's attention, leaving little room for thinking about other things', (Herzog et al., 2003), referred to as, 'hard' fascination, and those which provide 'soft' or 'quiet' fascination, affording 'effortless attention'. Herzog, et al., (1977) provide evidence for this distinction, and the association between soft fascination and natural settings. The distinction between 'hard' and 'soft' fascination can also be related to the circumplex model of affect. Originally a tool used in psychology, (Russell, 1980) and more recently applied to neuroscience, (Posner et al., 2005), this two dimensional model, (Figure 1) can be used to understand human emotional reactions.

The model proposes that all human reactions or affective states arise from two overlapping systems; firstly, one related to valence, a pleasure – displeasure continuum, and secondly one related to a degree of arousal or alertness, i.e., 'activation' to 'deactivation', (Russell, 1980). Each emotion is then understood as a linear combination of the two dimensions, valence and alertness, (see Figure 1). In the diagram the emotions 'excited', 'elated', 'relaxed' and 'calm' are all associated with a positive valence, yet all involve a different degree of 'arousal'. Whereas 'excited' and 'elated' are the product of a high degree of arousal, 'calm' and 'relaxed' are relatively much closer to 'deactivation'. It could be suggested that the type of stimuli or landscapes that generate 'hard' fascination are likely to generate a more activated, aroused response, because they demand attention, resulting in excitement or elation, whereas stimuli resulting in 'soft' stimulation are likely to create a deactivated state associated with relaxed, calm emotions.

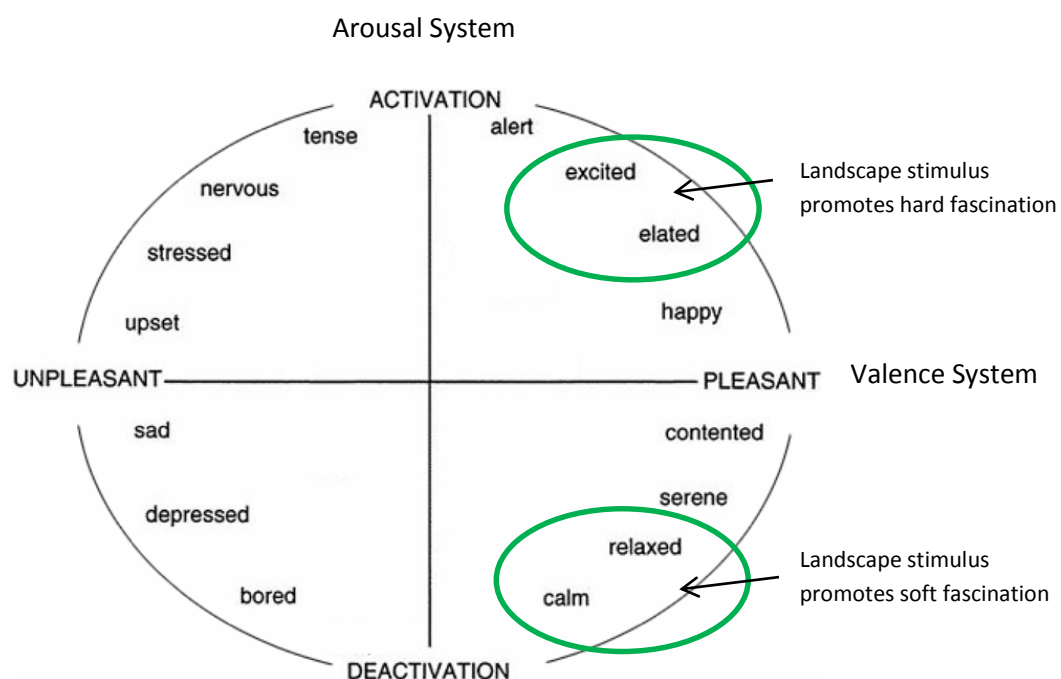


Figure 1 Graphical representation of circumplex model of affect from (Posner et al., 2005) adapted to show impact of contrasting landscape stimuli

The final component of a restorative setting is 'compatibility', or the fit between an individual's purpose or intent, and the possibilities afforded by the setting. It has been recognised that natural settings present the opportunity to engage in a wide range of activities, thereby being 'compatible' with the disparate intentions of a different individuals, (Herzog et al., 2003). Numerous studies have indicated the positive restorative effect of nature, in the case of 'fatigued' individuals, (Hartig et al., 1991, 2003; Herzog et al., 1997, 2003; Hartig & Staats, 2006). Hartig, (2008), presents a convincing argument for the value of green space, quoting evidence, (Mitchell & Popham, 2008) for its mitigating effect on health inequality, yet in most cases the research has focused on the relative potential for restoration in 'urban' as opposed to 'natural' settings, rather than focusing on the differences in the potential for restoration in a range of 'natural' settings. In one study, (Herzog et al., 1997), distinguished between three categories of environment, 'sports/entertainment', typified by scenes such as bowling alley, crowded swimming pool and nightclub, 'ordinary urban', featuring scenes such as a street with heavy traffic flow, car parks filled with cars, and 'natural'. Although there were different images used here, ranging from field – forest views, some enclosed and some depicting open vantage points, these 'natural' settings were treated as one homogeneous category. Some earlier studies have made an attempt to assess the relative restorativeness of different natural settings, yet the categories used in these studies were broad and generic. These studies included varying the number of trees present in a site, (Kou et al., 1998), focusing on the degree of 'greenness' using just 3 categories, (Taylor et al., 2001), adding trees or not, (Sullivan & Taylor Lovell, 2006), and gauging preferences for three categories of riparian buffers; 'tree buffers', 'grass buffers', and 'no buffers', (Kenwick et al., 2009).

Two more recent studies (Martens et al., 2011; Van den Berg et al., 2014), have focused on restoration in relation to different natural environments. Focusing on two natural categories; 'wild' and 'tended' forests, Martens et al., (2011) considered whether the perceived attractiveness of a natural environment had an influence on well – being, as well as whether wild and tended forest conditions influenced well – being differently. Findings indicated different effects for the two woodland categories, with a stronger increase in 'positive affect' (good mood and calmness) and decrease in 'negative affect' (depression and anger) in the 'tended' condition. This appeared to confirm earlier findings, (Herzog, 2003) indicating that well – kept natural scenes were, 'especially restorative and tranquilizing', (Martens et al., 2011). This view might be deemed consistent with Nassauer's (1988) observation that neatness in urban planting was a prerequisite for attractiveness, although in the study by Martens et al., (2011), there was no significant relationship between perceived attractiveness and well – being. In contrast, (Van den Berg et al., 2014), found no significant differences in the relative restorativeness of three different woodland settings, (parkland, tended woodland, wild woods). In addition to the three 'natural' categories, this study also included one urban, (urban street) setting. Participants were pre - stressed by exposure to a scary movie, before being randomly allocated to one of the four categories and viewing a photo/video presentation in this category. Findings showed significant stronger participant recovery in the natural conditions than in the urban condition, yet differences in recovery between the natural conditions were not significant. As stated in the Introduction, a much more nuanced, fine – grained approach distinguishing between particular typologies of 'natural' setting is required.

2.7. Perception and preference for designed vegetation in the context of climate change

There is an urgent need for landscape architects throughout the world to respond to the changing climate of the twenty first century. Climate change has already had a profound impact on the distribution of plant and animal species throughout the world, with species migrating polewards or to higher elevations as temperatures rise, (Parmesan & Yohe, 2003, Parmesan, 2006, Hickling et al., 2006). In the UK current predictions for London in 2050 are for a climate similar to current day Bordeaux, eight degrees of latitude to the south, (Hitchmough, 2011), and many species currently used in UK urban planting design are becoming less climatically fit for their current locations. The increasing frequency and severity of summer drought in SE England will force adoption of extensive drought tolerant herbaceous or low shrub communities as an alternative to extremely unattractive 'summer brown' gang mown grass. In order to realise sustainable urban landscapes it may therefore be necessary to incorporate a wider range of 'non – native' or exotic species which have potential utility in terms of 'fitness' of plant species to a warming climate, so long as these are culturally acceptable. As the south of England experiences higher mean average temperatures plants originating in more southerly parts of Europe, or even the Mediterranean vegetation biome, including Australia or South Africa may be more adapted to survive in a sustainable system than native cool temperate species such as *Betula*. To date there has been no UK research specifically considering public response to non – native species in the context of this warming climate.

Patterns of preference for native and non – native species appear to be particularly complex and both temporally and culturally specific. In Britain urban domestic gardens dominated by non – native species contribute significantly to the area of designed greenspace; 23% in Sheffield (Thompson et al., 2003), rising to 35% in affluent parts of Merseyside (Pauleit et al., 2005). Designed vegetation in gardens and greenspaces involves 'unnatural' assemblages of native and alien species, resulting from an interaction of human design decisions (Pickett and Cadenasso, 2008) and spontaneous ecological processes, (Hitchmough, 2011). This designed vegetation is often taxonomically hyper - diverse, (> 900 species/ha in Sheffield, Smith et al., 2006). Research conducted in 60 domestic gardens in Sheffield, (Smith et al., 2003) indicated that 33% of garden plants were natives and 67% aliens, mainly from Europe and Asia, suggesting an acceptance of and perhaps preference for the use of non – native plant species amongst the UK population. Hitchmough, (2011), suggests that traditionally landscape professionals and householders with private gardens chose plants because they found them attractive or useful, rather than because they were native or non - native. This is consistent with findings from European work by Fischer et al., (2011), which indicated that whether or not a species is native plays only a small part in determining whether the public would like to see an increase in the population of that species.

In parts of the world most recently colonised by Europeans attitudes to non – natives are typically different, (Hitchmough, 2011), yet this has changed significantly from the early 20th century to the present day, corresponding to relationships with and attitudes towards the colonial power, (Jay and Stolte, 2011). In the case of New Zealand the conceptual/symbolic distinction of native versus exotic is significant, (Jay, 2004, 2005). In the first half of the 20th century native plants were viewed in a negative light as 'common' and 'aggressive' while northern hemisphere plants from Britain and North America were valued as rare and out – of –

the – ordinary. In the latter part of the 20th century native plants became widely fashionable, in parallel with New Zealand’s growing identity as an Australasian – Pacific nation, separate from Britain as the former colonial power, (Jay, 2002). A recent study of the human ecology of ravine restoration in New Zealand revealed an appreciation of New Zealand’s unique native flora and fauna as a motive for many ravine restorers (Jay & Stolte, 2011). Similar patterns of preference are observable in Australia where Head and Muir, (2006) considered attitudes and practices of 38 backyarders who lived adjacent to, or in close proximity to, bushland in the Sydney Basin Bioregion. A more recent Australian study of people’s preferences for different garden plants described earlier, (Kendal et al., 2012), conducted in Ballarat, SE Australia, revealed strong reactions to native plants, with some respondents strongly preferring them, and others strongly disliking them.

In a European context, the negative perception of non – native plant species is related to both perceptions of their invasiveness, as well as perceptions of the relative benefits of native over non – native species in terms of supporting as much native animal biodiversity as possible. Hitchmough, (2011) refers to a media representation of exotic plants as aggressive invaders that destroy native biodiversity, whilst native plants nurture biodiversity (Peretti, 1998). Contemporary evidence now refutes this claim, (Thomas & Palmer, 2015). This research has shown that in the case of plant communities, ‘non – native plants add to the British flora without negative consequences for native diversity’. Focusing on the compatibility of non – native plants and native invertebrates, current policy guidance, (DEFRA, 2008), reinforces the misconception that only native plants support native invertebrates. There is, however evidence, that urban gardens in the UK dominated by non – native exotic species do support rich native invertebrate communities, (Smith et al., 2006). The view that in terms of food supply only native plants can support native fauna is increasingly untenable (Owen, 1991, Shapiro, 2002, Smith et al., 2006). Many herbivorous insects do not rely on a single plant species for food, but feed on a wide range of taxonomically related plant species, (Hodgkinson and Hughes, 1982). In reality, there is considerable evidence that vegetation with greater complexity in terms of species diversity, phenology (Crisp et al., 1998, Asteraki et al., 2004) and spatial form (Smith et al., 2006a) is likely to offer more valuable habitats for native fauna than monocultural planting, even when non – native species are concerned (Hitchmough, 2011). Vegetation structure appears more important than the geographic origin of the species in determining habitat opportunities for invertebrates, (Siemann, 1998; Morris, 2000).

Literature reviewed in this section including 2.5. The importance of beliefs and values, 2.6. Individual psychological needs and Attention Restoration Theory, and 2.7. Perception and preference for designed vegetation in the context of climate change all leads to the second main research question. This asks how preferences are related to underlying beliefs and values in relation to the extent to which people value greenspace and biodiversity for its restorative qualities, people’s beliefs relating to climate change and the use of non – native planting in a UK context. The literature on climate change suggests that in the future many species used today in public planting schemes will no longer be sustainable, and the UK population appears receptive to ‘non – native’ species in their choice of many of these in their gardens. There is a tension between this and policy guidance which emphasizes the invasive nature of ‘non – native’ species. This work asks whether people are prepared to accept non – native planting and whether they would be more prepared to accept it if seen as a response to a changing climate.

2.8. Landscape perception, preference and biodiversity

As stated in the introduction, numerous studies have provided evidence for the mental and physical health and well – being effects of contact with ‘natural’ green spaces, relating the percentage of local green space to increased perceived general health, (De Vries et al., 2003; Maas et al., 2006). Walking in natural spaces has been related to increased positive affect, relaxation, and fascination, and decreased negative affect, (Nisbet & Zelenski, 2011), and time spent in a forest environment to decreased stress response, blood pressure, pulse rate and increased well – being, (Lee, et al., 2009). Other research has indicated that even window views of natural spaces decreased postoperative hospital stays, (Ulrich, 1984), and increased various aspects of well – being, (Kaplan, 2001). Gobster et al., (2007), and Fry et al., (2009) reflect theoretically on the links between aesthetics or visual landscapes and ecology. A shortcoming of much of this research has been its treatment of natural spaces as homogenous, (Velarde et al., 2007; Clark et al., 2014), yet over the last 10 years there has been an increasing attempt to evidence and understand the indirect health and well – being benefits of actual and perceived levels of biodiversity within green spaces. Fuller et al., (2007) identified a positive relationship between self – reported well – being and actual biodiversity levels, whereas Dallimer et al., (2012), found no such relationship, yet there was a positive relationship between well – being and perceived biodiversity levels. The measures of biodiversity used in these studies were plant, bird and butterfly species richness. (Clark et al., 2014) differentiate between direct and indirect (cultural) pathways for how biodiversity might influence human health, (Figure 3), and comment on the limited evidence, (above) for the latter, as well as its narrow focus on western developed nations, (Keniger et al., 2008).

In order to differentiate between the health and well – being benefits of different types or categories of natural environment, Clark et al., (2014) advocate an explicit focus on the biodiversity of a particular habitat or species. One study taking this approach was the ‘Beyond Greenspace’ project of the European Centre for Environment and Human Health in the UK, which aimed to investigate if different types of green space with varying biodiversity characteristics had different impacts on health and well – being. The study integrated two types of secondary data; firstly, health and socio – economic status data (such as census data), and secondly, indicators of ecological type, (eg. grassland, woodland, coast), and character, (in terms of biodiversity, ecosystem quality). This focus on ‘character’ might include reference to species richness, or soil fertility, or some other predecided measure. Although this approach addresses the limitation of considering all ‘natural’ environments as one homogeneous category, there are two key limitations of this work itself. Firstly, it fails to acknowledge the unknown lag time between exposure to green space and biodiversity and the resultant health benefits, and secondly, another major issue, particularly for the social scientist or landscape architect, is the lack of attention to human aesthetic response to the environment studied. As stated, there is a real need for more work focusing on the relationship between aesthetic response or perceived attractiveness, biodiversity and well – being.

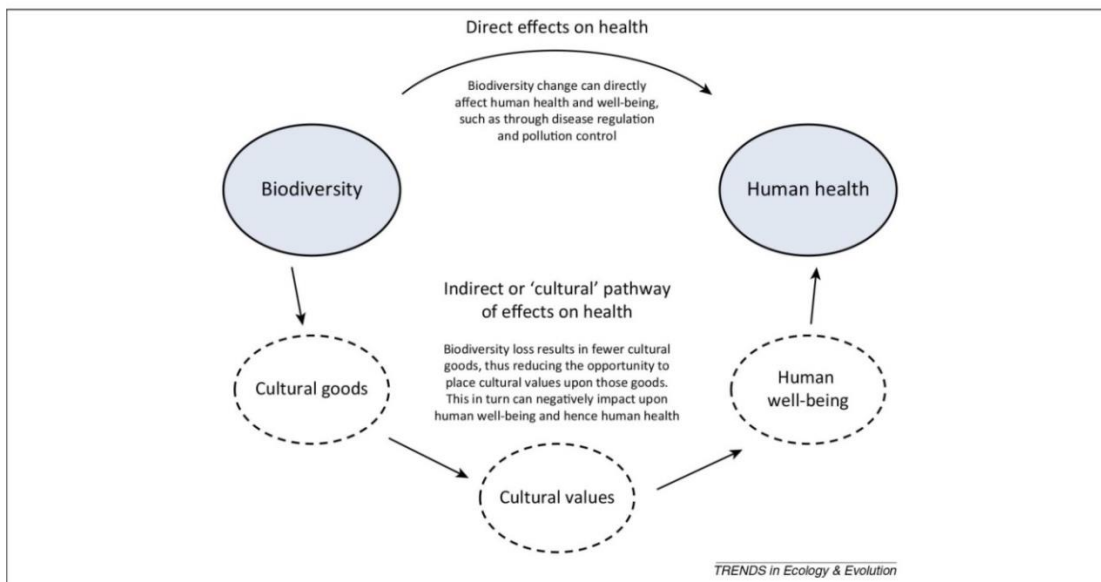


Figure 3: The direct and indirect (cultural) pathways from biodiversity to human health. Biodiversity change can directly affect human health such as through the regulation of the emergence and transmission of diseases, or via pollution control. Clark et al., (2014) propose that biodiversity change can indirectly impact on human health via cultural pathways. A loss in biodiversity affects the provision of cultural goods, which reduces our opportunity to realise the cultural value of these goods and negatively impacts on human well – being and consequently health, from Clark et al., (2014)

Addressing a clear gap in our understanding, this research aims to address the links between aesthetics, well – being and biodiversity. The final research question seeks to establish firstly whether or not there is a relationship between human perceived attractiveness of the planting and perceived biodiversity, secondly if there is a relationship between well – being and perceived biodiversity, and thirdly whether there is a relationship between perceived attractiveness and well – being.

3. Overall Research Aim

To assess public reaction to a range of designed landscapes; including woodland, shrub and herbaceous planting in order to inform future design decisions by both ecological value and consumer driven desire.

Working at the scale of human experience of designed urban planting, this study adopts a synthesising approach to landscape perception and preference, assessing the relative roles of the characteristics of the planting itself, human background socio – demographic factors, as well as people’s beliefs and values, in shaping their reactions. The work addresses the relationships between perceived attractiveness, biodiversity and well – being in the context of the warming twenty first century climate, in order to better equip the landscape architect of the future.

4. Research Questions

4.1. Are designed plant communities that look similar to semi – natural plant communities of that region more preferred than vegetation which looks dissimilar to semi – natural plant communities?

Two variables influencing ‘look’ include **Structure** and **Species Character**.

4.1.1. How is public perception and preference related to the structure of the planting?

Structure refers to the way in which different plant species are distributed through the planting, or ‘assembled’ to create the whole. In the case of woodland and shrub planting this refers to the complexity of vertical layering, ranging from simple single layered (eg specimen tree/shrub) to complex multi – layered (eg multi-layered woodland/shrub) system. The latter arrangement represents a semi – natural system, whereas the former is least like semi – natural. In the case of herbaceous planting ‘structure’ refers to the degree of horizontal mixing of species, ranging from discrete blocks of a single species to ‘mingled’ planting where species are mixed and distributed randomly through the planting as a whole. In this case the second scenario represents a semi – natural system and the first the least like a semi – natural one.

4.1.2. How do the public react to non – native species with very unfamiliar appearances?

Would they be accepting of these in UK public spaces?

Species Character is derived from the appearance of the species present and is likely to appear familiar or unfamiliar to the viewer in relation to the background often semi – natural vegetation of a region. It is related to the ‘nativeness’ of the planting, in that native UK species are likely to appear more familiar to UK citizens, and more exotic non – natives less so. Public response to character *embodies* learnt knowledge as well as untutored visceral reaction.

4.1.3. Are public perception and preference related to any further qualities of the planting such as flowering?

4.1.4. Is public perception and preference related to participants’ background factors such as age, gender and ethnicity?

Understanding the extent to which human reaction varies according to the age, gender, ethnicity or other background characteristics of the person perceiving the landscape is important for the landscape architect. Understanding such variations in response to planting between different user groups and potential user groups, allows the practitioner to design and specify in line with the varying needs and tastes of particular user groups.

4.1.5. How do people’s preferences vary with different levels of professional involvement with both nature conservation-biodiversity and landscape design?

4.1.6. Are these preferences based on factors such as the physical context of the planting or personal place attachment?

4.2. How are preferences related to people’s underlying beliefs and values in relation to the value of greenspace and biodiversity, global climate change and the value of non – native species?

4.2.1. Do people who already value urban greenspace and its biodiversity react differently to designed urban planting than others?

4.2.2. Does designed planting involving non – native species with very unfamiliar appearances become more accepted when it is viewed as part of a response to a radically changing climate?

4.3. Is there overlap between designed planting that is most preferred by people and planting that they perceive as the most biodiverse?

4.3.1. How are perceived attractiveness and perceived biodiversity related for people walking through areas of woodland, shrub and herbaceous planting?

4.3.2. How are psychological and physical well – being and perceived biodiversity related for people walking through areas of woodland, shrub and herbaceous planting?

4.3.3. How are perceived attractiveness and psychological and physical well – being related for people walking through areas of woodland, shrub and herbaceous planting?

5. Research Design and Methods

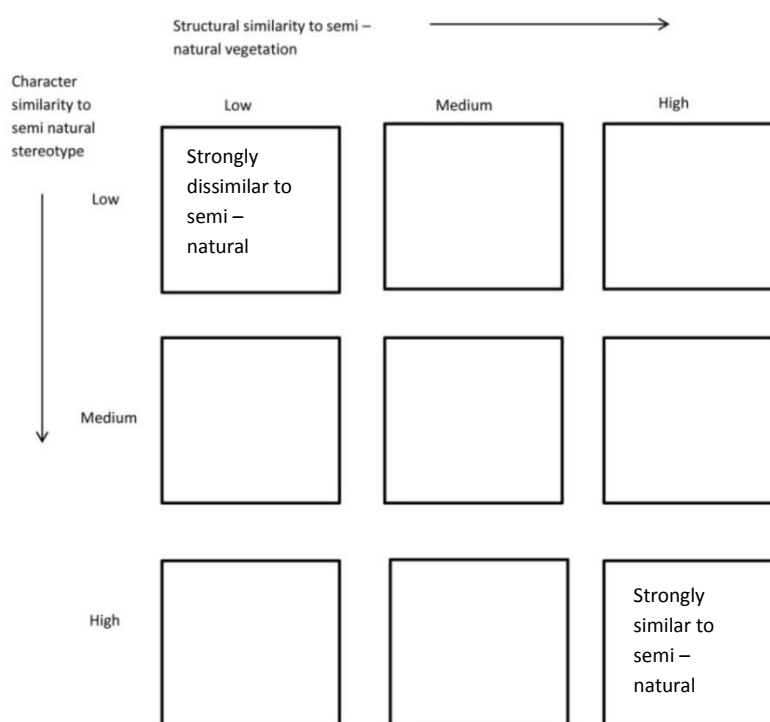
5.1. Overall experimental design

A two – stage, mixed – methods approach was used to assess public reaction to a range of urban woodland, shrub and herbaceous planting with varying structure and species character in relation to semi natural communities. This followed established methodology, (eg Jorgensen et al., 2007), where an initial large sample of respondents took part in a questionnaire survey, then a smaller subset of these volunteered to take part in a semi – structured in – depth interview. In this case questionnaires took place on – site, (eg. Martens et al., 2011). In the main, the questionnaire took the form of closed questions and attitudinal statements, also following established methodology, (eg. Ives & Kendal, 2013). Responses were analysed quantitatively. The initial questionnaire survey was designed to assess overall patterns in relation to public perception and preference of designed planting with specific structures and characters, yet closed questions and attitudinal statements reveal little of the reasons or feelings behind respondents’ reactions. The questionnaire results informed the design of the in – depth interviews, which explored respondents thoughts, beliefs and values in greater depth, in an attempt to understand why they reacted in particular ways to the planting stimuli. The interviews were more flexible and open, and were analysed qualitatively, using a method based upon established grounded theory practice, (eg. Gibson & Hartman, 2014).

5.2 Creation of a sampling framework based on vegetation structure and character relative to native/semi – natural stereotypes

The broad range of designed woodland, shrub and herbaceous planting possibilities was classified into a logical and consistent range of categories on the basis of structural and character similarities to semi-natural communities, (Figure 1: (a)).

Figure 1(a): Framework for categorisation of vegetation communities



This was achieved via a scaling method. Verbal descriptors were applied to each structure/character level along the scale from most to least natural. The combinations of specific structure/character criteria then defined the typologies, as shown in Figure 1 (b), (c) and (d). This ensured rigour and consistency in the next stage of the process, the identification of case study sites to populate the matrix. It also meant this method could be repeated in the future.

Figure 1 (b) Woodland typology descriptors

		Structural similarity to semi – natural vegetation →		
		Low	Medium	High
Character similarity to semi – natural vegetation ↓	Low	<p>Structure: single layer isolated mature trees in amenity grass/or under bedding. High degree of openness.</p> <p>Character: Exclusively/dominantly 'non – native' species with unfamiliar forms</p>	<p>Structure: Main canopy layer mature trees with single shrub layer, ground layer. Still a high degree of openness</p> <p>Character: Exclusively/dominantly 'non – native' species with unfamiliar forms</p>	<p>Structure: Multilayered woodland system. Main canopy mature trees, under canopy, shrub, field and ground layers</p> <p>Character: Exclusively/dominantly 'non – native' species with unfamiliar forms</p>
	Medium	<p>Structure: single layer isolated mature trees in amenity grass/or under bedding. High degree of openness.</p> <p>Character: Mixture 'non – native' species with unfamiliar forms and native UK species with familiar forms</p>	<p>Structure: Main canopy layer mature trees with single shrub layer, ground layer. Still a high degree of openness</p> <p>Character: Mixture 'non – native' species with unfamiliar forms and native UK species with familiar forms</p>	<p>Structure: Multilayered woodland system. Main canopy mature trees, under canopy, shrub, field and ground layers</p> <p>Character: Mixture 'non – native' species with unfamiliar forms and native UK species with familiar forms</p>
	High	<p>Structure: single layer isolated mature trees in amenity grass/or under bedding. High degree of openness.</p> <p>Character: Native UK species with familiar forms</p>	<p>Structure: Main canopy layer mature trees with single shrub layer, ground layer. Still a high degree of openness</p> <p>Character: Native UK species with familiar forms</p>	<p>Structure: Multilayered woodland system. Main canopy mature trees, under canopy, shrub, field and ground layers</p> <p>Character: Native UK species with familiar forms</p>

Figure 1 (c) Herbaceous typology descriptors

		Structural similarity to semi – natural vegetation →		
		Low	Medium	High
Character similarity to semi – natural vegetation ↓	Low	<p>Structure: Discrete ‘blocks’ of individual species within overall planted mass</p> <p>Character: Exclusively/dominantly ‘non – native’ species with unfamiliar forms</p>	<p>Structure: Repetition of ‘blocks’ of species throughout planted mass to create more mixed effect</p> <p>Character: Exclusively/dominantly ‘non – native’ species with unfamiliar forms</p>	<p>Structure: Random mixing of individual species within overall planted mass</p> <p>Character: Exclusively/dominantly ‘non – native’ species with unfamiliar forms</p>
	Medium	<p>Structure: Discrete ‘blocks’ of individual species within overall planted mass</p> <p>Character: Mixture ‘non – native’ species with unfamiliar forms and native UK species with familiar forms</p>	<p>Structure: Repetition of ‘blocks’ of species throughout planted mass to create more mixed effect</p> <p>Character: Mixture ‘non – native’ species with unfamiliar forms and native UK species with familiar forms</p>	<p>Structure: Random mixing of individual species within overall planted mass</p> <p>Character: Mixture ‘non – native’ species with unfamiliar forms and native UK species with familiar forms</p>
	High	<p>Structure: Discrete ‘blocks’ of individual species within overall planted mass</p> <p>Character: Native UK species with familiar forms</p>	<p>Structure: Repetition of ‘blocks’ of species throughout planted mass to create more mixed effect</p> <p>Character: Native UK species with familiar forms</p>	<p>Structure: Random mixing of individual species within overall planted mass</p> <p>Character: Native UK species with familiar forms</p>

Figure 1 (d) Shrub typology descriptors

		Structural similarity to semi – natural vegetation →	
		Low	High
Character similarity to semi – natural vegetation ↓	Low	<p>Structure: Single layer of shrubs (high/low) in grass/soil surface</p> <p>Character: Exclusively ‘non – native’ shrubs with unfamiliar forms</p>	<p>Structure: Multilayered system (high/low) with shrubs at different heights</p> <p>Character: Exclusively ‘non – native’ shrubs with unfamiliar forms</p>
	High	<p>Structure: Single layer of shrubs (high/low) in grass/soil surface</p> <p>Character: Dominantly/exclusively ‘native’ shrubs with familiar forms</p>	<p>Structure: Multilayered system (high/low) with shrubs at different heights</p> <p>Character: Dominantly/exclusively ‘native’ shrubs with familiar forms</p>

5.3. The Identification of Specific Case Study Sites for different structural x species character combinations within each vegetation type

In the case of each vegetation/landscape category; woodland, shrub and herbaceous perennials, a range of case study sites was identified to 'populate' the matrix, (Figure 1(a)) for these vegetation types. These sites represented a gradient from semi-natural designed stereotypes of native species (high similarity to semi-natural vegetation for both structural and character factors) through to designed vegetation where similarity was low for both structural and character factors. The latter was typically represented by horticulturally founded vegetation types.

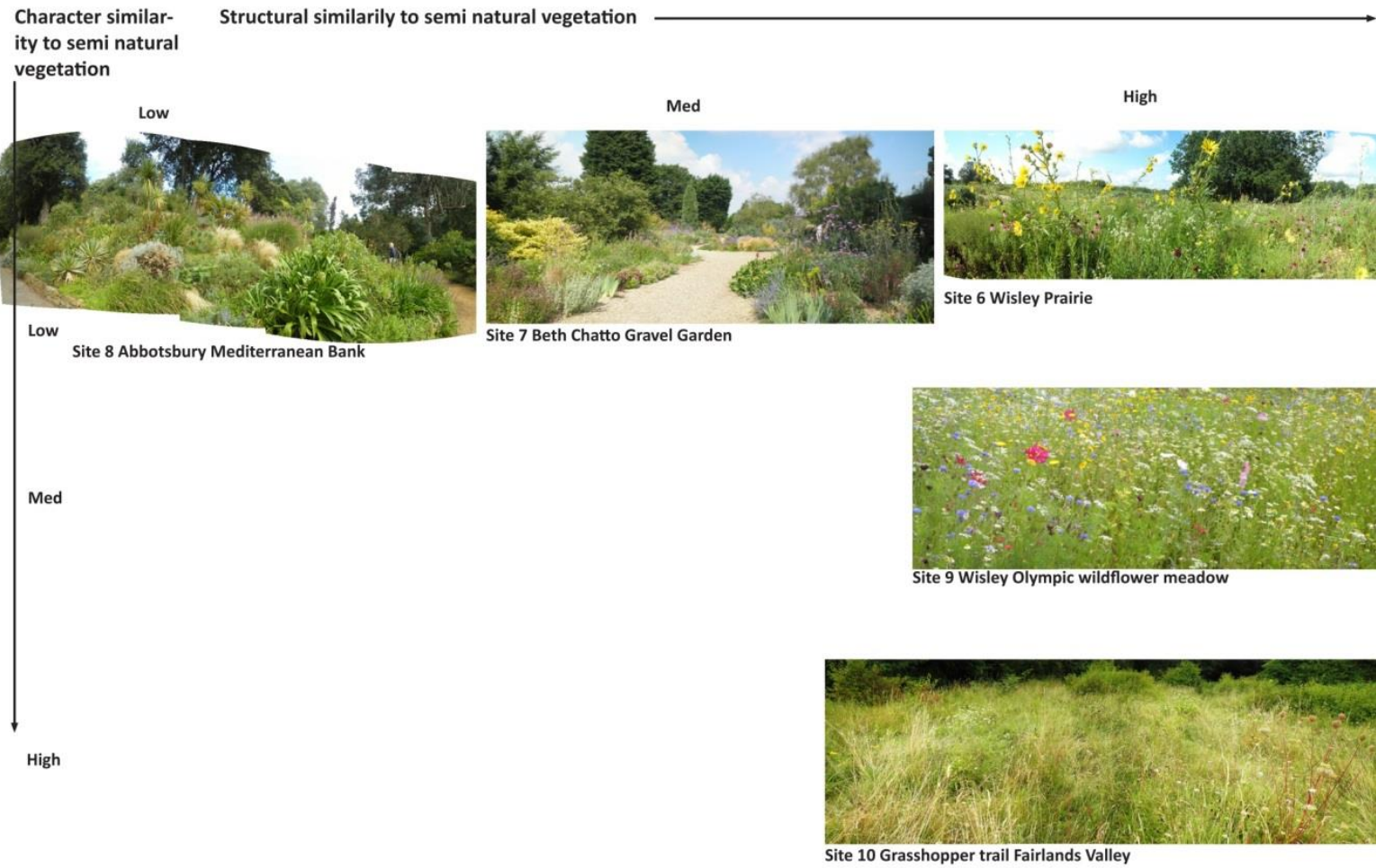
In the case of woodland and herbaceous communities all three levels of structure/character variability in relation to semi natural planting were represented in the case study sites, (Figures 2, 3). In the case of shrub communities, the medium level of similarity to semi natural vegetation was omitted, and only two levels were identified, i.e., high and low structural and character similarity to semi – natural vegetation, yet two sets of shrub planting were considered; low – growing shrub sites, and tall mounding shrubs (Figure 4). These sets represented the range of forms of shrub planting typically represented in public planting. In the case of herbaceous communities, again, two sets of contrasting planting were identified, firstly, planting on, productive moist sites, (Figure 3(a)) and secondly, that on unproductive dry alkaline sites (Figure 3 (b)). In this case the two sets represented contrasting physical environments, (i.e., soils and drainage) where different assemblages of species thrive. In the case of herbaceous planting, although all three levels of variability were represented, some cells in the matrix remained unpopulated due to the challenge of locating and accessing appropriate site



Fig.2: Case study woodland sites (n=13) selected to represent specific structure/character combinations in relation to semi – natural vegetation

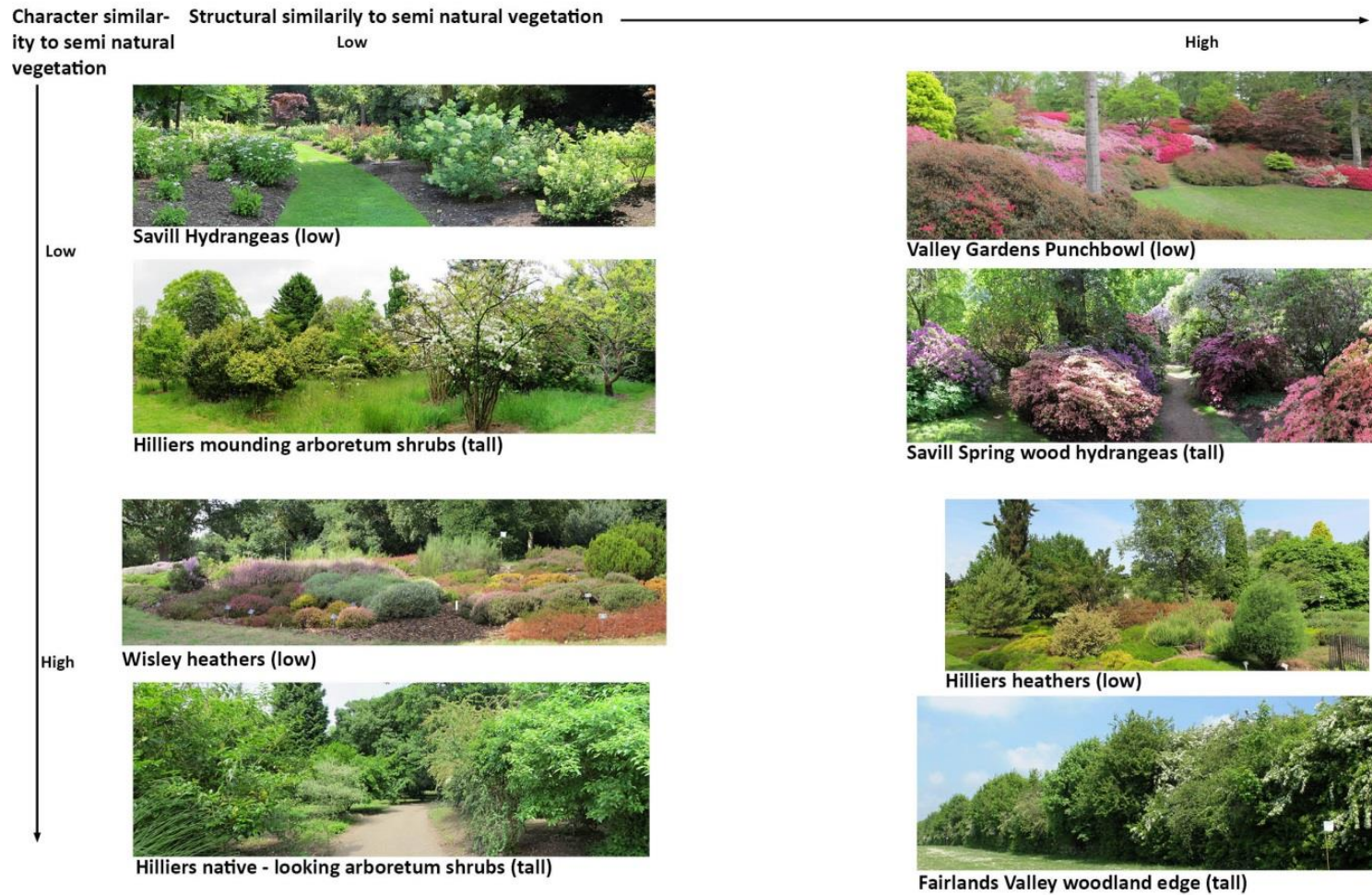
Figure 3: Case study herbaceous sites (n=10) selected to represent specific structure/character combinations in relation to semi – natural vegetation (a) Productive moist herbaceous sites (n= 5)





(b) Unproductive dry alkaline herbaceous sites (n= 5)

Figure 4: Case study shrub sites (n=8) selected to represent specific structure/character combinations in relation to semi – natural vegetation



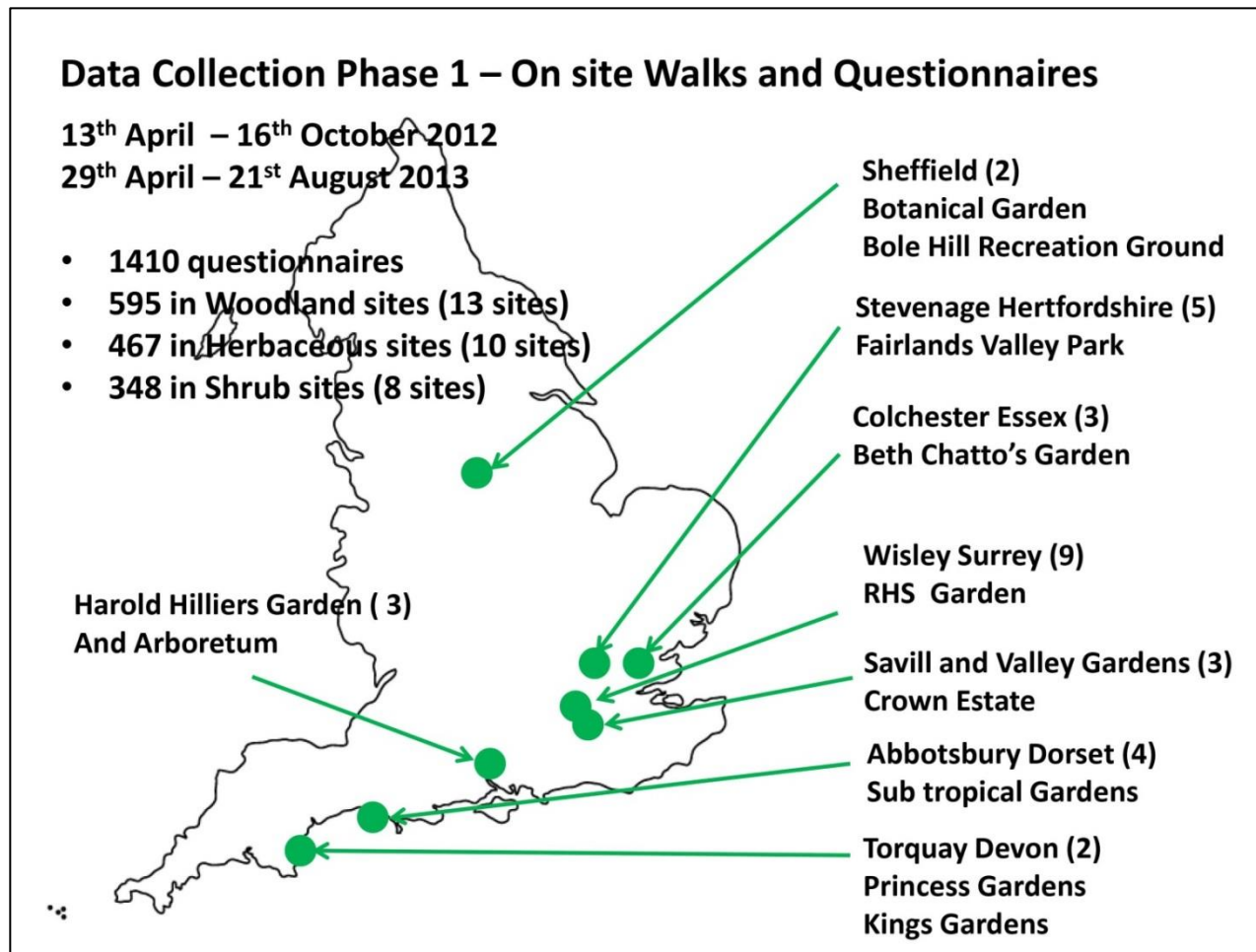


Figure 5: Geographical distribution of case study sites (n= 31) throughout England

In total, 13 woodland, 10 herbaceous and 8 shrub sites were sampled at 8 locations in England, (Figure 5). Sheffield was the most northerly location, hosting 2 sites. Most sites were located in the east (Beth Chatto’s Garden, Colchester, Essex,(3), Fairlands Valley Park, Stevenage, (5)), south east, (RHS Wisley, Surrey, (9), Savill and Valley Gardens, Crown Estate, (3)), south (Harold Hilliers Garden and arboretum, (3)), and south west, (Abbotsbury Subtropical Gardens, Dorset, (4), Princess Gardens and Kings Gardens, Torquay, (2)). This geographical spread facilitated the capture of the appropriate structure/character combinations, for example, it was necessary to travel as far south west as Dorset (Abbotsbury) and Torquay (Devon) to find near Mediterranean plantings and what are colloquially known as ‘sub – tropical’ species characters. Many locations, for example RHS Wisley in Surrey and Fairlands Valley Park in Stevenage, provided case study sites in multiple vegetation communities, for example 3 woodland sites, 1 shrub and 1 herbaceous site were all located within Fairlands Valley Park in Stevenage. These were all areas of planting with a high species character similarity to semi – natural vegetation.

Table 1 provides a summary of all 31 case study sites sampled in relation to different structure/character combinations. Of these, 10 sites were in public greenspaces in three geographically dispersed locations; Sheffield, Stevenage and Torquay, (5/13 x woodland sites, 2/8 shrub sites and 3/10 herbaceous sites). The remaining 21 sites were found in gardens such as RHS Wisley, where the public paid to enter, (8/13 woodland sites, 6/8 shrub sites, 7/10 herbaceous sites). In Table 1 these are referred to as, ‘private’, as they are not controlled by local authorities but by private managers, and the public does not have free access to the site. This private/public spread allowed access to both the necessary planting characteristics, i.e., the structure/character combinations, as well as providing socio - demographic diversity. The varying socio - demographic factors were both controlled for and analysed in the statistical analysis.

Table 1: Summary of all case study sites sampled showing structure/character similarity to semi – natural vegetation

- 1 = low structural/character similarity to semi – natural vegetation
- 2 = medium structural/character similarity to semi – natural vegetation
- 3 = high structural/character similarity to semi – natural vegetation

WOODLAND SITES				
Site No.	Structure Similarity to semi natural veg	Character Similarity to semi natural veg	Site	Private/Public site
1	3	1	Abbotsbury Jungle Ride	Private
2	2	1	Wisley Eucalypts	Private
3	1	1	Torquay Palms Princess Gardens (bedding)	Public
4	1	1	Torquay Palms Kings Gardens (no bedding)	Public
5	3	2	Wisley Wild Garden complex	Private
6	2	2	Wisley Battleston Hill semi complex	Private
7	2	2	Abbotsbury semi complex woodland	Private
8	2	2	Beth Chatto Woodland semi complex	Private
9	1	2	Wisley Arboretum	Private
10	1	2	Abbotsbury Arboretum	Private

11	3	3	Stevenage Monk's Wood complex	Public
12	2	3	Stevenage Monk's wood woodland trail semi complex	Public
13	1	3	Stevenage Fairlands Arboretum	Public
SHRUB (LOW GROWING MOUNDING) SITES				
Site No.	Structure Similarity to semi natural veg	Character Similarity to semi natural veg		
1	3	1	Punchbowl Azaleas, Valley Gardens	Public
2	1	1	Monocultural hydrangea planting Savill	Private
3	3	3	Hilliers heather garden – mixed shrub planting	Private
4	1	3	Wisley Erica, Calluna heather garden	Private
SHRUB (TALLER GROWING, MOUNDING, VARYING HEIGHT)				
Site No.	Structure Similarity to semi natural veg	Character Similarity to semi natural veg		
5	3	1	Spring Wood Savill big rhodos, camellias, magnolias	Private
6	1	1	Hilliers mounding arboretum shrubbery camellias, magnolias	Private
7	3	3	Native woodland edge Fairlands Valley Stevenage	Public
8	1	3	Hilliers native – looking arboretum shrubbery	Private
HERBACEOUS PRODUCTIVE MOIST SITES				
Site No.	Structure Similarity to semi natural veg	Character Similarity to semi natural veg		
1	3	1	Sheffield Botanic Garden Prairie	Public
2	2	1	Wisley Oudolf borders	Private
3	1	1	Wisley herbaceous borders	Private
4	2	2	Beth Chatto Wet Garden	Private
5	3	3	Sheffield Bole Hill Rec	Public
HERBACEOUS UNPRODUCTIVE DRY ALKALINE SITES				
Site No.	Structure Similarity to semi natural veg	Character Similarity to semi natural veg		
6	3	1	Wisley Prairie	Private
7	2	1	Beth Chatto Gravel Garden	Private
8	1	1	Abbotsbury Mediterranean Bank some flower	Private
9	3	2	Wisley Olympic wildflower meadow	Private
10	3	3	Stevenage Grasshopper trail Fairlands Valley	Public

5.4. On site walks and questionnaires with the visiting public

5.4.1. Questionnaire design

A questionnaire was designed to assess how human perception of and preference for designed urban planting are influenced by the structural and species character factors key to the research questions. Additional factors associated with the site and planting stimuli such as context, time of year, colour and flowering, familiarity, as well as background socio demographic factors such as age, gender, ethnicity, respondent levels of commitment to or involvement with both nature conservation-biodiversity and landscape design knowledge were explored through the questionnaire. Respondents' beliefs and values in relation to climate change, the role of non – native species in UK planting and environmental issues in general, were also addressed.

The questionnaire consisted of four sections; 'the Context', (perspectives on the site in relation to its locational context, distance travelled to the site, frequency of visits and motivation for site visit), 'the Walk', (focus on respondents' visual response to the planting through which they were walking, considering attractiveness, level of care and perceived biodiversity value), 'Your Thoughts' (beliefs and values, as outlined above), and 'You', (the respondent's socio demographic profile). The majority of questions took the form of attitudinal statements, using a five point Likert scale from +2 (agree strongly) to -2 (disagree strongly), following established methodology, (eg. Ives & Kendal 2013.).

At the end of the questionnaire respondents were invited to leave their email address or telephone number with a view to taking part in a follow – up interview.

Eight drafts of the questionnaire were produced prior to its submission to the ethics committee in the Department of Landscape at the University of Sheffield.

The questionnaire is included in the appendix.

5.4.2. Practical on – site procedure and pilot

In order to assess the attitudes of visitors to these sites in which designed vegetation types occur, short (approximately 30m) walks were established through sections of planting within the case study site which most accurately represented the desired structure/character combination. Walks were marked out unobtrusively with cane 'flags' indicating the start and finish of a walk, (Figure 6 (a)).

Members of the visiting public were then invited to experience the specific character/structure combination first hand, by walking through the planting and at the same time, or shortly afterwards, completing the self – guided questionnaire described above. Potential respondents were approached and asked if they wanted to take part in landscape research focusing on public perception of designed planting. It was explained that the walk and questionnaire would take 15 – 20 minutes and that it was entirely voluntary, and that they could leave at any time during the process. Respondents were given their own clipboard with a questionnaire, information sheet and pen before starting the walk. The researcher was on hand to answer any questions and offered to complete the survey with the interviewee if he/she said they had forgotten their glasses or showed reluctance to read the questionnaire. It was thought that allowing the respondents to complete the questionnaire themselves would give them chance to go at their own pace and to engage more fully with the planting without feeling any

pressure from the researcher. If possible walks were designed with convenient benches or seating at the end, which allowed respondents to sit, reflect on the walk and complete the questionnaire in relative comfort, (Figure 6 (b)).

The use of specific sites at particular locations was planned in collaboration with curators and managers at 'private' locations such as RHS Wisley or Abbotsbury Subtropical Gardens. Local authorities were consulted in the case of public sites such as Fairlands Valley Park in Stevenage and the seafront gardens in Torquay. To date the majority of landscape research focusing on public perception and preference has relied on the use of photographs (eg. Purcell & Lamb, 1998), or digitally manipulated images, (eg. Jorgensen et al., 2002, Todorova et al., 2004), rather than exposing respondents to a first – hand experience of the planting, as here. There is considerable evidence that experiencing landscapes directly rather than by looking at a photograph produces a different result (Scott and Canter, 1997), probably because direct experience is immersive and therefore more holistic. The method of on – site walks used in this study was also used by Martens et al., (2011), where recruited participants were asked to walk through areas of 'wild' or 'tended' forest and questionnaires were administered before and after the walk.

Figure 6: On – site walks at RHS Wisley Surrey, (a) and Fairlands Valley Park Stevenage, (b).



(a) Walk route marked with cane ‘flags’ at Battleston Hill, RHS Wisley



(b) Respondents conducting self – guided questionnaire in Fairlands Valley Park Stevenage

In April and May 2012, the walk and questionnaire were piloted in woodland areas at RHS Wisley and at Fairlands Valley Park Stevenage, with total of 113 questionnaires completed at 5 separate sites. The different sites sampled at the two locations represented contrasting levels of structural complexity. The objective of the pilot was to gauge public response to both the walking experience itself and to the questionnaire, particularly with a view to improving its design. After the pilot some minor changes were made to the wording of two questions and the layout of the questionnaire

5.4.3. Sampling strategy and respondents

The sampling strategy was designed to capture the views of a range of respondents who were users of the sites. Thirteen of the sites were sampled twice, at different times of year, either in spring, then in summer/autumn, or in summer then in autumn, in order to assess seasonal differences in public response., (Fig. 7). This included six woodland sites; Abbotsbury Jungle Ride, Wisley Wild Garden, Wisley Battleston Hill, Wisley Arboretum, Stevenage Monks wood semi – complex, and Fairland Valley arboretum, Stevenage, three shrub sites; the Punchbowl at the Valley Gardens, the hydrangeas Savill Garden, Spring Wood, Savill garden, and four herbaceous sites; Bole Hills in Sheffield, Wisley Prairie, the Mediterranean Bank at Abbotsbury and Stevenage grasshopper chalk meadow. It would have been advantageous to capture the views of non – users, particularly to identify and understand the reasons why these individuals and groups did not use the sites, and if this was in any way related to the planting. This was the original aim of the study, yet it was realised part way through the fieldwork phase that it would be difficult to compare findings from an on-site walk through the planting with data generated via a remote photo – based questionnaire, after Ulrich, (1983).

Figure 7: Examples of sites sampled in different seasons



Wisley Wild Garden April 2012



Wisley Wild Garden September 2012



Wisley Arboretum April 2012



Wisley Arboretum September 2012

(a) Woodland sites: The Wild Garden and Arboretum, Wisley



Savill Spring Wood Rhododendrons April 2013



Savill Spring Wood Rhododendrons June 2013



Valley Gardens Punchbowl May 2013



Valley Gardens Punchbowl August 2013

(b) Shrub sites: The Punchbowl and Spring Wood, the Crown Estate



Abbotsbury Mediterranean Bank July 2013



Abbotsbury Mediterranean Bank September 2012

(c) Herbaceous site: Mediterranean Bank, Abbotsbury

As indicated in Table 2, a grand total of 1410 on-site walks and questionnaires were completed across all sites and vegetation communities during spring, summer and autumn 2012 and 2013. This comprised 595 at 13 different woodland sites, 347 at 8 different shrub sites and 486 at 10 different herbaceous sites. Table 2 also shows the number of on - site walks and questionnaires completed at each site on a specific date. The intention was to collect data from 30 respondents at each case study site. The highest number of questionnaires collected at a particular site in a particular season was at the woodland site of Abbotsbury Jungle Ride, (70), on 10 September 2012. The lowest number of questionnaires collected at a particular site in a particular season was at Stevenage Monk's wood semi complex woodland (5), on 16th May 2012. The mean number of walks and questionnaires completed at a site in one season, usually on one day, was 33. Higher numbers of respondents were generally available at private garden sites, where members of the public had entered with a view to spending a leisurely day looking at planting, whereas public sites such as parts of Fairlands Valley Park in Stevenage and Bole Hills in Sheffield were dominated by dog walkers or those walking through the site to work, the shops or college, who were often less prepared to spend time completing a questionnaire.

Table 2: Summary of Questionnaire Data collected in 2012 and 2013

WOODLAND SITES				
Site No. (No. questionnaires)	Structure Similarity to natural veg	Character Similarity to natural veg	Site	Date(s) Collected
1.1 (70)	3	1	Abbotsbury Jungle Ride (Sept 12)	10 Sept 12
1.2 (32)	3	1	Abbotsbury Jungle Ride (July 13)	14 July 13
2 (40)	2	1	Wisley Eucalypts	15 Oct 12
3 (43)	1	1	Torquay Palms Princess Gardens (bedding)	2 Oct 12
4 (18)	1	1	Torquay Palms Kings Gardens (no bedding)	3 Oct 12
5.1 (28)	3	2	Wisley Wild Garden complex (Spring pilot)	16 April 12
5 (36)	3	2	Wisley Wild Garden complex	27 –28 Sept 12
6.1 (31)	2	2	Wisley Battleston Hill semi complex (Spring pilot)	13 April 12
6 (38)	2	2	Wisley Battleston Hill semi complex	27 Sep 12
7 (35)	2	2	Abbotsbury semi complex woodland	12 Sept 12
8 (16)	2	2	Beth Chatto Woodland semi complex	15 Aug 12
9.1 (27)	1	2	Wisley Arboretum (Spring pilot)	13 April 12
9 (22)	1	2	Wisley Arboretum	28 Sept 12
10 (45)	1	2	Abbotsbury Arboretum	11 Sept 12
11 (30)	3	3	Stevenage Monk's Wood complex	16 Oct 12
12.1 (5)	2	3	Stevenage Monk's wood woodland trail semi complex (Spring pilot)	16 May 12
12 (26)	2	3	Stevenage Monk's wood woodland semi complex	29 Sept 4 Oct 12
13.1 (22)	1	3	Stevenage Fairlands Arboretum (Spring pilot)	11 May 12
13 (31)	1	3	Stevenage Fairlands Arboretum	25 Sept 12
Total woodland = 450 (2012)+ 32 (2013) + 113 (pilot) = 595				
SHRUB (LOW GROWING MOUNDING) SITES				
Site No. (No. questionnaires)	Structure Similarity to natural veg	Character Similarity to natural veg	Site	Date(s) Collected
1.1 (37)	3	1	Punchbowl Azaleas, Valley Gardens in flower	13 May 13
1.2 (30)	3	1	Punchbowl Azaleas, Valley Gardens no flower	1 Aug 13
2.1 (36)	1	1	Monocultural hydrangea planting Savill no flower	4 June 13
2.2 (36)	1	1	Monocultural hydrangea planting Savill in flower	1 Aug 13
3 (34)	3	3	Hilliers heather garden – mixed shrub planting	27 June 13
4 (31)	1	3	Wisley Erica, Calluna heather garden	20 Aug 13
Total = 204				
SHRUB (TALLER GROWING, MOUNDING, VARYING HEIGHT)				
Site No. (No. questionnaires)	Structure Similarity to natural	Character Similarity to natural veg	Site	Date(s) Collected

	veg			
5.1 (34)	3	1	Spring Wood Savill big rhodos, camellias, magnolias some flower	29 April 13
5.2 (19)	3	1	Spring Wood Savill big rhodos, camellias, magnolias in flower	4 June 13
6 (32)	1	1	Hilliers mounding arboretum shrubbery camellias, magnolias	10 June 13
7 (37)	3	3	Native woodland edge Fairlands Valley Stevenage	23, 31 May 13
8 (21)	1	3	Hilliers native – looking arboretum shrubbery	27 June 13
Total = 143				
Total Shrub = 347				
HERBACEOUS PRODUCTIVE MOIST SITES				
Site No. (No. questionnaires)	Structure Similarity to natural veg	Character Similarity to natural veg		
1 (39)	3	1	Sheffield Botanic Garden Prairie	18 Sept 12
2 (33)	2	1	Wisley Oudolf borders	14 Aug 12
3 (41)	1	1	Wisley herbaceous borders	16 Aug 12
4 (38)	2	2	Beth Chatto Wet Garden	15 Aug 12
5.1 (23)	3	3	Sheffield Bole Hill Rec (Sept 12)	19-20 Sept 12
5.2 (27)	3	3	Sheffield Bole Hill Rec (Aug 13)	7,8 Aug 13
Total 174 (2012) + 27 (2013) = 201				
HERBACEOUS UNPRODUCTIVE DRY ALKALINE SITES				
Site No. (No. questionnaires)	Structure Similarity to natural veg	Character Similarity to natural veg		
6.1 (51)	3	1	Wisley Prairie (Aug 12)	14 Aug 12
6.2 (45)	3	1	Wisley Prairie (July 13)	12 July 13
7 (39)	2	1	Beth Chatto Gravel Garden	10 Aug 12
8.1 (33)	1	1	Abbotsbury Mediterranean Bank some flower (Sept 12)	12 Sept 12
8.2 (31)	1	1	Abbotsbury Mediterranean Bank in flower (July 13)	13 July 13
9 (31)	3	2	Wisley Olympic wildflower meadow	16 Aug 12
10.1 (30)	3	3	Stevenage Grasshopper trail Fairlands Valley (Sept 12)	4-7 Sept 12
10.2 (25)	3	3	Stevenage Grasshopper trail Fairlands Valley (July 13)	8, 9 July 13
Total 184 (2012)+ 101 (2013) = 285				
Total herbaceous = 486				
Woodland (595) + Shrub (347) + Herbaceous (468)= Total 1410				
2012 (including pilot) - 921 , 2013 - 451				

As expected, the socio – demographic composition of the sample did not reflect that of the UK population as a whole, but was probably an accurate representation of the site users, and was skewed towards the older age groups. There was a lack of ethnic diversity. A summary of the

socio - demographic profile of questionnaire respondents is provided in the questionnaire results section.

5.4.4. Statistical analysis of questionnaire data

All questionnaire data were analysed using SPSS version 20. Statistical analysis was carried out to assess the relative importance of planting stimuli, (eg.structure, character, flowering and colour), background factors (e.g. ethnicity, gender and age, educational qualifications), and beliefs and values in influencing respondents' perceptions and preferences. A sequential process of analysis was carried out, as summarised below, involving a Principal Components Analysis, (PCA), followed by an Analysis of Variance using the components/factors emerging from the PCA. ANOVA results were then interpreted using post hoc multiple comparisons with the Sidak correction. These methods are described below. Initially, the whole combined data set for all vegetation communities was analysed together, then data were separated into woodland communities, shrub communities and herbaceous communities, for more detailed and specific analysis. The results and analysis are presented in this order in the following section. Finally, in order to establish whether or not there was an overlap between vegetation most preferred by people and the planting they perceived as the most biodiverse, Pearson's product – moment correlations were carried out between respondents' perceptions of the attractiveness of the planting, plant and invertebrate biodiversity and their own well-being.

i) Principal Components Analysis

The initial phase of analysis involved the use of variable attitudinal statement scores to carry out a principal components analysis on respondents reactions to the 'walk', i.e., responses to planting itself, and their 'thoughts', i.e., their beliefs and values. The questionnaire presents multiple attitudinal statements and poses different questions concerning respondents' perceptions of the walk. It addresses their thoughts or beliefs about certain issues in the same way. Many of these individual statements and questions are closely correlated, and it is a challenge to unravel the complexity of these correlations.

One method of doing this, to pick out the complexity of the variability and to see the ways in which people answered questions differently, is to use a principal components analysis. What it does is look for the combination of variables that encompasses the most variance (information) within it. Statistically the 'variance' actually measures how far a set of numbers are spread out; it will be small if data are all clustered around the mean, and large if data points are spread out in relation to both the mean and to each other. These variables tend to vary in the same direction for a given individual. The combination of variables identified in this manner is referred to as a 'factor'. This is an established method of analysis, (e.g., Todorova et al., 2004). A similar approach was used by Dallimer et al., (2012) in a study into understanding the relationship between self – reported human well – being and species richness.

Principal components analysis was used rather than factor analysis because the analysis was exploratory. Factor analysis presupposes a certain number of factors, whereas we were unsure of how many components/factors would emerge. Principal components analysis is a standard technique used by social scientists for exploratory factor analysis. A varimax rotation was used in the analysis. This is a technique used to aid data interpretability. This rotates the dimensions so that a few high scoring variables (eg attplant, colour) weigh onto the components or factors. Before the analysis was performed a Pearson's product – moment correlation was carried out with all the variables, to ensure 'factorability' of the variables was feasible. The majority of

variables correlated with at least one other variable at 0.3 or above, indicating that factorability was feasible.

Factors are arranged in descending order of variance (information). For example, in the case of 'all vegetation communities', the combination of variables in Factor 1 (Walk variables) explained 30.577% total variance. Variables that were strongly represented were 'colourful', 'colcomb', 'attplant', 'intplant' and 'bees'. These variables have commonality around colour, attractiveness and invertebrate presence, hence Factor 1, was named 'colour, attractiveness and invertebrate presence'. A complete list of variable descriptors is found in the questionnaire results section.

The 'factors' emerging from the principal components analysis also informed the design of the in – depth interviews, as these were the key, 'themes' to emerge from the questionnaire data analysis.

ii) Analysis of Variance

Following the principal components analysis, multifactor analysis of variance was conducted using the Walk principal components factors as dependent. This was carried out to identify the percentage contribution of each planting, motive and background variable, as well as the thoughts PCA factors, to the overall variability of respondents' perceptions of planting along the walk. The walk PCA factors represent respondents' perceptions along the walk.

A two stage ANOVA was carried out. Firstly, single factor ANOVAs were done to identify which variables were significant. In the second stage, a multifactor ANOVA was carried out, to isolate the independent main effects of each individual variable, such as 'structure', 'character' and 'flowering'. This means that the extent to which each individual variable was driving the responses was measured and reported.

iii) Interpretation of ANOVA results using post hoc multiple comparisons with the Sidak correction.

Once the independent effect of each significant variable had been identified using a two stage analysis of variance, as explained above, post hoc multiple comparisons were carried out to distinguish where there were significant differences between groups or categories, facilitating interpretation of the results. The Sidak is used as a method of correcting the probability of comparing two subgroups. It is a method for altering the 'P' value to take into account the fact that multiple comparisons are being conducted.

The results of these multiple comparisons are reported in Part 2 Sections 1 – 4. The labels 'a, b, c, d, e' are used to indicate Sidak groups with significant differences. In the example below, (Table 3), focusing on differences between different vegetation communities, herbaceous planting was perceived as significantly different to shrub planting in terms of Colour, attractiveness and invertebrate presence. We know this because Herbaceous planting is labelled 'a', and Shrub planting 'b'. Woodland planting, however, is not significantly different to either Herbaceous or Shrub in terms of these perceptions. It is labelled 'a,b' because in some respects it is perceived as similar to Herbaceous planting, (a), and in others Shrub planting, (b), hence the label 'ab'.

Table 3: Example of Sidak labelling

The effect of Vegetation Community (Woodland, Shrub or Herbaceous planting) on respondents' perceptions of their walk.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Vegetation Community (marginal mean score) and Sidak scores a,b,c		
			Woodland (1)	Shrub (2)	Herbaceous (3)
Factor 1 Colour, attractiveness and invertebrate presence	P = <0.001	4.5	Intermediate (-0.199), a,b	Lowest (-0.327), b	Highest (-0.151), a

'a,b,c' indicate Sidak groups showing significant differences

iv) Pearson's product – moment correlations between perceived attractiveness and perceived biodiversity, well-being and perceived biodiversity and perceived attractiveness and well-being.

In order to establish the relationship between human preference and perceived biodiversity, and to clarify the relationship between attractiveness and well – being, three Pearson's product – moment correlations were carried out; firstly between perceived attractiveness and perceived plant and invertebrate biodiversity, secondly between respondent's psychological and physical well-being and perceived biodiversity and thirdly between perceived attractiveness and psychological and physical well-being.

5.5. In depth semi – structured on – site interviews with the public

5.5.1. Interview design

In-depth, semi-structured interviews were conducted with a sub-set of the original respondents who had completed the on-site walks and questionnaires in order to better understand and interpret the range of factors affecting perception and preference. Exploratory principal components analysis of questionnaire data confirmed that the initial research themes 'attractiveness', 'feeling relaxed', or a sense of physical/psychological well-being, tidiness, insect biodiversity, flowering and colour, were meaningful in terms of our respondents' perceptions. These themes informed the content and approach of the semi-structured interviews. Interviews were designed to address the themes in relation to the planting structure and character, yet other themes were allowed to emerge. Pre-determined research themes relating to respondents' thoughts and beliefs were also addressed. These included beliefs in relation to climate change, non – native plant species and broader environmental issues.

A flexible approach to this part of the interview allowed interviewees the opportunity to focus on additional issues relevant to them personally. The semi – structured interviews were conducted after a method described by Mason, (2002), where three core features are crucial to the process;

1. An interactional exchange of dialogue between interviewee and interviewer. In this case interviews were conducted face to face
2. The use of a relatively informal interview style, described as, 'conversations with a purpose', Burgess, (1984)
3. A thematic approach, where the researcher has a number of starting points or themes which they intend to cover during the interview. It is unlikely there will be a fully

sequenced set of questions. This allows the interviewer to choose the order of the themes discussed according to how the interview progresses. The structure should therefore be fluid and flexible, allowing unexpected themes to emerge.

More specific detail concerning the content and structure of the interviews is provided in the introduction to interview results and analysis, and a generic set of interview 'questions' is provided in the appendix.

5.5.2. Practical procedure and pilot

Thirty four semi – structured interviews were conducted from 20th March – 31st July 2014, with a sub – set of the original respondents who had completed the on-site walks and questionnaires in 2012 or 2013. With the exception of the three interviews focusing on the two Sheffield sites, where the interviews took place in the Department of Landscape in the Arts Tower, all interviews were conducted in the locations of the original walk sites. These included Abbotsbury Subtropical Gardens, Hilliers, Beth Chatto's Garden, RHS Wisley, The Crown Estate, Torquay seafront and Fairlands Valley Park in Stevenage. The interviews were carried at the original walk sites because it was thought that these should be relatively accessible to most interviewees, as they had originally visited the site on the day of the questionnaire, in 2012 or 2013. It was also thought that the experience would be more holistic or immersive, and that interviewees would be more likely to recall and remember their original walk through the planting if they returned to the walk venue. This generally proved successful, yet many questionnaire respondents had been on holiday when visiting sites such as Abbotsbury, and were therefore unavailable for a follow – up interview on a specific date.

In the case of the garden locations, indoor office/meeting room/café locations were arranged and booked on specific dates in collaboration with the garden curators. In the case of the two public locations, eg., Fairlands Valley Park, Stevenage, appropriate indoor/outdoor café locations were used and the café owners were contacted beforehand to seek permission. Interviews within the garden venues such as RHS Wisley and Hilliers proved more straightforward to administer, as the venues were mainly indoors, comfortable, with tables available to accommodate photographs, notebook and recording equipment. Outdoor venues were often windy, so photographs blew away, and café's such as Fairlands Valley and at Abbotsbury gardens were often noisy, sometimes with children screaming and dogs barking. Potential interviewees were offered refreshments such as tea and coffee, cold drinks and snacks, but were not offered any further remuneration or travel expenses.

All interviews were audio – recorded and later transcribed in full.

The three interviews conducted in the Landscape Department at Sheffield were considered pilot interviews, yet these were incorporated into the final data set.

5.5.3. Sampling strategy and respondents

The intention was to conduct one interview per 'walk site' (31 in total), but this proved impossible, as did sampling across the age range and achieving a balance between male and female interviewees. Questionnaire respondents' contact details were obtained for all 31 sites, yet many failed to reply to emails and phone calls, and others were unavailable for interview on the appointed dates. In total, 34 Interviews were conducted representing walks at 24 sites. Nine interviewees were carried out with respondents who had originally walked through woodland sites, (5xM, 4xF), 8 with respondents who had walked through shrub sites,

(4xM, 4xF) and 17 with those who had walked through herbaceous sites, (5xM, 12xF). In some cases two or even three interviewees originally walked through the same area of planting, e.g. Wisley Wildflower meadow, as these individuals were very keen to take part in the interview process. This sample partially reflected the socio – demographic characteristics of the questionnaire respondents in that the older age groups dominated and there was a lack of ethnic diversity. In addition, there was a gender imbalance, with 20/34 (59%) female interviewees, as opposed to only 14/34 (41%) male. The sample is particularly unrepresentative of the wider public in that 5/34 (15%) respondents had been or were currently working in landscape/environmental professions. These questionnaire respondents were more willing than many others to take part in an interview because they were particularly interested in the subject matter of the research. A full socio – demographic profile of interviewees is provided in the results section.

5.5.4. Interview analysis

The interview transcripts were analysed using a technique referred to as ‘structural coding’, (Saldana, 2013). In this case research themes informed by the questionnaires and pre – determined research themes relating to respondents’ thoughts provided an initial broad framework for categorisation of interviewees’ comments (extracts). Within this broad framework, extracts taking a particular slant or standpoint were grouped together. This involves the use of an indexing system to categorise data, as practised by MacQueen et al., (1998). Recurring emergent themes were flagged up for particular attention, and extracts again classified according to interviewees’ responses.

5.6. The Structure of the Results, Analysis and Discussion

The write –up of the questionnaire and interview results and analysis are presented in sequence, as shown in Figure 8. The discussion integrates findings from both questionnaire and interview analysis, and is organized in terms of the three main research questions.

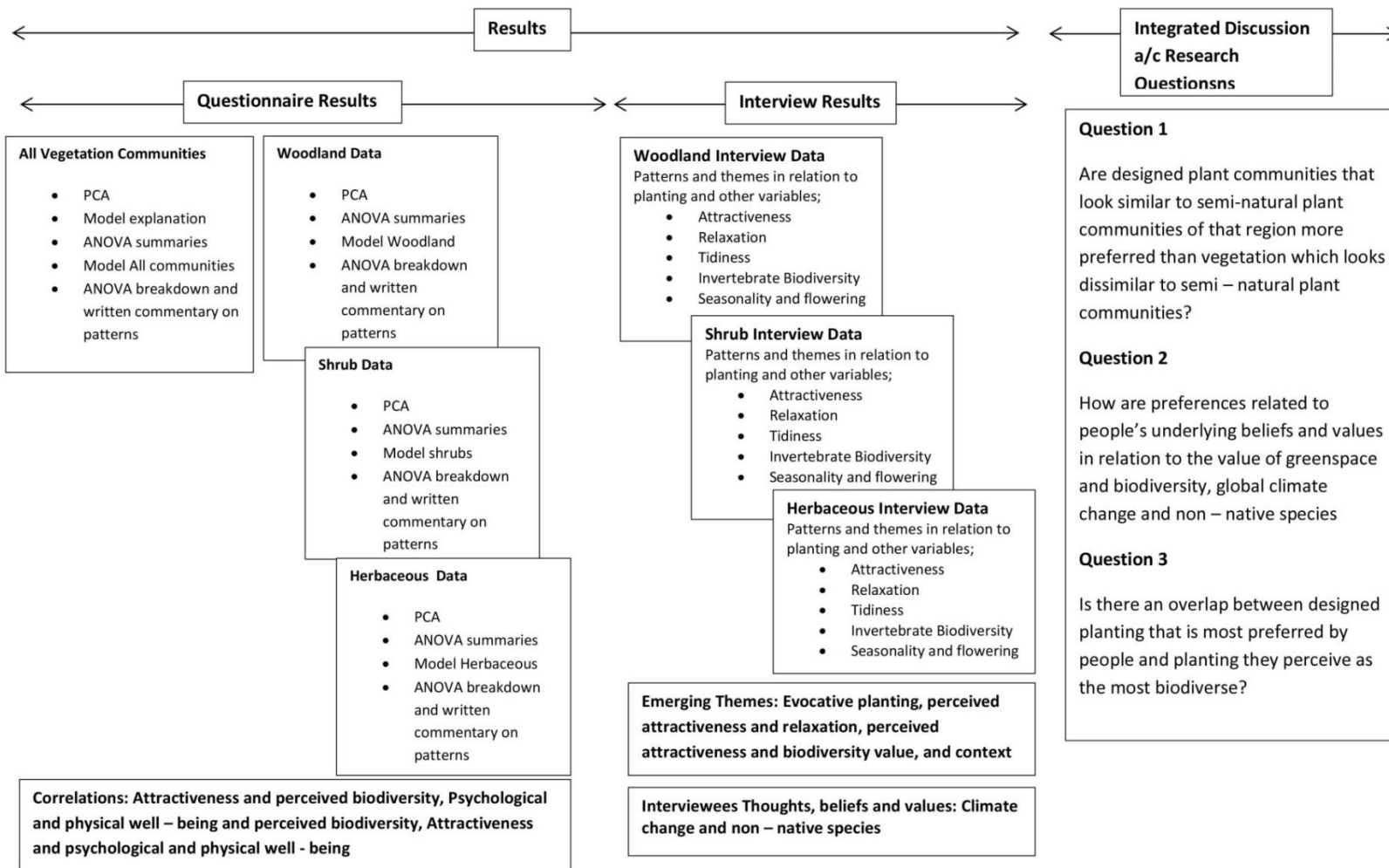


Figure 8: The Structure of the Questionnaire and Interview Results, Analysis and Discussion

Part Two

Public Perception of Planting: On site Questionnaire Results, Statistical Analysis and Interpretation

Introduction

As stated in the Research Design and Methods, a grand total of 1410 on - site walks and questionnaires were completed across all sites and vegetation communities during spring, summer and autumn 2012 and 2013. This comprised 595 at 13 different woodland sites, 347 at 8 different shrub sites and 486 at 10 different herbaceous sites.

Table 1 focuses specifically on the socio - demographic composition of the questionnaire respondents.

The gender balance of the questionnaire sample was uneven, with more females than males; (37.5% male, 62.5% female overall). Older respondents outnumbered younger respondents, with over half the sample being drawn from the two oldest age groups, (59.1% were 55 and older). Only 14.1% respondents were from the two youngest age groups, (18 – 34). In terms of ethnicity, white British respondents dominated the sample (89%), with only 11% from all the other ethnic groups together. The next largest group was White (other), (7.3%), followed by Asian Indian, (only 0.8%), then Asian Chinese (0.6%) and Asian (other), (also 0.6%). The walk/questionnaire was completed by respondents with a broad range of educational qualifications. The category with the highest number of respondents was GCSE /O' level (or equivalent), (28.7%), followed by those with a first degree, (27.5%). Only 2.8% respondents had a doctorate, and 14.7% had no qualifications. Thirty two respondents, (3.4% those answering this question) identified themselves as members of the landscape profession.

Table 2 shows the percentages and scores for flower and bare ground cover at each site on the day on the day (s) of walks and questionnaires.

Table 1: Questionnaire Respondents : Socio - demographic Profile *(Valid %)

Gender (Overall missing values = 29 respondents)							
Woodland Communities		Shrub Communities		Herbaceous Communities		Overall	
M	232 (39.9%)	M	114 (33.4%)	M	178 (37.4%)	M	524 (37.5%)
F	349 (60.1%)	F	227 (66.6%)	F	298 (62.6%)	F	874 (62.5%)
Age (Overall missing values = 34 respondents)							
Woodland Communities		Shrub Communities		Herbaceous Communities		Overall	
18 – 24	38 (6.5%)	18 – 24	19 (5.6%)	18 – 24	33 (6.9%)	18 – 24	90 (6.5%)
25 – 34	35 (6.0%)	25 – 34	28 (8.3%)	25 – 34	43 (9.1%)	25 – 34	106 (7.6%)
35 – 44	54 (9.3%)	35 – 44	29 (8.6%)	35 – 44	53 (11.2%)	35 – 44	136 (9.8%)
45 – 54	95 (16.4%)	45 – 54	48 (14.2%)	45 – 54	95 (20.0%)	45 – 54	238 (17.1%)
55 – 64	172 (29.6%)	55 – 64	82 (24.3%)	55 – 64	114 (24.0%)	55 – 64	368 (26.4%)
65 +	187 (32.2%)	65 +	131 (38.9%)	65 +	137 (28.8%)	65 +	455 (32.7%)
Ethnicity (Overall missing values = 187 respondents)							
Woodland Communities		Shrub Communities		Herbaceous Communities		Overall	
White British/Irish	413 (90.8%)	White British/Irish	285 (88.0%)	White British/Irish	405 (87.9%)	White British/Irish	1103 (89%)
White (other)	30 (6.6%)	White (other)	25 (7.7%)	White (other)	35 (7.6%)	White (other)	90 (7.3%)
Mixed white/black Caribbean	2 (0.4%)	Mixed white/black Caribbean	1 (0.3%)	Mixed white/black Caribbean	1 (0.2%)	Mixed white/black Caribbean	4 (0.3%)
Mixed white/black African	0	Mixed white/black African	0	Mixed white/black African	0	Mixed white/black African	0
Mixed white/Asian	1 (0.2%)	Mixed white/Asian	0	Mixed white/Asian	4 (0.9%)	Mixed white/Asian	5 (0.4%)
Mixed other	1 (0.2%)	Mixed other	3 (0.9%)	Mixed other	1 (0.2%)	Mixed other	5 (0.4%)
Asian Indian	0	Asian Indian	5 (1.5%)	Asian Indian	5 (1.1%)	Asian Indian	10 (0.8%)
Asian Pakistani	0	Asian Pakistani	1 (0.3%)	Asian Pakistani	0	Asian Pakistani	1 (0.1%)
Asian Chinese	4 (0.9%)	Asian Chinese	0	Asian Chinese	4 (0.9%)	Asian Chinese	8 (0.6%)
Asian other	3 (0.7%)	Asian other	0	Asian other	5 (1.1%)	Asian other	8 (0.6%)
Black African	0	Black African	1 (0.3%)	Black African	0	Black African	1 (0.1%)

Black Caribbean	0	Black Caribbean	1 (0.3%)	Black Caribbean	0	Black Caribbean	1 (0.1%)
Black other	1 (0.2%)	Black other	2 (0.6%)	Black other	0	Black other	3 (0.2%)
Arab	0	Arab	0	Arab	1 (0.2%)	Arab	1 (0.1%)
Educational Qualifications (Overall missing values = 123 respondents)							
Woodland Communities		Shrub Communities		Herbaceous Communities		Overall	
None	87 (16.3%)	None	39 (12.3%)	None	66 (14.6%)	None	192 (14.7%)
GCSE/O' level (or equiv)	183 (34.3%)	GCSE/O' level (or equiv)	76 (23.9%)	GCSE/O' level (or equiv)	115 (25.4%)	GCSE/O' level (or equiv)	374 (28.7%)
A level (or equiv)	86 (16.1%)	A level (or equiv)	61 (19.2%)	A level (or equiv)	83 (18.3%)	A level (or equiv)	230 (17.6%)
Degree	127 (23.8 %)	Degree	104 (32.7%)	Degree	128 (28.3%)	Degree	359 (27.5%)
Masters' degree	36 (6.8%)	Masters' degree	28 (8.8%)	Masters' degree	49 (10.8%)	Masters' degree	113 (8.7%)
Doctorate	14 (2.6%)	Doctorate	10 (3.1%)	Doctorate	12 (2.6%)	Doctorate	36 (2.8%)
Landscape professional? (Overall missing values = 482 respondents)							
Woodland Communities		Shrub Communities		Herbaceous Communities		Overall	
Yes	11 (3%)	Yes	10 (3.9%)	Yes	11 (3.4%)	Yes	32 (3.4%)
No	353 (97%)	No	246 (96.1%)	No	314 (96.6%)	No	913 (96.6%)

*Valid percentages given due to missing values

Table 2: Flowering and Bare percentages and scores per site at time of walk/questionnaire

WOODLAND SITES				
Site No. (No. questionnaires)	Flower cover % and scores	Bare cover % and scores	Site	Date(s) Collected
1.1 (70)	7% (2)	5% (2)	Abbotsbury Jungle Ride (Sept 12)	10 Sept 12
1.2 (32)	7% (2)	5% (2)	Abbotsbury Jungle Ride(July 13)	14 July 13
2 (40)	0% (1)	50% (4)	Wisley Eucalypts	15 Oct 12
3 (43)	20% (3)	5% (2)	Torquay Palms Princess Gardens (bedding)	2 Oct 12
4 (18)	0% (1)	5% (2)	Torquay Palms Kings Gardens (no bedding)	3 Oct 12
5.1 (28)	10% (3)	8% (2)	Wisley Wild Garden complex (Spring pilot)	16 April 12
5 (36)	2% (2)	8% (2)	Wisley Wild Garden complex	27 –28 Sept 12
6.1 (31)	15% (3)	8% (2)	Wisley Battleston Hill semi complex (Spring pilot)	13 April 12
6 (38)	5%(2)	8% (2)	Wisley Battleston Hill semi complex	27 Sep 12
7 (35)	0% (1)	10% (2)	Abbotsbury semi complex woodland	12 Sept 12
8 (16)	7% (2)	5% (2)	Beth Chatto Woodland semi complex	15 Aug 12
9.1 (27)	5% (2)	0% (1)	Wisley Arboretum (Spring pilot)	13 April 12
9 (22)	0% (1)	0% (1)	Wisley Arboretum	28 Sept 12
10 (45)	0% (1)	0% (1)	Abbotsbury Arboretum	11 Sept 12
11 (30)	0% (1)	5% (2)	Stevenage Monk's Wood complex	16 Oct 12
12.1 (5)	30% (4)	5% (2)	Stevenage Monk's wood woodland trail semi complex (Spring pilot)	16 May 12
12 (26)	0% (1)	40% (4)	Stevenage Monk's wood woodland semi complex	29 Sept 4 Oct 12
13.1 (22)	5% (2)	5% (2)	Stevenage Fairlands Arboretum (Spring pilot)	11 May 12
13 (31)	0% (1)	5% (2)	Stevenage Fairlands Arboretum	25 Sept 12
SHRUB (LOW GROWING MOUNDING) SITES				
1.1 (37)	70% (5)	0% (1)	Punchbowl Azaleas, Valley Gardens in flower	13 May 13
1.2 (30)	0% (1)	0% (1)	Punchbowl Azaleas, Valley Gardens no flower	1 Aug 13
2.1 (36)	0% (1)	60% (5)	Monocultural hydrangea planting Savill no flower	4 June 13
2.2 (36)	50% (5)	20% (3)	Monocultural hydrangea planting Savill in flower	1 Aug 13
3 (34)	5% (2)	10% (2)	Hilliers heather garden – mixed shrub planting	27 June 13
4 (31)	20% (3)	10% (2)	Wisley Erica, Calluna heather garden	20 Aug 13
SHRUB (TALLER GROWING, MOUNDING, VARYING HEIGHT)				
5.1 (34)	30% (4)	15% (3)	Spring Wood Savill big rhodos, camellias, magnolias some flower	29 April 13
5.2 (19)	60% (5)	5% (2)	Spring Wood Savill big rhodos, camellias, magnolias in flower	4 June 13
6 (32)	5% (2)	3% (2)	Hilliers mounding arboretum shrubbery camellias, magnolias	10 June 13
7 (37)	20% (3)	0% (1)	Native woodland edge Fairlands Valley Stevenage	23, 31 May 13
8 (21)	5%(2)	20% (3)	Hilliers native – looking arboretum	27 June 13

			shrubby	
HERBACEOUS PRODUCTIVE MOIST SITES				
1 (39)	40% (4)	3% (2)	Sheffield Botanic Garden Prairie	18 Sept 12
2 (33)	50% (5)	0% (1)	Wisley Oudolf borders	14 Aug 12
3 (41)	50% (5)	5% (2)	Wisley herbaceous borders	16 Aug 12
4 (38)	30% (4)	0% (1)	Beth Chatto Wet Garden	15 Aug 12
5.1 (23)	15% (3)	0% (1)	Sheffield Bole Hill Rec (Sept 12)	19-20 Sept 12
5.2 (27)	30% (4)	0% (1)	Sheffield Bole Hill Rec (Aug 13)	7,8 Aug 13
HERBACEOUS UNPRODUCTIVE DRY ALKALINE SITES				
6.1 (51)	25% (3)	25% (3)	Wisley Prairie (Aug 12)	14 Aug 12
6.2 (45)	30% (4)	25% (3)	Wisley Prairie (July 13)	12 July 13
7 (39)	40% (4)	25% (3)	Beth Chatto Gravel Garden	10 Aug 12
8.1 (33)	10% (3)	20% (3)	Abbotsbury Mediterranean Bank some flower (Sept 12)	12 Sept 12
8.2 (31)	40% (4)	20% (3)	Abbotsbury Mediterranean Bank in flower (July 13)	13 July 13
9 (31)	50% (5)	5% (2)	Wisley Olympic wildflower meadow	16 Aug 12
10.1 (30)	5% (2)	5% (2)	Stevenage Grasshopper trail Fairlands Valley (Sept 12)	4-7 Sept 12
10.2 (25)	5% (2)	5% (2)	Stevenage Grasshopper trail Fairlands Valley (July 13)	8, 9 July 13

The questionnaire results, statistical analysis and interpretation are presented in five sections, as illustrated in Figure 1 below. The first section, 'All Vegetation Communities, refers to the combined data, i.e. that from questionnaires conducted within woodland, shrub and herbaceous communities. Data from each of the three communities are then considered separately. Finally, results and analysis of the correlations between perceived attractiveness, perceived biodiversity and well-being are presented.

Within each of the first four sections, the results and analysis are presented in four sub – sections; firstly the **results of the Principal Components Analysis (PCA)**, secondly the **summaries of Analysis of Variance outcomes**, followed by an original **model proposed to indicate the relationships between explanatory factors and respondents' perceptions** as revealed by the Principal components analysis and ANOVAs. Finally, the **detailed ANOVA results are presented and described**, using **post hoc multiple comparisons with the Sidak correction**.

Figure 1: Diagrammatic representation of the presentation of questionnaire results, statistical analysis and interpretation.



Section 1: All Vegetation Communities

Principal Components Analysis (PCA) has been explained in the Methods section in relation to analysis of the questionnaire results. This analysis generates ‘factors’ which are meaningful groups of the original variables from the questionnaire which can be used to measure or gauge a single aspect of people’s perceptions or beliefs. They are defined and named by the variables which load onto them. The value of the ‘loading’ represents the correlation between the individual variable and the factor itself, so the closer to 1 the value, the more closely the individual variable relates to the factor. As combinations of variables, ‘factors’ are more reliable measures of perception than individual variables, which are more fickle due to people’s unpredictability and the subjective nature of human response.

This analysis focuses on two sets of data. The first are referred to as the ‘walk’ variables, (Table 1), and each refers to a specific attitudinal statement in the ‘walk’ section of the questionnaire. These variables load onto and define factors which gauged aspects of people’s perceptions of the aesthetic qualities of the planting itself and their own psychological well-being as they walked through the planted area. As an example, in the case of ‘all vegetation communities’, the first factor is named ‘colour, attractiveness and invertebrate presence’ because it is dominated by the individual variables; ‘colourful’ (the planting is colourful), ‘colcomb’ (the colour combination is attractive), ‘attplant’ (the planting is attractive), ‘intplant’ (the planting is interesting), and ‘bees’ (the planting is good for butterflies, bees and other insects).

Table 1: Public perception of planting interpretation of ‘walk’ variable descriptors

Walk Variable	Meaning
Comfort	Feeling comfortable
Escape	Allowed to escape mundane routines and work
Relaxed	Feeling relaxed
Unique	This reveals a special unique place
Intplant	Planting interesting
Bees	Planting good for butterflies, bees and other insects
Attplant	Planting attractive
Natplant	Planting looks natural
Cared for	Planting looks cared for
Designed	Planting looks designed
Tidy	Planting looks tidy
Familiar	Planting looks familiar
Colourful	Planting is colourful
Colcomb	Colour combination is attractive
Nnative	How many native UK plant species?
Nbees	How many native UK insects?
Nspec	How many different plant species overall?
Complex	How structurally complex?

The second data set refers to questionnaire respondents’ ‘thoughts’, with each variable being related to a specific attitudinal statement completed in the ‘thoughts’ section of the questionnaire, (Table 2). The thoughts variables are those reflecting people’s beliefs and values in relation to a range of issues including the potentially restorative value of outdoor green

spaces, biodiversity, climate change and non – native species. Here the ‘factors’ are meaningful groups of variables which can be used to measure a single aspect of people’s beliefs and values in relation to the issues considered. As an example, in the case of ‘all vegetation communities’, the first factor, ‘Well – being and biodiversity’, is defined by four individual variables, ‘spirits’ (outdoor green spaces lift my spirits), ‘likeout’ (I like being in outdoor green spaces), ‘habitat’ (plants, shrubs and trees provide valuable habitats for butterflies, bees and other insects), and ‘eco’ (insects such as flies, butterflies and bees are an important part of ecosystems).

Table 2: Public perception of planting interpretation of ‘thoughts’ variable descriptors

Thoughts Variable	Meaning
Likeout	Like being in outdoor green spaces
Spirits	Outdoor green spaces lift spirits
Colour	Like looking at colourful flowering plants
Burdock	Can distinguish between different plants
Eco	Insects such as flies, butterflies and bees are an important part of ecosystems
Habitat	Plants shrubs and trees provide valuable habitats for butterflies, bees and other insects
Natonly	Planting in parks and gardens should be restricted to native species
Natbee	Native plants support more native insects than non – native plants
Envimp	The environment is important regardless of its value to people
Globreal	Belief that climate change happening
Globbad	Belief that climate change will have serious consequences
Globchange	Belief that global warming will change plant species most suited to grow in UK parks and gardens over next 50 yrs
Hapnat	Happy to see non – native species (as in photo of palms, Tresco) growing in UK parks and gardens
acceptnat	Acceptance of non – native species (as in photo of palms, Tresco) gin UK parks and gardens if better suited to climate than present – day species

1.1 Summary of Principal Components Analysis (PCA) Outcomes; All Vegetation Communities

1.1.1. Walking through the planting

Table 3 shows the loading of individual walk variables such as ‘colourful’ (planting is colourful) onto specific factors. In this case individual variables load onto five main factors.

Table 3: The loading of individual attitudinal ‘walk’ variables onto specific factors

Factors (1- 5 accounted for 65.332% total variance)	Variables	Loadings (= \geq 0.5)
<u>Factor 1 (30.557% variance)</u>		
Colour, attractiveness and invertebrate presence	colourful	0.851
	colcomb	0.848
	attplant	0.716
	intplant	0.715
	bees	0.593

<u>Factor 2 (12.359% variance)</u>		
Psychological and physical well being	relaxed	0.840
	comfort	0.787
	escape	0.756
<u>Factor 3 (9.754% variance)</u>		
Neatness	tidy	0.840
	cared for	0.780
	designed	0.779
<u>Factor 4 (6.391% variance)</u>		
Native plant and invertebrate biodiversity	nnative	0.797
	nbees	0.718
<u>Factor 5 (6.271% variance)</u>		
Unfamiliarity and complexity	familiar	-0.686
	complex	0.582
	nspec	0.557

The first factor is named 'colour, attractiveness and invertebrate presence' because it is dominated by the individual variables; 'colourful' (the planting is colourful), 'colcomb' (the colour combination is attractive), 'attplant' (the planting is attractive), 'intplant' (the planting is interesting), and 'bees' (the planting is good for butterflies, bees and other insects).

The 'commonality' between the variables loading onto each factor means that in the case of Factor 1, planting perceived as colourful was also perceived as having attractive colour combinations, being attractive, interesting and good for bees and butterflies. The same pattern follows for the other factors. The three variables referring to people's restoration, ie 'relaxed' (feeling relaxed), 'comfort' (feeling comfortable), and 'escape' (being allowed to escape mundane routines and work) all load onto one factor, which has therefore been named 'Psychological and physical well – being'. This means that planting which facilitated people's relaxation was also associated with their feeling comfortable and being allowed to escape mundane routines and work. Factor 3 gauges people's perceptions of 'Neatness', and is defined by the three variables, 'tidy', (planting looks tidy), 'cared for' (planting looks cared for), and 'designed' (planting looks designed). Planting considered tidy was also considered cared for and designed. Factor 4 is a measure of people's perceptions of 'Native plant and invertebrate biodiversity'. Two factors load onto this, 'nnative' (the number of native UK plant species present) and 'nbees' (the number of native UK insects present). This shows planting perceived as native planting was also believed by respondents to be associated with native invertebrates. Finally, Factor 5, 'Unfamiliarity and complexity', was defined by three variables, 'familiar' (planting looked familiar to respondents), 'complex' (planting was perceived as structurally complex) and 'nspec' (the number of species perceived to be present). Generally, people perceived the planting they saw as unfamiliar as also being complex, with a large number of species present.

1.1.2. Respondents' thoughts

Table 4 shows the loading of individual thoughts variables such as 'spirits' (outdoor green spaces lift my spirits) onto specific factors. In this case individual variables loaded onto four main factors.

Table 4: The loading of individual attitudinal 'thoughts' variables onto specific factors

Factors (1-4 accounted for 59.718% total variance)	Variables	Loadings (>=/>0.5)
<u>Factor 1 (23.406% variance)</u> Well – being and biodiversity	spirits	0.783
	likeout	0.758
	habitat	0.713
	eco	0.702
<u>Factor 2 (15.862% variance)</u> Climate change reality	globbad	0.917
	globreal	0.909
	globchange	0.848
<u>Factor 3 (12.264% variance)</u> Acceptance of non – native plant sp.	hapnat	0.856
	acceptnat	0.822
<u>Factor 4 (8.185% variance)</u> Acceptance of non - native plant sp. and compatibility with native invertebrates	natbee	0.841
	natonly	0.821

The first factor, 'Well – being and biodiversity', is defined by four individual variables, 'spirits' (outdoor green spaces lift my spirits), 'likeout' (I like being in outdoor green spaces), 'habitat' (plants, shrubs and trees provide valuable habitats for butterflies, bees and other insects), and 'eco' (insects such as flies, butterflies and bees are an important part of ecosystems). This indicates that people who said they generally like being in outdoor green spaces also said these spaces lift their spirits. These same people also appreciated planting for its habitat value and considered insects an important part of ecosystems. Factor 2, 'Climate change reality', is defined by 'globreal', (the belief that climate change is happening), 'globbad' (the belief that climate change will have serious consequences), and 'globchange', (belief that climate change will change the plant species most suited to grow in UK parks and gardens over the next 50 yrs), and shows that people with one of these beliefs also held the others. Factor 3 is a measure of people's acceptance of non – native plant species and is defined by two variables, 'hapnat' (I would be happy to see non – native species growing in UK parks and gardens), and 'acceptnat' (I would accept non – native plant species in UK parks and gardens if they were better – suited to the climate than present – day species). Factor 4 gauges both 'Acceptance of non – native plant species and compatibility with native invertebrates' and is defined by the two variables, 'natonly' (planting in parks and gardens should be restricted to native species) and 'natbee' (native plants support more native insects than non – native plants.). The loading of these two variables onto the same factor indicates that generally people who thought planting

should be restricted to native plant species also believed that native plant species supported more native invertebrates than non – native plants, and vice versa.

1.2. Summary of Analysis of Variance outcomes; All Vegetation Communities

Following the principal components analysis, multifactor analysis of variance was conducted using the Walk principal components factors as dependent. Table 5 shows the percentage contribution of each planting and background variable, as well as the thoughts PCA factors, to the overall variability of respondents' perceptions of planting along the walk. As described, the walk PCA factors represent respondents' perceptions along the walk.

1.3. Relationships between Planting Stimulus, Background Socio – demographic Variables, Beliefs and Values and Perceptions and Preferences; All Communities

A model that indicates the relationship between planting stimulus, background socio – demographic factors, respondents' beliefs and values and their perceptions and preferences is shown in Figure 1. Only variables which are significant at $P = < 0.05$ are included in the model. Proportional arrows are used to represent the percentage effect of each significant variable, providing a visual account of relationships shown statistically in table 5.

Both table 5 and figure 1 indicate that when all the data for all of the walks was pooled and analysed as 'All Vegetation Communities', planting variables had a dominant effect on people's perceptions and preferences, i.e., the six variables, 'structure', 'character', 'private/public', 'vegetation community', 'flowering % score' and 'bare % score' were much more important than people's background characteristics in accounting for variability in their reactions to the planting along the walk. Their beliefs and values, represented by the thoughts factors also played a role, with the dominance of one factor, 'well – being and biodiversity'.

Focusing on the planting variables, the calculated score for the amount of flowering on the walk had the greatest single effect, (23.4%), and had a bearing on people's perceptions of the colourfulness, attractiveness and invertebrate presence of the planting. Planting structure effected people's perceptions of its neatness, unfamiliarity and complexity, as well as their own psychological well – being whilst walking through it. Vegetation character was important in terms of perceptions of colour, attractiveness and invertebrate presence, neatness, native plant and invertebrate biodiversity and unfamiliarity and complexity. Although the planting variables had the greatest overall effect compared to background variables and 'thoughts', their effects were not spread evenly across all five perceptual factors, i.e., they were focused on the 4 factors related to the visual planting characteristics, i.e., factors 1, 3, 4 and 5. Only one planting variable, 'structure' had any effect on people's perceptions of their own psychological well – being whilst walking through the planting. In this one case, the background variables (gender, educational qualifications, and whether or not the person was a landscape professional) and thoughts factors dominated. This suggests that whilst the planting variables had a bearing on people's perception of the planting itself, their own mental and physical well – being were more the product of their background factors and underlying beliefs and values.

Considering beliefs and values, the dominant explanatory thoughts factor was 'well – being and biodiversity', which had a bearing on four out of five aspects of people's perceptions. Importantly, this means that people who already appreciated outdoor green spaces for their

psychological, and biodiversity value were likely to react more strongly than those who had lower appreciation levels, in terms of their perceptions of the planting and their own well – being during their walk through an area of planting.

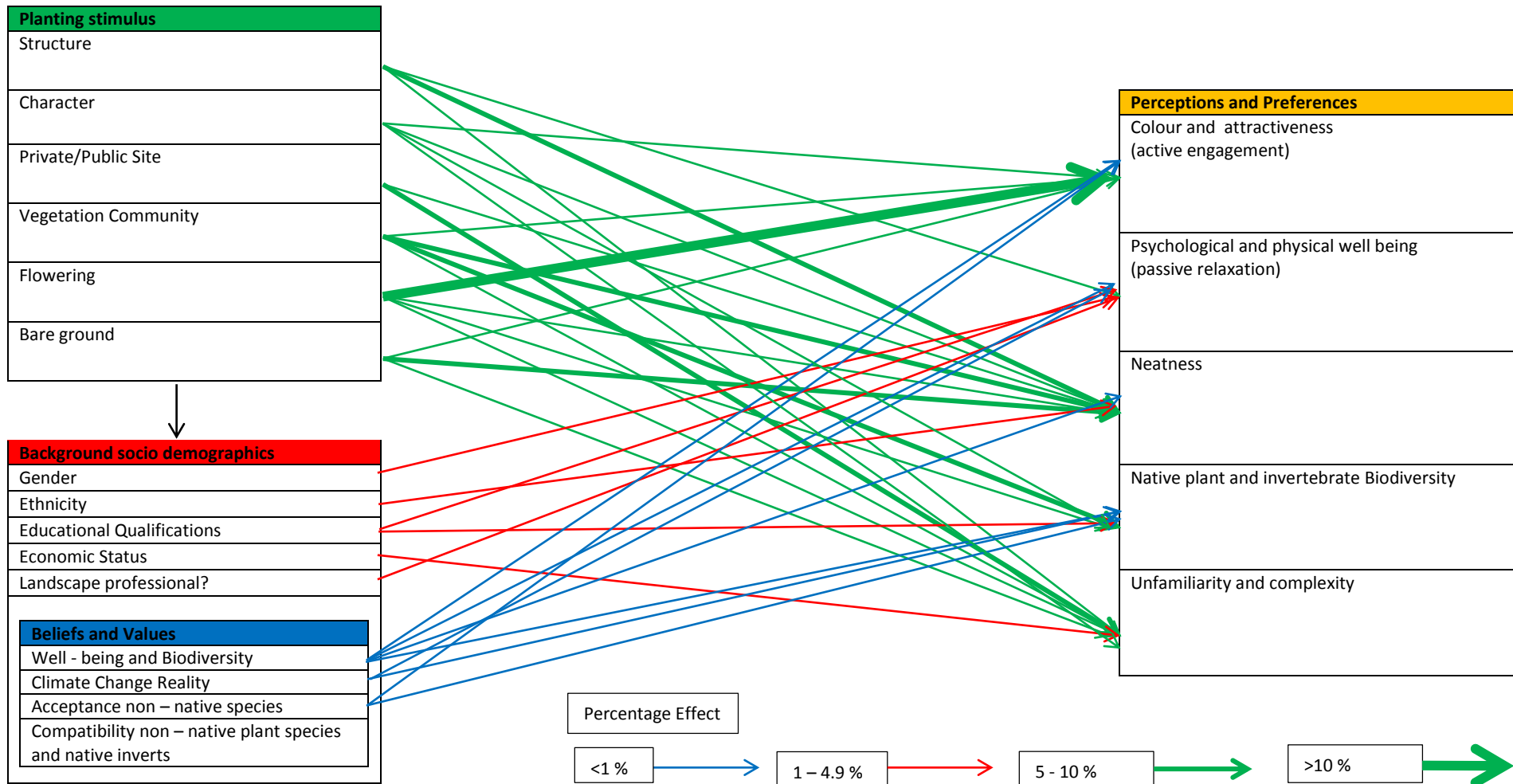
Table 5: Effect of the planting variables, background variables and thoughts factors on the walk factors and variables.

Percentages indicate the proportional contribution of a planting/background variable or thoughts factor to the overall variability of the walk factors

Asterisks (*, **, *) indicate the degree to which variables and factors caused statistically significant differences in the walk factors (* = P < 0.05, ** = P < 0.01, *** = P < 0.001, ns = Not significant < 0.05)**

	Walk PCA FACTORS				
	Factor 1 Colour, attractiveness and invertebrate presence	Factor2 Psychological and physical well being	Factor3 Neatness	Factor4 Native plant and invertebrate biodiversity	Factor 5 Unfamiliarity and complexity
Planting variables					
Structure	ns	2.8 ***	9.3 ***	ns	1.4 **
Character	2.8 ***	ns	1.3 *	4.0 ***	2.0 ***
Private/public	ns	ns	1.0 **	ns	5.0 ***
Veg community	4.5 ***	ns	9.6 ***	5.2 ***	3.1 ***
Flowering % score	23.4 ***	ns	3.2 ***	2.0 ***	3.9 ***
Bare% score	4.4 ***	ns	5.0 ***	ns	2.4 ***
Background variables					
Gender	ns	1.2 **	ns	ns	ns
Age	ns	ns	ns	ns	ns
Ethnicity	ns	ns	3.3 *	ns	ns
Livurb	ns	ns	ns	ns	ns
Lifeurb	ns	ns	ns	ns	ns
Edqual	ns	2.2 **	ns	2.3 ***	ns
Ecstat	ns	ns	ns	ns	2.4 **
Landpro	ns	3.2 ***	ns	ns	ns
Landper	ns	ns	ns	ns	ns
Horper	ns	ns	ns	ns	ns
Biopro	ns	ns	ns	ns	ns
Envpro	ns	ns	ns	ns	ns
Envper	ns	ns	ns	ns	ns
Thoughts PCA Factors					
Factor1 Well – being and biodiversity	0.6 **	0.35 ***	0.8 *	1.2 ***	ns
Factor 2 Climate change reality	ns	0.6 *	ns	0.4 *	ns
Factor3 Acceptance non – native plant species	0.5 *	ns	ns	0.7 **	ns
Factor4 Acceptance non – native plant species and compatability with native invertebrates	ns	ns	ns	ns	ns
	1204 cases	793 cases	716 cases	1118 cases	1092 cases

Figure 1: All Communities: Model Showing Relationships between Planting Stimulus, Background Socio – demographic variables, Beliefs and Values and Perceptions and Preferences; Proportional arrows indicate the percentage effect of each significant variable



1.4. Multifactor Anovas showing Walk PCA factors as Dependent : Interpretation of results: All Vegetation Communities

Once the independent effect of each significant variable had been identified using a two stage analysis of variance, as explained above, post hoc multiple comparisons were carried out to distinguish where there were significant differences between groups or categories, to improve interpretation of the results. The effects of planting variables, background variables and beliefs and values, are presented and described.

1.4.1. Planting Variables

1.4.1.i) Planting Structure

Planting structure had a significant effect on three Walk factors. Although significant, these values are not very high. Structure had the greatest influence on perceptions of **Neatness**, (9.3%, $P = < 0.001$). The influence of structure on respondents' **Psychological and physical well – being** during walks was lower, (2.8% $P = < 0.001$), and that perceptions of **Unfamiliarity and complexity**, lower still, (1.4%, $P = < 0.01$).

Table 6: The effect of Structure (least to most natural) on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which structure influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Structure (marginal mean score) and Sidak scores a,b,c		
			Least natural (1)	Moderately natural (2)	Most natural (3)
Factor 1 Colour, attractiveness and invertebrate presence	ns	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	$P = < 0.001$	2.8	Lowest (-0.653), b	Highest (-0.260), a	Intermediate (-0.349), a
Factor 3 Neatness	$P = < 0.001$	9.3	Intermediate (-0.182), a	Highest (0.056), a	Lowest (-0.578), b
Factor 4 Native plant and invertebrate biodiversity	ns	ns	ns	ns	ns
Factor 5 Unfamiliarity and complexity	$P = < 0.01$	1.4	Lowest (-0.0729), b	Highest (-0.377), a	Intermediate (-0.542), a

'ns' indicates not significant at the 95% level

'a,b,c' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

People perceived planting moderately natural in structure as the neatest, most unfamiliar and complex and the best in terms of their own psychological and physical well – being whilst they were walking through it. It was perceived as significantly neater than that most natural in structure, significantly more unfamiliar and complex, and significantly better in terms of their psychological and physical well – being than that least natural in structure. This shows a positive reaction to planting with some degree of human intervention, i.e., the 'moderately

natural'. Structures with the most human intervention, i.e., the 'least natural' were rated the lowest in terms of psychological and physical well – being.

Planting structure had no statistically significant bearing on people’s perceptions of the colour, attractiveness, and invertebrate presence of the planting, or on perceptions of native plant and invertebrate biodiversity.

1.4.1.ii) Species Character

Species character had a significant effect on four Walk factors; perception of **Native plant and invertebrate biodiversity**, (4.0 %, P = < 0.001), perception of **Colour, attractiveness and invertebrate presence**, (2.8 %, P = < 0.001), **Unfamiliarity and complexity**, (2.0 %, P = < 0.001), and **Neatness**, (1.3%, P = < 0.05). These percentage effects, although significant, are however generally quite small.

Table 7: The effect of Species Character (least to most natural) on respondents’ perceptions of their walk. The percentage effect (%) represents the extent to which species character influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Character (marginal mean score) and Sidak scores a,b,c		
			Least natural (1)	Moderately natural (2)	Most natural (3)
Factor 1 Colour, attractiveness and invertebrate presence	P = < 0.001	2.8	Highest (-0.020), a	Intermediate (-0.291), b	Lowest (- 0.441), b
Factor 2 Psychological and physical well - being	ns	ns	ns	ns	ns
Factor 3 Neatness	P = < 0.05	1.3	Highest (0.023), a	Lowest (-0.511), b	Intermediate (-0.216), a,b
Factor 4 Native plant and invertebrate biodiversity	P = < 0.001	4.0	Lowest (-0.277), b	Intermediate (-0.028), a	Highest (0.184), a
Factor 5 Unfamiliarity and complexity	P = < 0.001	2.0	Highest (-0.259), a	Intermediate (-0.486), a	Lowest (-0.904), b

'ns' indicates not significant at the 95% level

'a,b,c' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

Planting whose character was least natural was perceived as significantly more colourful, attractive and beneficial in terms of invertebrate presence than planting that was moderately or most natural in species character. This least natural planting It was also considered to be significantly neater than that moderately natural in character and significantly more unfamiliar and complex than that most natural in character. This shows that generally people reacted very positively aesthetically to planting with an unfamiliar species character, yet such characters were perceived as providing the lowest native plant and invertebrate biodiversity.

People perceived planting that was most natural in species character as providing the highest native plant and invertebrate biodiversity, significantly higher than the least natural in character.

The species character of the planting had no bearing on people’s perceptions of their psychological and physical well – being whilst they were walking through it.

1.4.1.iii) Ownership and Access

The distinction between **Private gardens and public green space** had a significant, if percentage wise small effect on respondents’ perception of both **Unfamiliarity and complexity** (5.0%, $P < 0.001$), with a smaller effect on perceptions of the **Neatness** of the planting, (1.0%, $P < 0.01$).

Table 8: The Effect of ownership and access (Private Gardens vs Public Green space) on respondents’ perceptions of their walk. The percentage effect (%) represents the extent to which ownership and access influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Private Gardens vs Public Greenspace (marginal mean score) and Sidak scores a,b,c	
			Gardens	Greenspace
Factor 1 Colour, attractiveness and invertebrate presence	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	ns	ns	ns	ns
Factor 3 Neatness	$P < 0.01$	1.0	Highest (-0.068), a	Lowest (-0.402), b
Factor 4 Native plant and invertebrate biodiversity	ns	ns	ns	ns
Factor 5 Unfamiliarity and complexity	$P < 0.001$	5.0	Highest (-0.358), a	Lowest (-0.742), b

‘ns’ indicates not significant at the 95% level

‘a,b,c’ indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

Private gardens with paid entry, such as RHS Wisley were viewed as significantly neater, and significantly more unfamiliar and complex, than public greenspaces with free access, such as Fairlands Valley Park in Stevenage. Both these outcomes were expected. Private gardens experience a higher level of maintenance input than does public greenspace, creating an overall ‘neater’ appearance. The gardens would also appear less familiar to members of the public visiting once in a while from afar than the greenspaces that are visited on a much more regular basis by people living close by.

Ownership and access had no significant effect on people’s perceptions of the colour and attractiveness of the planting, levels of native plant and invertebrate biodiversity, or on people’s psychological and physical well – being whilst they were walking through the planting

1.4.1.iv) Vegetation Community

Whether planting was woodland, shrub or herbaceous, had a significant effect on four Walk factors. It had the greatest effect on respondents' perception of **Neatness**, (9.6%, $P < 0.001$), followed by **Native plant and invertebrate biodiversity**, (5.2%, $P < 0.001$), **Colour, attractiveness and invertebrate presence**, (4.5%, $P < 0.001$), and **Unfamiliarity and complexity**, (3.1%, $P < 0.001$).

Table 9: The effect of Vegetation Community (Woodland, Shrub or Herbaceous planting) on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which vegetation community influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Vegetation Community (marginal mean score) and Sidak scores a,b,c		
			Woodland (1)	Shrub (2)	Herbaceous (3)
Factor 1 Colour, attractiveness and invertebrate presence	$P = < 0.001$	4.5	Intermediate (-0.199), a,b	Lowest (-0.327), b	Highest (-0.151), a
Factor 2 Psychological and physical well - being	ns	ns	ns	ns	ns
Factor 3 Neatness	$P = < 0.001$	9.6	Highest (-0.013), a	Intermediate (-0.017), a	Lowest (-0.700), b
Factor 4 Native plant and invertebrate biodiversity	$P = < 0.001$	5.2	Lowest (-0.247), b	Intermediate (-0.156), b	Highest (0.281), a
Factor 5 Unfamiliarity and complexity	$P = < 0.001$	3.1	Lowest (-0.806), b	Intermediate (-0.537), b	Highest (-0.270), a

'ns' indicates not significant at the 95% level

'a,b,c' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

Of the three vegetation communities, people viewed herbaceous planting as the most colourful, attractive and the best for insects, the best in terms of native plant and invertebrate biodiversity and the most unfamiliar and complex. It was seen as significantly more colourful and attractive than shrub planting and scored significantly higher than the other two communities for native plant and invertebrate biodiversity, unfamiliarity and complexity.

Woodlands scored the highest of the three communities for neatness, were seen as the least unfamiliar and complex, and scored the lowest for native plant and invertebrate biodiversity.

People did not react very positively to shrub planting in general; this was rated the lowest overall in terms of colour, attractiveness and invertebrate presence. Shrubs seem to be a potentially challenging vegetation type in designed landscapes.

The vegetation community did not have a bearing on people's psychological and physical well – being whilst they walked through the planting.

1.4.1.v) Flowering % Score

The flowering % score reflects the percentage of the planting which was covered in bloom at the time of the on-site walks and questionnaires. This was calculated for each site using panoramic photographs of the sites at the time of the walks. The scores, (1 – 5) were allocated to represent the percentage cover, i. e., 1 = 0 – 1 % cover, 2 = 2 – 9% cover, 3 = 10 – 26% cover, 4 = 27 – 45% cover, 5 = 46% + cover . These categories represent natural 'groupings 'of cover which emerged from the distribution of percentages from all sites.

Flowering % score, i.e. % flower cover, had a significant effect on four Walk factors; as might be expected, a very large effect on perception of **Colour, attractiveness and invertebrate presence** (23.4%, $P = < 0.001$), then much smaller effects on **Unfamiliarity and complexity**, (3.9%, $P = < 0.001$), **Neatness** (3.2%, $P = < 0.001$), and **Native plant and invertebrate biodiversity**, (2.0%, $P = < 0.001$).

Table 10: The effect of Flowering % Score on respondents' perceptions of their walk .The percentage effect (%) represents the extent to which % flower cover influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Flowering % score (marginal mean score) and Sidak scores a,b,c				
			1 (0-1%)	2 (2-9%)	3 (10 – 26%)	4 (27 – 45%)	5 (46%+)
Factor 1 Colour, attractiveness and invertebrate presence	P = < 0.001	23.4	(-0.566), c	Lowest (-0.890), d	(-0.160), b	(0.171), a	Highest (0.241), a
Factor 2 Psychological and physical well-being	ns	ns	ns	ns	ns	ns	ns
Factor 3 Neatness	P = < 0.001	3.2	(-0.212), a,b	Lowest (-0.457), b	(-0.264), a,b	(-0.254), a,b	Highest (0.013), a
Factor 4 Native plant and invertebrate biodiversity	P = < 0.001	2.0	Lowest (-0.155), b	Highest (0.149), a	(-0.127), b	(-0.022), a,b	(-0.047), a,b
Factor 5 Unfamiliarity and complexity	P = < 0.001	3.9	Highest (-0.121), a	(-0.153), a	(- 0.534), b	(-0.901), c	Lowest (-1.039), c

'ns' indicates not significant at the 95% level

'a,b,c' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

People perceived planting with a high flowering score of 46% and above as the most colourful and attractive with the highest invertebrate presence. This was also seen as the neatest planting and the least unfamiliar and complex. It is interesting that a larger percentage area in flower made the planting to be perceived as neater.

Planting with a low flowering score of 2 – 9% was viewed as the least colourful and attractive with the lowest invertebrate presence, the least neat, but it was seen as providing the highest native plant and invertebrate biodiversity. Interestingly, that with a lower score (0 – 1%) was perceived as providing the lowest levels of native plant and invertebrate biodiversity. It is likely that people perceived planting with a limited amount of flower as ‘native biodiversity’, but as soon as the flowering level fell below a certain threshold, they were unable to recognise biodiversity. This, together with the association between high flowering score and invertebrate presence suggests that people use flowering as an indicator of biodiversity levels, particularly linking invertebrate biodiversity and pollinator abundance with the presence of flowers. The data also suggests that the message of nature conservation over the past 40 years (now shown to be false) that the least neat vegetation is however good for biodiversity has been received and incorporated by our respondents.

Flowering % score per se had no impact on people’s psychological and physical well – being whilst they walked through a particular area of planting.

1.4.1.vi) Bare Ground % Score

Percentage bare ground exposed in plantings, had a significant effect on three Walk factors, **Neatness**, (5.0%, $P < 0.001$), **Colour, attractiveness and invertebrate presence**, (4.4%, $P < 0.001$), and **Unfamiliarity and Complexity**, (2.4%, $P < 0.001$). ‘Bare ground’ might have been interpreted as a path surface or bare soil.

Table 11: The effect of Bare Ground % Score on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which % bare ground influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Bare Ground % score (marginal mean score) and Sidak scores a,b,c				
			1 (0-1%)	2 (2-12%)	3 (13-35%)	4 (36 - 55%)	5 (56%+)
Factor 1 Colour, attractiveness and invertebrate presence	P = <0.001	4.4	(-0.112), b	Highest (0.222), a	(-0.136), b	(0.035), a,b	Lowest (-1.212), c
Factor 2 Psychological and physical well-being	ns	ns	ns	ns	ns	ns	ns
Factor 3 Neatness	P = < 0.001	5.0	Highest (0.277), a	(-0.122), b	(-0.271), b	Lowest (-1.102), c	(0.044), b
Factor 4 Native plant and invertebrate biodiversity	ns	ns	ns	ns	ns	ns	ns
Factor 5 Unfamiliarity and complexity	P = <0.001	2.4	(-0.401), a	(-0.228), a	Highest (-0.227), a	(-0.558), a,b	Lowest (-1.334), b

'ns' indicates not significant at the 95% level

'a,b,c' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

People rated the areas of planting with the highest bare ground values, (5 (56% +)), as the least colourful and attractive with the lowest invertebrate presence.

They were also seen as the least unfamiliar and complex. This planting was composed of very immature hydrangeas where the plants consisted of sparse woody

stems with a few green shoots. This planting was not well received by many respondents, who failed to understand why they were being asked to walk through it and considered it very unattractive.

Planting with a low bare ground score of 2 was seen as the most colourful and attractive, with the highest invertebrate presence, indicating that people prefer to see denser, fuller planting, but that they still prefer some bare ground over none, maybe in the form of an access route through the planting.

Surprisingly, that with the lowest bare ground score was seen as the neatest.

The bare ground % score had no impact on people's psychological and physical well – being whilst they walked through a particular area of planting, or on perceptions of native plant and invertebrate biodiversity.

1.4.2. Background Variables

1.4.2.i) Gender

In terms of background variables, **Gender** had a significant yet small effect on respondents' perception of their own **Psychological and physical well – being** during walks, (1.2%, $P = < 0.01$).

Table 12: The Effect of Gender on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which gender influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Gender (marginal mean difference) and Sidak score	
			Female	Male
Factor 1 Colour, attractiveness and invertebrate presence	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	$P = < 0.01$	1.2	Highest (0.212), a	Lowest (-0.212), b
Factor 3 Neatness	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	ns	ns	ns	ns
Factor 5 Unfamiliarity and complexity	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

'a,b,c' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

Gender had no bearing on any of the four factors relating to the visual characteristics of the planting through which respondents were walking, yet there was a significant relationship between gender and people's psychological and physical well – being whilst they were walking through the planting. Female respondents recorded significantly higher levels of psychological and physical well – being, than male respondents. This indicates that women felt a greater sense of relaxation, feeling comfortable and being allowed to escape from mundane routines and work, than did men during the walk experience.

1.4.2.ii) Ethnicity

Ethnicity had a significant, but small effect on perceptions of **Neatness**, (3.3%, $P = < 0.05$)

Table 13: The Effect of Ethnicity on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which ethnicity influenced responses to walk PCA factors

Walk Variables	Statistical significance	Percentage effect (%)	Ethnic Group (Raw mean score, (n) and Rank Highest (1) – Lowest (13))												
			White British/Irish	White (other)	Mixed white/Black Caribbean	Mixed white/Asian	Mixed (other)	Asian (Indian)	Asian (Pakistani)	Asian (Chinese)	Asian (other)	Black African	Black Caribbean	Black (other)	Arab
Factor 1 Colour, attractiveness and invertebrate presence	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Factor 2 Psychological and physical well-being	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Factor 3 *Neatness	$P = < 0.05$	3.3	- 0.026 (899), 8	0.281 (67), 5	- 1.585 (2), 12 Lowest	- 0.595 (5), 10	0.109 (4), 7	1.066 (9), 1 Highest	0.345 (1), 4	- 0.170 (8), 9	- 1.153 (6), 11	0.447 (1), 3	0.621 (1), 2	0.199 (3), 6	n/a (0)
Factor 4 Native plant and invertebrate biodiversity	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Factor 5 Unfamiliarity and complexity	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

Highest scores: bold red

Lowest scores: red

***Raw means have been substituted as marginal means were not estimable due to discrepancy between group sizes. The group 'White British' dominates (899 respondents), with a relatively small number of people in other groups.** The number of respondents in each group is shown in brackets in each case.

Although a clear link between ethnicity and people's perceptions of 'neatness' was identified, the interpretation of these results is impossible. These results, (Table 12) are raw mean scores. The raw mean is of limited value to the interpretation of results as this 'raw' result incorporates the effect of multiple overlapping variables, eg., planting variables such as structure, character and flowering, background variables such as educational qualifications as well as ethnicity per se; ie., this value does not represent the individual main effect of the variable Ethnicity. In this case the highest raw mean score for Neatness, (Factor 3), was recorded for the Asian Indian group, comprising (9) individuals. Of this group, 4 individuals were members of the same family, who viewed the herbaceous Oudolf borders at RHS Wisley. The high score reflects the characteristics of the planting, (Structure, character, flowering) as well as educational qualifications, gender mix and ethnicity. In order to interpret the data accurately it is essential to calculate marginal means which are adjusted to take into account different group sizes. In this case this was impossible due to the extreme discrepancies in group size.

Interview evidence discussed later does highlight the impact of ethnicity on perceptions of neatness. One Asian Indian interviewee attributed her intolerance of untidiness to her upbringing in India where the word for 'untidy' is the same as that for 'dirty'.

1.4.2.iii) Economic Status

Economic status had a significant, but again small effect on perception of **Unfamiliarity and complexity**, (2.4%, (0.001)).

Table 14: The Effect of Economic Status on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which ethnicity influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Economic Status (Raw mean score, (n) and Rank Highest (1) – Lowest (8))							
			Paid employed/Self employed	Retired	Full time student	Living with family	Unemployed/seeking work	Looking after family/home	Long term sick/disabled	Other
Factor 1 Colour, attractiveness and invertebrate presence	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

Factor 2 Psychological and physical well - being	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Factor 3 Neatness	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Factor 5 *Unfamiliarity and complexity	P = < 0.01	2.4	0.047 (502), 3	0.028 (472), 2	-0.142 (51), 4	0.220 (4), 1 Highest	-0.649 (19), 7	-0.467 (58), 6	-0.692 (16), 8 Lowest	-0.455 (14), 5

'ns' indicates not significant at the 95% level

Highest scores: bold red

Lowest scores: red

***Raw means have been substituted as marginal means not estimable due to discrepancy between group sizes. The groups Paid employed/self - employed (502 respondents) and Retired, (472 respondents) dominate, with a relatively small number of people in other groups. The number of respondents in each group is shown in brackets in each case.**

As in the case of Ethnicity, although a significant relationship between economic status and familiarity has been identified, interpretation of this is difficult, as these scores (Table 13) are raw means as previously discussed. The three groups recording the highest scores for Unfamiliarity and complexity (Factor 5), were Living with family, Retired and Paid employed/self - employed. Many people in these groups (particularly large groups Retired/Employed) had travelled significant distances from home to 'visit' private gardens, which would appear unfamiliar/ complex. The three groups recording the lowest scores for Unfamiliarity and complexity (Factor 5), were Long term sick/disabled, Unemployed/seeking work and Looking after family/home. Many people in these groups were tied to their local area, and seemed to spend significant amounts of time out in local green spaces, which would appear familiar. Some of the 'looking after family' group took children to private gardens such as Wisley, but did this regularly, so the surroundings did not appear 'unfamiliar and complex'.

In order to interpret the data accurately it is essential to calculate marginal means which are adjusted to take into account different group sizes. In this case this was impossible due to the extreme discrepancies in group size.

1.4.2.iv) Educational Qualifications

Educational qualifications had significant, but small effects on perceptions of both **Native plant and invertebrate biodiversity**, (2.3 %, $P < 0.001$), and respondents' perceptions of their own **Psychological and physical well – being** during walks, (2.2%, $P < 0.01$).

Table 15: The Effect of Educational Qualifications on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which educational qualifications influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Educational Qualifications (Raw means, tukey scores, Rank 1 – 5,)				
			None	GCSE/O levels/Scottish standard grade	A' levels/Scottish higher grades/ I B	Degree	Masters' degree/ Doctorate
Factor 1 Colour, attractiveness and invertebrate presence	ns	ns	ns	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	$P < 0.01$	2.2	(-0.501), a,b (3rd)	(-0.238), a Highest (1st)	(- 0.534), b (4 th)	(-0.345),a,b (2 nd)	(-0.585), b Lowest (5th)
Factor 3 Neatness	ns	ns	ns	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	$P < 0.001$	2.3	(0.299), a Highest (1st)	(0.162), a,b (2 nd)	(0.072), a,b,c (3 rd)	(-0.044), b,c (4 th)	(-0.200), c Lowest (5th)
Factor 5 Unfamiliarity and complexity	ns	ns	ns	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

'a,b,c' indicate Sidak groups showing significant differences

Highest scores: bold red Lowest scores: red

People with the highest level of educational qualifications, i.e., a masters' degree or doctorate, recorded the lowest levels of psychological and physical well – being whilst conducting their walks and questionnaires, lower than people from any other group based on educational qualifications alone. This means they felt the least relaxed, comfortable and with less of a sense of escape from mundane routines and work, maybe because they did not seek escape from work.

The most qualified respondents also perceived the lowest levels of biodiversity associated with the plantings. This might have been related to their having more knowledge about biodiversity – related issues and therefore able to make an accurate assessment, or they might have perceived plantings as too artificial and horticultural to support native plant and invertebrate biodiversity. The highest levels of native plant and invertebrate diversity were recorded by people with no qualifications at all.

The highest levels of psychological and physical well – being were recorded by respondents with GCSE/O' level / Scottish standard grade qualifications, indicating that they felt the most relaxed, comfortable and the greatest sense of escape from mundane routines and work when walking through the planting. This may be because they have less control over their work lives, and hence 'escape' is more strongly felt.

1.4.2.v) Landscape Professionals

Respondents' status with respect to the landscape profession also had a significant yet small effect on their own **Psychological and physical well – being** during walks, (3.2%, $P = < 0.001$).

Table 16: The Effect of being a Landscape Professional on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which being a landscape professional influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Landscape prof vs Non – landscape prof (marginal mean difference) and Sidak score	
			Landscape professional	Non - landscape professional
Factor 1 Colour, attractiveness and invertebrate presence	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	0.000	3.2	-0.778,b Lowest	0.778, a Highest
Factor 3 Neatness	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	ns	ns	ns	ns
Factor 5 Unfamiliarity and complexity	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

'a,b,c' indicate Sidak groups showing significant differences

Highest scores: **bold red**

Lowest scores: red

Belonging to the landscape profession had no bearing on any of the four factors relating to the visual characteristics of the planting through which respondents were walking, yet there was a significant relationship between belonging to the landscape profession and psychological and physical well – being whilst walking through the planting. These respondents recorded a significantly lower level of psychological and physical well – being during walks than did other respondents. This may be because the well – being factor reflected respondents' assessment of their own feelings of escape from mundane routines and work. Members of the landscape profession may either have associated being in areas of planting with work, so they did not feel the 'escape' as strongly, or they may not have felt the need to escape from work.

1.4.3. Respondents' beliefs and values: Regressions between Walk PCA Factors and Thoughts PCA Factors

As well as focusing on the effects of planting and background variables on people's reactions to their walk through the planting, the effects of their underlying beliefs and values were also considered. Respondents' beliefs and values were represented by the 'thoughts' PCA factors which incorporate variables representing attitudinal statements from the 'thoughts' section of the questionnaire. Regressions were carried out to identify possible relationships (correlations)

between people’s beliefs and values (thoughts PCA factors) and their perceptions (walk PCA factors).

1.4.3.i) Well – being and habitat biodiversity value

Thoughts Factor 1, concerning **Well - being and the value of biodiversity** in green spaces had a significant but small effect on perception of Native plant and invertebrate biodiversity, (1.2%, $P = < 0.001$), **Neatness**, (0.8%, $P = < 0.05$), **Colour, attractiveness and invertebrate presence**, (0.6%, $P = < 0.01$), and respondents’ perception of their own **Psychological and physical well – being** during walks, (0.35%, $P = < 0.001$).

Table 17: Thoughts Factor 1: Well - being and biodiversity value. The percentage effect (%) represents the extent to which thoughts PCA factor ‘Well – being and habitat biodiversity value’ influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Regression coefficient	Description
Factor 1 Colour, attractiveness and invertebrate presence	$P = < 0.01$	0.6	+0.064 Positive correlation	For every 1.0 increase in respondents’ Thoughts Fac 1 Well - being and biodiversity score there is a 0.064 increase in respondents’ Walk Fac 1 Colour, attractiveness and invertebrate presence score
Factor 2 Psychological and physical well - being	$P = < 0.001$	0.35	+0.215 Positive correlation	For every 1.0 increase in respondents’ Thoughts Fac 1 Well - being and biodiversity score there is a 0.215 increase in respondents’ Walk Fac 2 Psychological and physical well – being score
Factor 3 Neatness	$P = < 0.05$	0.8	+0.086 Positive correlation	For every 1.0 increase in respondents’ Thoughts Fac 1 Well - being and biodiversity score there is a 0.086 increase in respondents’ Walk Fac 3 Neatness score
Factor 4 Native plant and invertebrate biodiversity	$P = < 0.001$	1.2	+0.105 Positive correlation	For every 1.0 increase in respondents’ Thoughts Fac 1 Well - being and biodiversity score there is a 0.105 increase in respondents’ Walk Fac 4 Native plant and invertebrate biodiversity score
Factor 5 Unfamiliarity and complexity	ns	ns	ns	ns

‘ns’ indicates not significant at the 95% level

Respondents expressed their beliefs concerning the potentially restorative qualities of outdoor green spaces and the value of biodiversity through the ‘thoughts’ section of the questionnaire. As stated earlier, the thoughts factor ‘Well – being and biodiversity’, was defined by four individual variables, ‘spirits’ (outdoor green spaces lift my spirits), ‘likeout’ (I like being in outdoor green spaces), ‘habitat’ (plants, shrubs and trees provide valuable habitats for butterflies, bees and other insects), and ‘eco’ (insects such as flies, butterflies and bees are an important part of ecosystems).

Those who reported a higher general level of appreciation of outdoor green spaces and valued habitat biodiversity via their ‘thoughts’ recorded slightly higher levels of; Factor 1, Colour,

attractiveness and invertebrate presence, Factor 2, Psychological and physical well – being, Factor 3 Neatness and Factor 4 Native plant and invertebrate biodiversity during walks through planting, than did those who reported a lower general level of appreciation.

This is important, because it means that people who were already predisposed to feeling positive about planting and the psychological and biodiversity value of green outdoor environments perceived the planting they actually walked through as more colourful and attractive, neater, with higher levels of native plant and invertebrate biodiversity than people who were less predisposed to feel this way. A higher level of psychological and physical well – being was also associated with their walk experience than for people who were less predisposed to feel this way.

1.4.3.ii) The Belief in the reality of Climate Change

Thoughts Factor 2, concerning the acceptance of the **reality of Climate change** and its potential consequences had a very small but significant effect on both respondents’ perception of their own **Psychological and physical well – being** during walks, (0.6%, $P < 0.05$), and perception of **Native plant and animal biodiversity**, (0.4%, ($P < 0.05$)).

Table 18: Thoughts Factor 2: Climate change reality. The percentage effect (%) represents the extent to which thoughts PCA factor ‘Climate change reality’ influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Regression coefficient	Description
Factor 1 Colour, attractiveness and invertebrate presence	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	$P < 0.05$	0.6	+0.085 Positive correlation	For every 1.0 increase in respondents’ Thoughts Fac 2 Climate Change Reality score there is a 0.085 increase in respondents’ Walk Fac 2 Psychological and physical well – being score
Factor 3 Neatness	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	$P < 0.05$	0.4	+0.058 Positive correlation	For every 1.0 increase in respondents’ Thoughts Fac 2 Climate Change Reality score there is a 0.058 increase in respondents Walk Fac 4 Native plant and invertebrate biodiversity score
Factor 5 Unfamiliarity and complexity	ns	ns	ns	ns

‘ns’ indicates not significant at the 95% level

Respondents expressed their beliefs and values concerning the reality and consequences of climate change of through the ‘thoughts’ section of the questionnaire. As stated earlier, the thoughts factor, ‘Climate change reality’ was defined by three individual variables; by ‘globreal’, (the belief that climate change is happening), ‘globbad’ (the belief that climate change will have serious consequences), and ‘globchange’, (belief that climate change will change the plant species most suited to grow in UK parks and gardens over the next 50 yrs).

Respondents who reported stronger beliefs in the reality, potentially serious consequences and planting implications of climate change, recorded slightly higher levels of; Factor 2, psychological and physical well – being and Factor 4 Native plant and invertebrate biodiversity during walks through planting, than did people with lower levels of acceptance of climate change reality.

People who held these stronger climate change beliefs are likely to be the same people who showed an appreciation of the psychological and biodiversity value of outdoor green spaces above (Table 17). These people were informed about the reality of climate change and might have been more highly educated, or have possessed particular environment – related knowledge. They would therefore feel positive psychologically and physically about the walk experience, and would be more likely to distinguish between native and non – native biodiversity.

1.4.3.iii) The Acceptance of non – native plant species

Thoughts Factor 3, concerning the **Acceptance of non – native plant species** had a very small but significant effect on perception of **Native plant and animal biodiversity**, (0.7%, $P < 0.01$), and **Colour, attractiveness and invertebrate presence**, (0.5%, $P < 0.05$).

Table 19: Thoughts Factor 3: Acceptance of non – native plant species. The percentage effect (%) represents the extent to which thoughts PCA factor ‘Acceptance of non – native plant species’ influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Regression coefficient	Description
Factor 1 Colour, attractiveness and invertebrate presence	$P < 0.05$	0.5	+0.060 Positive correlation	For every 1.0 increase in Thoughts Fac 3 Acceptance of non – native plant species there is a 0.060 increase in Walk Fac 1 Colour, attractiveness and invertebrate presence
Factor 2 Psychological and physical well - being	ns	ns	ns	ns
Factor 3 Neatness	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	$P < 0.01$	0.7	+0.080 Positive correlation	For every 1.0 increase in Thoughts Fac 3 Acceptance of non – native plant species there is a 0.080 increase in Walk Fac 4 Native plant and invertebrate biodiversity
Factor 5 Unfamiliarity and complexity	ns	ns	ns	ns

‘ns’ indicates not significant at the 95% level

Respondents also expressed their beliefs and values concerning non – native plant species through the ‘thoughts’ section of the questionnaire. Factor 3 is a measure of people’s acceptance of non – native plant species and is defined by two variables, ‘hapnat’ (I would be happy to see non – native species growing in UK parks and gardens), and ‘acceptnat’ (I would accept non – native plant species in UK parks and gardens if they were better – suited to the climate than present – day species).

Respondents who reported higher levels of acceptance of the planting of non – native plant species in UK parks and gardens recorded slightly higher scores for Factor 1, Colour, attractiveness and invertebrate presence and Factor 4 Native plant and invertebrate biodiversity during walks through planting than did those with lower levels of acceptance of non – native plant species.

This indicates that people who were accepting of non – native planting were particularly positive about the visual aesthetic qualities of the planting, viewing it as more colourful, attractive and with a greater insect abundance at the time of their walk than those with lower levels of acceptance. These people might also have been more educated or in possession of particular environmental knowledge, as above, equipping them to recognise and distinguish between native and non – native biodiversity.

1.5. Overall Summary; All Vegetation Communities

Considering human visual and aesthetic response to the planting, the characteristics of the planting itself were most important in influencing these, more so than people’s background socio – demographic factors, or their underlying beliefs and values. This is a very interesting finding for landscape architecture, the nature of the plantings that we design really does matter with the public. The one single most important factor affecting perceptions of colour, attractiveness and the immediate invertebrate presence was flowering. Structure and character were also important. Structure affected perceptions of neatness and unfamiliarity and complexity, but significantly did not affect perceptions of colour, attractiveness and invertebrate presence. Considering species character, people expressed a preference for least natural planting which was seen as the most colourful and attractive, with the most invertebrates present. This was also seen as the neatest, most unfamiliar and complex.

In contrast, people’s psychological and physical well – being whilst walking through the planting was more dependent on their background socio – demographic characteristics (gender, educational qualifications and whether they were a landscape professional or not) and their underlying beliefs and values, than the planting characteristics. Importantly, people who were well informed about climate change and already recognised the psychological benefits and biodiversity value of outdoor natural spaces both responded more positively than others to the aesthetic qualities of the planting and reported higher levels of psychological and physical well – being whilst walking through the planting than did others. Structure was the only planting characteristic that had any bearing on people’s well – being. People felt most comfortable and relaxed when walking through areas of planting moderately natural in structure with some degree of human design intervention, rather than ‘wild’ nature, or highly designed planting.

Section 2: Woodland Communities

2.1 Summary of Principal Components Analysis (PCA) Outcomes; Woodland Communities

2.1.1. Walking through the planting

Table 1 shows the loading of individual walk variables such as ‘tidy’ (planting looks tidy) onto specific factors. In the case of woodland communities, individual variables load onto four main factors.

Table 1: The loading of individual attitudinal ‘walk’ variables onto specific factors

Factors (1-4 accounted for 56.155% total variance)	Variables	Loadings (=/ $>$ 0.5)
<u>Factor 1 (28.325% variance)</u> Neatness and colour	tidy cared for designed colourful colcomb	0.790 0.737 0.697 0.578 0.540
<u>Factor 2 (11.495% variance)</u> Complexity, interest and attractiveness	complex intplant attplant nspec unique	0.743 0.723 0.623 0.548 0.503
<u>Factor 3 (9.268% variance)</u> Psychological and physical well being	relaxed comfort escape	0.832 0.783 0.719
<u>Factor 4 (7.067% variance)</u> Native plant and invertebrate biodiversity	nbees nnative bees	0.675 0.669 0.613

The first factor is named ‘neatness and colour’ because it is dominated by individual variables referring to aspects of neatness and colour perception, ie.; ‘tidy’ (planting looks tidy), ‘cared for’ (planting looks cared for), ‘designed’ (planting looks designed), ‘colourful’ (the planting is colourful) and ‘colcomb’ (the colour combination is attractive). In the case of factor 1, planting perceived as ‘tidy’ was also perceived as looking cared for, designed and colourful, with attractive colour combinations. The same pattern follows for the other factors. Factor 2, ‘Complexity, interest and attractiveness’, is also dominated and defined by five individual variables, in this case, ‘complex’ (planting is structurally complex), ‘intplant’ (the planting is interesting), ‘attplant’ (the planting is attractive), ‘nspec’ (the number of species present), and ‘unique’ (the walk reveals a special unique place). The three variables referring to people’s psychological and physical restoration, ie ‘relaxed’ (feeling relaxed), ‘comfort’ (feeling

comfortable), and ‘escape’ (being allowed to escape mundane routines and work) all load onto one factor, which has therefore been named ‘Psychological and physical well – being’. This means that people’s relaxation was also associated with their feeling comfortable and being allowed to escape mundane routines and work. Finally, Factor 4 refers to people’s perceptions of the native plant and invertebrate diversity along the walk. Three factors load onto this; ‘nbees’ (the number of native UK insects present, ‘nnative’ (the number of native UK plant species present), and ‘bees’ (the planting is good for butterflies, bees and other insects).

2.1.2. Respondents’ thoughts

Table 2 shows the loading of individual thoughts variables such as ‘spirits’ (outdoor green spaces lift my spirits) onto specific factors. In this case individual variables loaded onto four main factors.

Table 2: The loading of individual attitudinal ‘thought’ variables onto specific factors

Factors (1-4 accounted for 60.960% total variance)	Variables	Loadings (= / > 0.5)
<u>Factor 1 (24.527% variance)</u> Well – being , biodiversity and colour	spirits	0.793
	eco	0.752
	likeout	0.747
	habitat	0.722
	colour	0.582
<u>Factor 2 (15.685% variance)</u> Climate change reality	globreal	0.913
	globbad	0.912
	globchange	0.844
<u>Factor 3 (12.036% variance)</u> Acceptance of non – native plant sp.	hapnat	0.862
	acceptnat	0.819
<u>Factor 4 (8.712% variance)</u> Acceptance of non - native plant sp. and compatibility with native invertebrates	natonly	0.823
	natbee	0.822

The first factor, ‘Well – being, biodiversity and colour’, is defined by five individual variables; ‘spirits’ (outdoor green spaces lift my spirits), ‘eco’ (insects such as flies, butterflies and bees are an important part of ecosystems), ‘likeout’ (I like being in outdoor green spaces), ‘habitat’ (plants, shrubs and trees provide valuable habitats for butterflies, bees and other insects) and ‘colour’ (I like looking at colourful flowering plants). This indicates that people who said they generally like being in outdoor green spaces also said these spaces lift their spirits. These same people also appreciated planting for its habitat value, considered insects an important part of ecosystems and liked looking at colourful flowering plants. Factor 2, ‘Climate change reality’, is defined by ‘globreal’, (the belief that climate change is happening), ‘globbad’ (the belief that climate change will have serious consequences), and ‘globchange’, (belief that climate change will change the plant species most suited to grow in UK parks and gardens over the next 50 yrs),

and shows that people with one of these beliefs also held the others. Factor 3 is a measure of people's acceptance of non – native plant species and is defined by two variables, 'hapnat' (I would be happy to see non – native species growing in UK parks and gardens), and 'acceptnat' (I would accept non – native plant species in UK parks and gardens if they were better – suited to the climate than present – day species). Factor 4 gauges both 'Acceptance of non – native plant species and compatibility with native invertebrates' and is defined by the two variables, 'natonly' (planting in parks and gardens should be restricted to native species) and 'natbee' (native plants support more native insects than non – native plants.). The loading of these two variables onto the same factor indicates that generally people who thought planting should be restricted to native plant species also believed that native plant species supported more native invertebrates than non – native plants, and vice versa.

2.2. Summary of Analysis of Variance outcomes: Woodland Communities

Following the principal components analysis, multifactor analysis of variance was conducted using the Walk principal components factors as dependent. Table 3 shows the percentage contribution of each planting, and background variable, as well as the thoughts PCA factors, to the overall variability of respondents' perceptions of planting along the walk. As described, the walk PCA factors represent respondents' perceptions along the walk.

2.3. Relationships between Planting Stimulus, Background Socio – demographic Variables, Beliefs and Values and Perceptions and Preferences; Woodland Communities

A model that indicates the relationship between planting stimulus, background socio – demographic factors, respondents' beliefs and values and their perceptions and preferences is shown in Figure 1. Only variables which are significant at $P = < 0.05$ are included in the model. Proportional arrows are used to represent the size of the percentage effect of each significant variable, providing a visual account of relationships shown statistically in Table 3.

Table 3 and Figure 1 indicate that in the case of Woodland planting, (as in the case of All Vegetation Communities), people's reactions to the visual, and other aesthetic characteristics of the planting, as reflected by walk factors, 1, 2 and 4, were influenced more by the planting itself than respondents' background factors or their beliefs and values. Both table 3 and figure 1 indicate that four planting variables were significant; 'structure', 'character', 'private/public' and 'flowering % score' .

Focusing on these planting variables, the structure of the woodland areas people walked through had the greatest bearing on their reactions, influencing perceptions of the neatness, and colour, (24.6%) and complexity, interest and attractiveness of the planting, (21.2%). Structure also influenced perceptions of the native plant and invertebrate biodiversity of the woodland areas, although to a much lesser extent, (2.3%). The species character of the woodland areas had an effect on these same three aspects of people's perception, although to a lesser degree. In contrast to the combined results for all communities, in the case of Woodland planting, flowering played a reduced role in influencing people's reactions, yet did have a bearing on people's perception of the neatness and colour of the planting, (6.7%). Whether or not the woodland was in a private garden such as RHS Wisley, or in a public space such as Fairlands Valley park affected the level of native plant and invertebrate presence perceived to be present, as described later.

Two background factors, (gender and educational qualifications) were also seen to have some effect on people's perceptions of the native plant and invertebrate biodiversity of the woodland areas they walked through.

No characteristics of the woodland planting appear to have had an influence the levels of people's psychological and physical well – being recorded whilst they were walking through the planting. In the case of woodland, just one background factor, educational qualifications, appeared to affect well – being. Respondents' general beliefs and values in relation to 'well – being and biodiversity' were also important. As in the case of All Vegetation Communities, people who already appreciated outdoor green spaces for their psychological, and biodiversity value were likely to react more strongly than those who had lower appreciation levels, in terms of their own well – being during their walk through an area of planting.

As in the case of results for All Vegetation Communities, this suggests that whilst the planting variables had a bearing on people's perception of the planting itself, their own mental and physical well – being were more the product of their background factors and underlying beliefs and values.

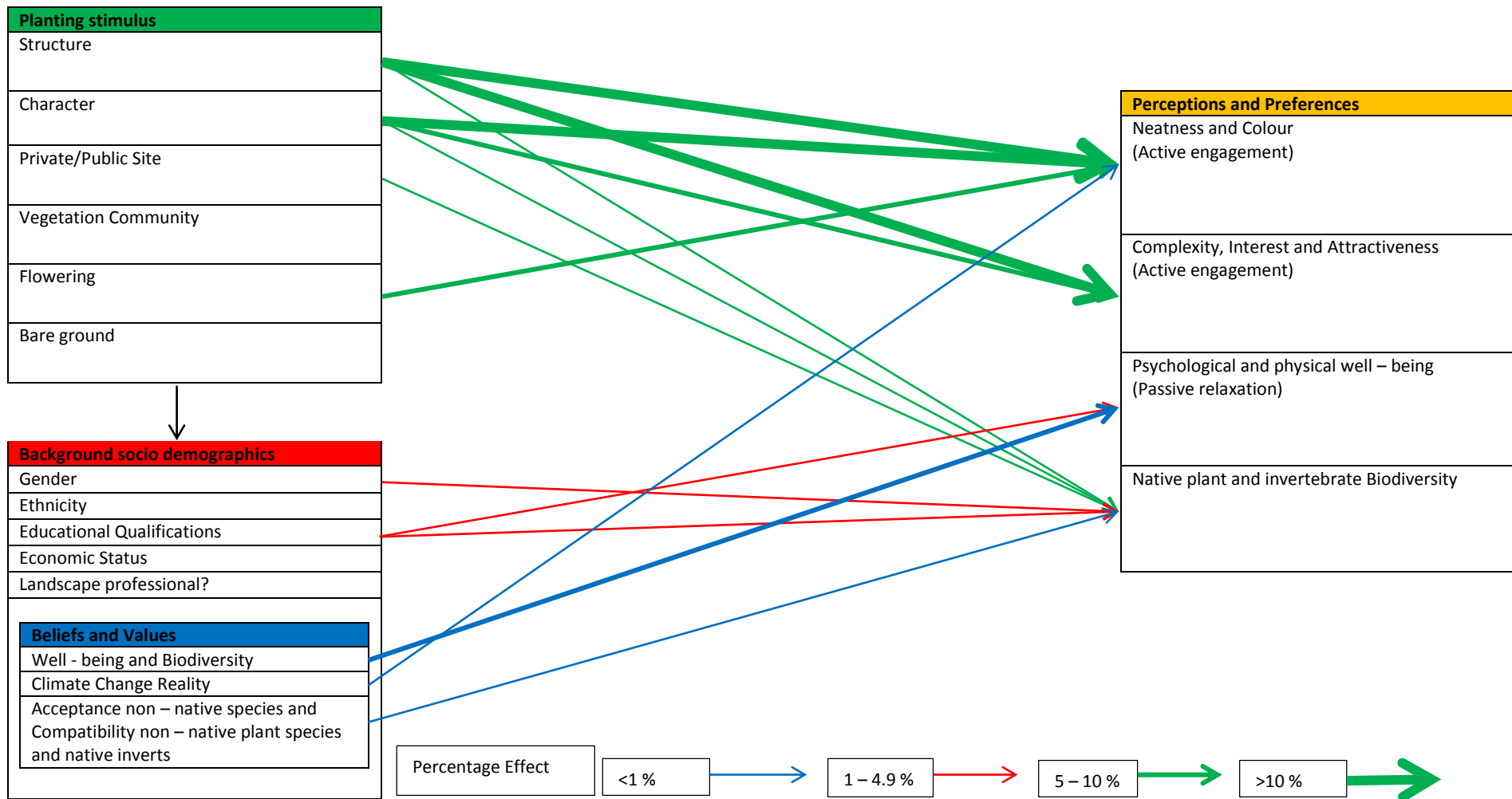
Table 3: Effect of the planting variables, background variables and thoughts factors on the walk factors and variables for woodland communities

Percentages indicate the proportional contribution of a planting/background variable or thoughts factor to the overall variability of the walk factors

Asterisks (*, **, ***) indicate the degree to which variables and factors caused statistically significant differences in the walk factors (* = P < 0.05, ** = P < 0.01, *** = P < 0.001, ns = Not significant < 0.05)

	Walk PCA FACTORS			
	Factor 1 Neatness and Colour	Factor2 Complexity, interest and attractiveness	Factor3 Psychological and physical well being	Factor4 Native plant and invertebrate biodiversity
Planting variables				
Structure	24.6 ***	21.5 ***	ns	2.3 **
Character	15.3 ***	7.0 ***	ns	3.5 **
Private/public	ns	ns	ns	1.1 *
Flowering % score	6.7 ***	ns	ns	ns
Bare% score	ns	ns	ns	ns
Background variables				
Gender	ns	ns	ns	1.9 **
Age	ns	ns	ns	ns
Ethnicity	ns	ns	ns	ns
Livurb	ns	ns	ns	ns
Lifurb	ns	ns	ns	ns
Edqual	ns	ns	4.9 *	2.8 *
Ecstat	ns	ns	ns	ns
Landpro	ns	ns	ns	ns
Landper	ns	ns	ns	ns
Horper	ns	ns	ns	ns
Biopro	ns	ns	ns	ns
Envpro	ns	ns	ns	ns
Envper	ns	ns	ns	ns
Thoughts PCA Factors				
Factor1 Well - being, biodiversity and colour	ns	ns	6.2 ***	ns
Factor 2 Climate change reality	1.4 **	ns	ns	ns
Factor3 Acceptance of non – native plant species	ns	ns	ns	ns
Factor4 Acceptance of non – native plant sp and compatibility with native inverts	ns	ns	ns	0.9 *
	502 cases	300 cases	292 cases	450 cases

Figure 1: Woodland Communities: Model Showing Relationships between Planting Stimulus, Background Socio – demographic factors, Beliefs and Values and Perceptions and Preferences; proportional arrows indicate the percentage effect of each significant variable.



2.4. Multifactor Anovas showing Walk PCA factors as Dependent: Interpretation of results : Woodland Communities

Once the independent effect of each significant variable had been identified using a two stage analysis of variance, as explained above, post hoc multiple comparisons were carried out to distinguish where there were significant differences between groups or categories, facilitating interpretation of the results. The effects of planting variables, then motive variables, background variables and finally beliefs and values, are presented and described.

2.4.1 Planting Variables

2.4.1.i) Planting Structure

Planting structure had a significant effect on three Walk factors; dominantly on perception of both **Neatness and Colour**, (24.6%, $P < 0.001$), and **Complexity, interest and attractiveness**, (21.5%, $P < 0.001$). The effect on perception of **Native plant and invertebrate biodiversity**, (2.3%, $P < 0.01$), was much smaller.

Table 4: The effect of Structure (least to most natural) on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which structure influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Structure (marginal mean score) and Sidak scores a,b,c		
			Least natural (1)	Moderately natural (2)	Most natural (3)
Factor 1 Neatness and colour	$P < 0.001$	24.6	Highest (0.256), a	Intermediate (-0.043), a	Lowest (-0.528), b
Factor 2 Complexity, interest and attractiveness	$P < 0.001$	21.5	Lowest (-0.169), b	Highest (0.058), a	Intermediate (-0.167), a
Factor 3 Psychological and physical well being	ns	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	$P = 0.01$	2.3	Lowest (0.093), b	Intermediate (0.106), b	Highest (0.449), a

'ns' indicates not significant at the 95% level

'a,b,c' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

The structure of the woodland areas people walked through had an influence on the three visual, aesthetic aspects of the experience, (factors 1, 2 and 4), but not on people's psychological and physical well – being.

People walking through woodland areas of planting perceived arboretum – style woodland areas (least natural in structure) as the neatest and most colourful, but also as the least complex, interesting and attractive. They were also seen as having the lowest native plant and invertebrate biodiversity. In contrast, multi – layered woodlands (most natural in structure) were viewed as the least neat, and colourful, yet they were accurately perceived as likely to provide the highest levels of native plant and invertebrate biodiversity. Moderately natural woodlands, the intermediate category, were viewed as the most complex, interesting and

attractive, indicating that in the case of woodland areas people preferred (in terms of attractiveness) those displaying some cues to human design intervention over wild woods (most natural) or the most highly designed (least natural) arboretum – style woods.

2.4.1.ii) Species Character

Species character had a significant effect on the same three Walk factors; most strongly for perception of **Neatness and Colour**, (15.3%, $P < 0.001$). **Complexity, interest and attractiveness** registered (7.0% , $P < 0.001$), and **Native plant and invertebrate biodiversity**, (3.5 % , $P < 0.01$)

Table 5: The effect of Species Character (least to most natural) on respondents’ perceptions of their walk. The percentage effect (%) represents the extent to which species character influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Character (marginal mean score) and Sidak scores a,b,c		
			Least natural (1)	Moderately natural (2)	Most natural (3)
Factor 1 Neatness and colour	$P < 0.001$	15.3	Highest (0.463), a	Lowest (-0.634), b	Intermediate (-0.145), b
Factor 2 Complexity, interest and attractiveness	$P < 0.001$	7.0	Highest (0.014), a	Intermediate (-0.335), a,b	Lowest (-0.956), b
Factor 3 Psychological and physical well being	ns	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	$P < 0.01$	3.5	Lowest (0.003), b	Highest (0.344), a	Intermediate (0.304), a,b

‘ns’ indicates not significant at the 95% level

‘a,b,c’ indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

As in the case of woodland structure, the species character of the woodland areas people walked through had an influence on the three visual, aesthetic aspects of the experience, (factors 1, 2 and 4), but not on people’s psychological and physical well – being.

People walking through woodland areas perceived unfamiliar (least natural) woodlands such as the ‘subtropical’ woodland planting at Abbotsbury, Eucalypts at Wisley and the *Cordyline australis* planting in Torquay as the neatest, most colourful and most complex, interesting and attractive. Respondents perceived woodlands with the least natural species character as providing the lowest levels of native plant biodiversity. In contrast, woodlands most similar in species character to natural woodlands dominated by species such as oak, ash and hornbeam, which form the familiar background planting in public outdoor spaces such Fairlands Valley Park in Stevenage, were viewed as the least complex, interesting and attractive. This shows that context aside, in terms of woodland attractiveness, the public are prepared to see and able to appreciate unfamiliar exotic species over familiar native ones.

2.4.1.iii) Ownership and Access

The distinction between **Private gardens and public green space** had a very small significant effect on just one walk factor; respondents' perception of Native plant and invertebrate biodiversity, (1.1%, $P = < 0.05$).

Table 6: The Effect of ownership and access (Private Gardens vs Public Green space) on respondents' perceptions of their walk. The percentage effect (%) represents the extent to ownership and access influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Private Gardens vs Public Greenspace (mean score) and Sidak scores a,b,c	
			Gardens	Greenspace
Factor 1 Neatness and colour	ns	ns	ns	ns
Factor 2 Complexity, interest and attractiveness	ns	ns	ns	ns
Factor 3 Psychological and physical well being	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	$P = < 0.05$	1.1	Lowest (-0.106), b	Highest (0.541), a

'ns' indicates not significant at the 95% level

'a,b,c' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

Results indicate that irrespective of structure, species character, and flowering, woodland planting in public greenspaces such as Fairlands Valley Park Stevenage was perceived as providing higher levels of native plant and invertebrate biodiversity than woodlands in gardens such as RHS Wisley.

2.4.1.iv) Flowering % Score

The flowering % score reflects the percentage of the planting which was covered in bloom at the time of the on-site walks and questionnaires and was calculated as described in Section 1.

Flowering % score, i.e. % flower cover, had a significant effect on one Walk factors; perception of **Neatness and Colour**, (6.7%, $P = < 0.001$)

Table 7: The effect of Flowering % Score on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which % flower cover influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percent age effect (%)	Flowering % score (marginal mean score) and Sidak scores a,b,c				
			1 (0-1%)	2 (2-9%)	3 (10 – 26%)	4 (27 – 45%)	5 (46%+)
Factor 1* Neatness and colour	P = < 0.001	6.7	(-0.054)	(-0.323)	Highest (0.415)	Lowest (-0.459)	n/a
Factor 2 Complexity, interest and attractiveness	ns	ns	ns	ns	ns	ns	ns
Factor 3 Psychological and physical well being	ns	ns	ns	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	ns	ns	ns	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

Factor 1* Sidaks inestimable due to discrepancy between group sizes (huge error possible as group 4 much smaller than others)

Highest scores: bold red

Lowest scores: red

A clear link between flowering % score and perceptions of 'neatness and colour' was identified, and it would appear from Table 7 that people rated woodlands with a % flower cover of 10 – 26% as the neatest and most colourful, and those with a higher % flower cover of 27 – 45% the least neat and colourful, yet accurate interpretation of these results is impossible. These results, (Table 7) are raw mean scores. The raw mean is of limited value to the interpretation of results as this 'raw' result incorporates the effect of multiple overlapping variables, e.g., other planting variables such as structure, character, background variables such as educational qualifications as well as flowering per se; ie., this value does not represent the individual main effect of the variable Flowering % score. In order to interpret the data accurately it is essential to calculate marginal means which are adjusted to take into account different group sizes. In this case this was impossible due to the extreme discrepancies in group size. In this case group 4 (27 – 45%) represents just 4 individual values and is much smaller than any other

2.4.2 Background Variables

2.4.2.i) Gender

In terms of **background variables**, **Gender** had a significant yet small effect on respondents' perception of **Native plant and invertebrate biodiversity**, (1.9%, $P < 0.01$).

Table 8: The Effect of Gender on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which gender influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Gender (marginal mean difference) and Sidak score	
			Female	Male
Factor 1 Neatness and colour	ns	ns	ns	ns
Factor 2 Complexity, interest and attractiveness	ns	ns	ns	ns
Factor 3 Psychological and physical well being	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	$P < 0.01$	1.9	Highest (0.255), a	Lowest (-0.255), b

'ns' indicates not significant at the 95% level

'a,b,' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

Results indicate that women recorded higher levels of native plant and invertebrate biodiversity when walking through woodland areas than did men.

2.4.2. ii) Educational Qualifications

Educational qualifications had a significant effect on both respondents' perception of their own **Psychological and physical well – being** during walks, (4.9%, $P < 0.05$) and perceptions of **Native plant and invertebrate biodiversity**, (2.8 %, $P < 0.05$)

Table 9: The Effect of Educational Qualifications on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which educational qualifications influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percent age effect (%)	Educational Qualifications (marginal means, sidak scores, Rank 1 – 5,)				
			None	GCSE/O levels/Scottish standard grade	A' levels/Scottish higher grades/ I B	Degree	Masters' degree/ Doctorate
Factor 1 Neatness and Colour	ns	ns	ns	ns	ns	ns	ns
Factor 2 Complexity, interest and attractiveness	ns	ns	ns	ns	ns	ns	ns
Factor 3 Psychological and physical well - being	P = < 0.05	4.9	(-0.229), a,b (4 th)	(0.101), a,b (2 nd)	(-0.154), a,b (3 rd)	(0.165), a Highest (1st)	(-0.484), b Lowest (5th)
Factor 4 Native plant and invertebrate biodiversity	P = < 0.05	2.8	(0.367), a Highest (1st)	(0.152), a,b (2 nd)	(-0.025), a,b (4 th)	(-0.003), a,b (3 rd)	(-0.225), b Lowest (5th)

'ns' indicates not significant at the 95% level

'a,b,' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

As in the case of All Vegetation Communities, people with the highest level of educational qualifications, ie., a masters' degree or doctorate, recorded the lowest levels of psychological and physical well – being whilst conducting their walks and questionnaires through woodland areas, lower than people from any other group based on educational qualifications alone. This means they felt the least relaxed, comfortable and had less of a sense of escape from mundane routines and work than other people, maybe because they did not seek escape from work to the same degree as others. They also perceived the lowest levels of native plant

and invertebrate biodiversity, perhaps because they had sufficient learnt information to allow them to make some assessment of these factors. The highest levels of perceived native plant and invertebrate diversity were recorded by people with no qualifications at all.

In woodland areas, the highest levels of psychological and physical well – being were recorded by respondents with first degree level qualifications, indicating that they felt the most relaxed, comfortable and the greatest sense of escape from mundane routines and work when walking through the planting.

2.4.3 Respondents' beliefs and values: Regressions between Walk PCA Factors and Thoughts PCA Factors

As stated in Section 1, the effects of respondents underlying beliefs and values as represented by the thoughts PCA factors were also considered. Regressions were carried out to identify possible relationships (correlations) between people's beliefs and values (thoughts PCA factors) and their perceptions (walk PCA factors).

2.4.3.i) Well – being, biodiversity value and colour

Thoughts Factor 1, concerning **Well - being and the value of biodiversity** in green spaces was dominant and had a significant effect on respondents' perception of their own **Psychological and physical well – being** during walks, (6.2%, $P = < 0.001$).

Table 10: Thoughts Factor 1 Well – being, biodiversity value and colour. The percentage effect (%) represents the extent to which thoughts PCA factor 'Well – being and habitat biodiversity value' influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Regression Coefficient	Description
Factor 1 Neatness and Colour	ns	ns	ns	ns
Factor 2 Complexity, interest and attractiveness	ns	ns	ns	ns
Factor 3 Psychological and physical well - being	$P = < 0.001$	6.2	+0.310 Positive correlation	For every 1.0 increase in respondents' Thoughts Fac 1 Well – being, biodiversity and colour score there is a 0.310 increase in respondents' Walk Fac 3 Psychological and physical well - being score
Factor 4 Native plant and invertebrate biodiversity	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

Respondents expressed their beliefs and concerning the potential restorative qualities of outdoor green spaces and the value of biodiversity through the 'thoughts' section of the questionnaire. As stated earlier, the thoughts factor 'Well – being, biodiversity value and colour', was defined by five individual variables, 'spirits' (outdoor green spaces lift my spirits), 'eco' (insects such as flies, butterflies and bees are an important part of ecosystems), 'likeout' (I like being in outdoor green spaces), 'habitat' (plants, shrubs and trees provide valuable habitats for butterflies, bees and other insects) and 'colour' (I like looking at colourful flowering plants).

Those who reported a higher general level of appreciation of outdoor green spaces, valued habitat biodiversity and liked looking at colourful flowering plants in general, expressed via their 'thoughts' recorded slightly higher levels of; Factor 3, Psychological and physical well – being, (Factor 3), during their specific walks through woodland planting. This is important, because it shows that those members of the public who were already predisposed to the psychological and aesthetic benefits of planting and green space were more likely to gain more

in terms of restoration, from a particular walk experience through a woodland area than other members of the public.

2.4.3.ii) The Belief in the reality of Climate Change

Thoughts Factor 2, concerning the acceptance of the **reality of Climate change** and its potential consequences had a significant if minor effect on respondents' perception of **Neatness and colour**, (1.4%, $P = < 0.01$)

Table 11: Thoughts Factor 2: Climate change reality. The percentage effect (%) represents the extent to which thoughts PCA factor 'Climate change reality' influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Regression Coefficient	Description
Factor 1 Neatness and Colour	$P = < 0.01$	1.4	+0.094 Positive correlation	For every 1.0 increase in respondents' Thoughts Fac 2 Climate Change reality score there is a 0.094 increase in respondents' Walk Fac 1 Neatness and Colour score
Factor 2 Complexity, interest and attractiveness	ns	ns	ns	ns
Factor 3 Psychological and physical well - being	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

Respondents expressed their beliefs and values concerning the reality and consequences of climate change through the 'thoughts' section of the questionnaire. As previously stated, the thoughts factor, 'Climate change reality' was defined by three individual variables; by 'globreal', (the belief that climate change is happening), 'globbad' (the belief that climate change will have serious consequences), and 'globchange', (belief that climate change will change the plant species most suited to grow in UK parks and gardens over the next 50 yrs).

Respondents who reported stronger beliefs in the reality, potentially serious consequences and planting implications of climate change, recorded slightly higher levels of Neatness and colour, (Factor 1), during walks through woodland planting. In the case of woodland areas, people who held these stronger beliefs in the reality and consequences of climate change are likely to be the same people who showed a general appreciation of the psychological value of outdoor green spaces, biodiversity and looking at colourful flowering plants, above (Table 10). These people would therefore be receptive to the neatness and colour of planting along their walk.

2.4.3.iii) Acceptance of non – native plant species and compatibility with native invertebrates

Thoughts Factor 4, concerning the **Acceptance of non – native plant species and their compatibility with native invertebrates** had a significant, but very small effect on perception of **Native plant and animal biodiversity**, (0.9%, $P < 0.05$).

Table 12: Thoughts Factor 4: Acceptance of non – native plant species and compatibility with native invertebrates. The percentage effect (%) represents the extent to which thoughts PCA factor ‘Acceptance of non – native plant species and compatibility with native invertebrates’ influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percent age effect (%)	Regression Coefficient	Description
Factor 1 Neatness and Colour	ns	ns	ns	ns
Factor 2 Complexity, interest and attractiveness	ns	ns	ns	ns
Factor 3 Psychological and physical well - being	ns	ns	ns	ns
Factor 4 Native plant and invertebrate biodiversity	$P < 0.05$	0.9	-0.092 Negative correlation	For every 1.0 increase in respondents’ Thoughts Fac 4 Acceptance of non – native plant species and compatability with native invertebrates score there is a 0.092 decrease in respondents’ Walk Fac 4 Native plant and invertebrate biodiversity score

‘ns’ indicates not significant at the 95% level

Respondents also expressed their beliefs and values concerning non – native plant species and their compatibility with native invertebrates through the ‘thoughts’ section of the questionnaire. Factor 4 gauges both ‘Acceptance of non – native plant species and compatibility with native invertebrates’ and is defined by the two variables, ‘natonly’ (planting in parks and gardens should be restricted to native species) and ‘natbee’ (native plants support more native insects than non – native plants).

Results show that people walking through woodland areas who indicated a generally higher level of acceptance of non – native plant species and their compatibility with native invertebrates recorded slightly lower levels of Native plant and invertebrate biodiversity, (Factor 4), than others, during their specific walks through the woodland planting, perhaps due to an enhanced ability to distinguish between native and non – native biodiversity. The size of the effect was very similar to that for vegetation plant communities as a whole, although in that case the correlation was positive, with people who accepted non – native plants perceiving higher levels of native plant and invertebrate biodiversity.

2.5. Overall Summary; Woodland Planting

When considering public reactions to woodland planting, as in the case of all vegetation communities, human visual aesthetic response was related to the characteristics of the

woodland planting rather than to the respondents' background factors. In the case of woodland planting the structure and species character were more important than flowering, yet in the case of the woodland walks there was very little visible flowering present at any site. Structure was the dominant factor influencing people's reactions, including perceptions of neatness and colour, and complexity, interest and attractiveness. Although arboretum – style planting was considered the neatest and most colourful, woodland moderately natural in structure showing some signs of human intervention was the most preferred in terms of overall attractiveness. This was considered more attractive than more natural, wilder – looking woodland, or arboretum style planting, although the wilder woods were considered the most biodiverse. In terms of character and overall attractiveness, people preferred the least natural woodlands such as eucalypts, cordylines and subtropical woodlands, to the more familiar indigenous species, although there was no specific focus on context here.

In the case of woodland planting, no particular characteristic of the planting itself appeared to have a bearing on people's perception of psychological and physical well – being as they walked through the woods. This was related to just two factors; educational qualifications, with the most qualified reporting the lowest levels of restoration, and existing beliefs and values with respect to the psychological benefits of greenspace, and value of biodiversity. As in the case of all communities, people who already valued the psychological and aesthetic aspects of walking through green spaces with flowers, and valued biodiversity, were likely to feel more restored than others on their particular woodland walk.

Section 3: Shrub Communities

3.1 Summary of Principal Components Analysis (PCA) Outcomes; Shrub Communities

3.1.1. Walking through the planting

Table 1 shows the loading of individual walk variables such as ‘colourful’ (planting is colourful) onto specific factors. The concept of loading is explained in detail in Section 1. In the case of shrub communities, individual variables load onto four main factors.

Table 1: The loading of individual attitudinal ‘walk’ variables onto specific factors

Factors (1-4 account for 63.489% variance)	Variables	Loadings (= \geq 0.5)
<u>Factor 1 (35.579% variance)</u> Colour, interest and attractiveness	colourful	0.864
	colcomb	0.850
	intplant	0.722
	attplant	0.713
	unique	0.616
<u>Factor 2 (12.837% variance)</u> Psychological and physical well being	relaxed	0.836
	comfort	0.816
	escape	0.805
<u>Factor 3 (8.013% variance)</u> (Native) plant and invertebrate biodiversity	nbees	0.797
	nnative	0.723
	nspec	0.709
	bees	0.545
<u>Factor 4 (7.060% variance)</u> Neatness	designed	0.835
	tidy	0.745
	cared for	0.652

The first factor, and that accounting for by far the largest proportion of overall variability in responses, is named ‘colour, interest and attractiveness’, because it is dominated by the individual variables; ‘colourful’ (the planting is colourful), ‘colcomb’ (the colour combination is attractive), ‘intplant’ (the planting is interesting), ‘attplant’ (the planting is attractive) and ‘unique’ (the walk reveals a special unique place). Planting perceived as colourful was also perceived as having attractive colour combinations, as being interesting, attractive and the walk was perceived as revealing a special unique place. The same pattern follows for the other factors. The three variables referring to people’s restoration, ie ‘relaxed’ (feeling relaxed), ‘comfort’ (feeling comfortable), and ‘escape’ (being allowed to escape mundane routines and work) all load onto one factor, which has therefor been named ‘Psychological and physical well – being’. This means that planting which facilitated people’s relaxation was also associated with their feeling comfortable and being allowed to escape mundane routines and work.

Factor 3 is a measure of people’s perceptions of ‘Native plant and invertebrate biodiversity’. Four factors load onto this, ‘nbees’ (the number of native UK insects present), ‘nnative’ (the number of native UK plant species present), ‘nspec’ (the number of plant species perceived to be present) and ‘bees’ (planting is good for butterflies, bees and other insects). This shows that planting perceived as having high overall levels of plant and invertebrate biodiversity was also associated with native plant and invertebrate biodiversity. Finally, factor 4 gauges people’s perceptions of ‘Neatness’, and is defined by the three variables, ‘designed’ (planting looks designed), ‘tidy’, (planting looks tidy), and ‘cared for’ (planting looks cared for). The planting considered designed was also considered tidy and cared for.

3.1.2. Respondents’ thoughts

Table 2 shows the loading of individual thoughts variables such as ‘globbad’ (the belief that climate change will have serious consequences) onto specific factors. In this case individual variables loaded onto three main factors.

Table 2: The loading of individual attitudinal ‘thoughts’ variables onto specific factors

Factors (1 – 3 account for 53.101% total variance)	Variables	Loadings (>=/>0.5)
<u>Factor 1 (22.391% variance)</u>		
Climate change reality	globbad	0.934
	globreal	0.902
	globchange	0.854
<u>Factor 2 (17.545% variance)</u>		
Well – being , biodiversity and colour	spirits	0.813
	likeout	0.786
	habitat	0.676
	eco	0.663
	colour	0.569
<u>Factor 3 (13.165% variance)</u>		
Acceptance of non - native plant sp. and compatibility with native invertebrates	hapnat	0.784
	acceptant	0.709
	natonly	0.611
	natbee	0.523

The first factor, ‘Climate change reality’, is defined by ‘globbad’ (the belief that climate change will have serious consequences), ‘globreal’, (the belief that climate change is happening), and ‘globchange’, (belief that climate change will change the plant species most suited to grow in UK parks and gardens over the next 50 yrs), and shows that people with one of these beliefs also held the others. The second factor, ‘Well – being, biodiversity and colour’, is defined by five individual variables; ‘spirits’ (outdoor green spaces lift my spirits), ‘likeout’ (I like being in outdoor green spaces), ‘habitat’ (plants, shrubs and trees provide valuable habitats for butterflies, bees and other insects) ‘eco’ (insects such as flies, butterflies and bees are an important part of ecosystems), and ‘colour’ (I like looking at colourful flowering plants). This indicates that people who said they generally like being in outdoor green spaces also said these spaces lift their spirits. These same people also appreciated planting for its habitat value

and considered insects an important part of ecosystems. In the case of the shrub respondents, as with woodland respondents, these same people also liked looking at colourful flowering plants. Factor 3 is a measure of both 'acceptance of non – native plant species and compatibility with native invertebrates' and is defined by the four variables, 'hapnat' (I would be happy to see non – native species growing in UK parks and gardens), 'acceptnat' (I would accept non – native plant species in UK parks and gardens if they were better – suited to the climate than present – day species) 'natonly' (planting in parks and gardens should be restricted to native species) and 'natbee' (native plants support more native insects than non – native plants.). When questionnaire scores were allocated for these last two variables, they were scored inversely. ie., whereas 'agree strongly' was usually allocated a score of 5, in the case of these statements it was given a '1' and 'disagree strongly' was allocated a '5' Results therefore indicate that generally people who accept non – native planting and would be happy to see it in UK parks and gardens also think it is compatible with non – native invertebrates. People who were less accepting of non – native plants and thought planting should be restricted to native plant species also believed that native plant species supported more native invertebrates than non – native plants.

3.2. Summary of Analysis of Variance outcomes: Shrub Communities

Following the principal components analysis, multifactor analysis of variance was conducted using the Walk principal components factors as dependent. Table 3 shows the percentage contribution of each planting, motive and background variable, as well as the thoughts PCA factors, to the overall variability of respondents' perceptions of planting along the walk. The walk PCA factors represent respondents' perceptions along the walk.

3.3. Relationships between Planting Stimulus, Background Socio – demographic Variables, Beliefs and Values and Perceptions and Preferences; Woodland Communities

A model that indicates the relationship between planting stimulus, background socio – demographic factors, respondents' beliefs and values and their perceptions and preferences is shown in Figure 1. Only variables which are significant at $P = < 0.05$ are included in the model. Proportional arrows are used to represent the percentage effect of each significant variable, and the model provides a visual account of relationships shown statistically in Table 3.

Table 3 and Figure 1 indicate that human visual aesthetic response to shrub planting, as reflected by factors 1, 3 and 4, was related principally to characteristics of the planting itself, rather than to respondents' background characteristics or to their beliefs and values. These patterns correspond with findings from woodland communities, yet in this case flowering % score was the dominant factor. Flowering was related to all three aspects of visual aesthetic response, ie. factors 1, 3, and 4, as well as to people's feelings of well – being whilst they were walking through the shrubs, and this was the largest single influence on people's perceptions of colour, interest and the attractiveness of the shrub planting, (24.8%). The structure of the shrub planting was not related to any visual perceptual reaction, and species character affected only one, people's perceptions of neatness. The percentage of exposed bare ground also had a bearing on people's perceptions of colour, interest, attractiveness and of neatness.

Focusing on people's psychological and physical well – being whilst they were walking through the shrub planting, the biggest single influence appeared to be whether or not they were in the landscape profession, (11.3%), yet in the case of shrub planting, two planting

characteristics were also related to well – being, namely, planting structure, and as referred to earlier, the flowering score.

In the case of shrub planting, people’s underlying beliefs and values appeared to play a lesser role in influencing their reactions to the planting, than in the case of woodland planting, and there was no significant relationship between underlying beliefs and values and people’s well – being on the day of their walk. There was, however a relationship between people’s acceptance of non – native plants, their compatibility with non – native invertebrates, and perceptions of native plant and invertebrate biodiversity on the day of their walk through a shrub areas.

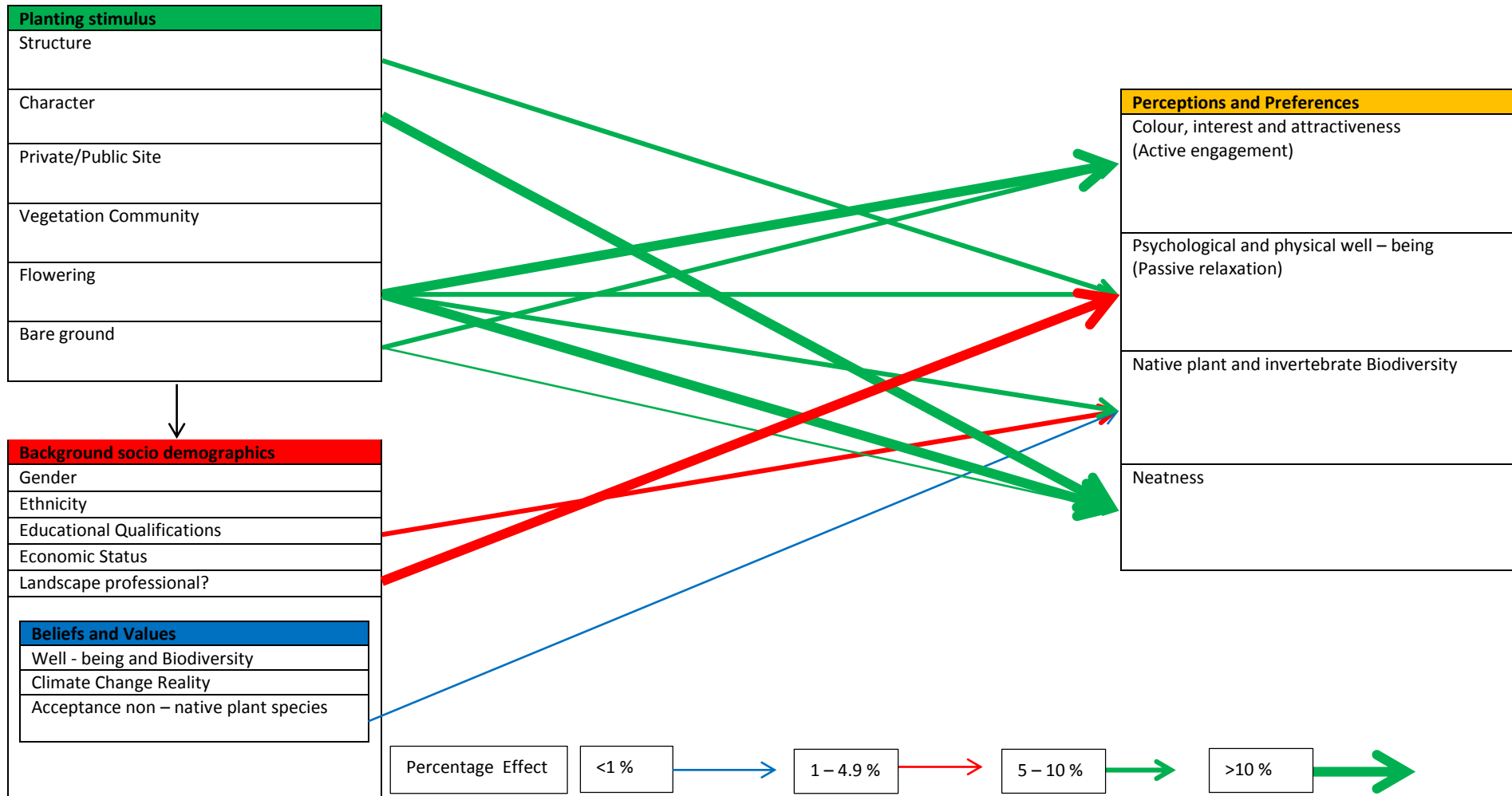
Table 3: Effect of the planting variables, background variables and thoughts factors on the walk factors and variables for shrub communities

Percentages indicate the proportional contribution of a planting/background variable or thoughts factor to the overall variability of the walk factors

Asterisks (*, **, ***) indicate the degree to which variables and factors caused statistically significant differences in the walk factors (* = P < 0.05, ** = P < 0.01, *** = P < 0.001, ns = Not significant < 0.05)

	Walk PCA FACTORS			
	Factor 1 Colour, interest and attractiveness	Factor2 Psychological and physical well being	Factor3 Native plant and invertebrate biodiversity	Factor4 Neatness
Planting variables				
Structure	ns	5.1 **	ns	ns
Character	ns	ns	ns	11.8 ***
Private/public	ns	ns	ns	ns
Flowering % score	24.8 ***	6.4 **	5.3 **	18.9 ***
Bare% score	9.9 ***	ns	ns	4.3 **
Background variables				
Gender	ns	ns	ns	ns
Age	ns	ns	ns	ns
Ethnicity	ns	ns	ns	ns
Livurb	ns	ns	ns	ns
Lifeurb	ns	ns	ns	ns
Edqual	ns	ns	5.5 *	ns
Ecstat	ns	ns	ns	ns
Landpro	ns	11.3 ***	ns	ns
Landper	ns	ns	ns	ns
Horper	ns	ns	ns	ns
Biopro	ns	ns	ns	ns
Envpro	ns	ns	ns	ns
Envper	ns	ns	ns	ns
Thoughts PCA Factors				
Factor1 Climate change reality	ns	ns	ns	ns
Factor 2 Well - being, biodiversity and colour	ns	ns	ns	ns
Factor 3 Acceptance of non – native plant sp and compatibility with native inverts	ns	ns	3.8 **	ns
	294 cases	240 cases	275 cases	295 cases

Figure 1: Shrub Communities: Model Showing Relationships between Planting Stimulus, Background Socio – demographic factors, Beliefs and Values and Perceptions and Preferences; proportional arrows indicate the percentage effect of each significant variable.



3.4. Multifactor Anovas showing Walk PCA factors as Dependent: Interpretation of results: Shrub Communities

Once the independent effect of each significant variable had been identified using a two stage analysis of variance, as explained above, post hoc multiple comparisons were carried out to distinguish where there were significant differences between groups or categories, facilitating interpretation of the results. The effects of planting variables, then motive variables, background variables and finally beliefs and values, are presented and described.

3.4.1 Planting Variables

3.4.1.i) Planting Structure

Shrub Planting structure had a significant effect on one Walk factor; respondents' perception of their own **Psychological and physical well – being** during walks, (5.1%, $P = < 0.01$), but no significant effect on any of the three visual, aesthetic aspects of the walk, (factors 1, 3 and 4).

Table 4: The effect of Structure (least to most natural) on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which structure influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Structure (marginal mean score) and Sidak scores a,b,c	
			Least natural (1)	Most natural (3)
Factor 1 Colour, interest and attractiveness	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	$P = < 0.01$	5.1	(- 0.976), b Lowest	(- 0.491), a Highest
Factor 3 Native plant and invertebrate biodiversity	ns	ns	ns	ns
Factor 4 Neatness	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

'a,b,' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

These results indicate that people felt a significantly greater sense of well – being when walking through shrub areas most natural in structure, such as the heathers at Hilliers and native woodland edge in Fairlands Valley Park in Stevenage, than those least natural in structure such as the flatter heathers at Wisley or hydrangea planting at the Savill Garden.

3.4.1.ii) Species Character

Shrub Species character also had a significant effect on just one Walk factor; perception of **Neatness** (11.8%, $P = < 0.001$). Character had no significant effect on any other perceptual factor.

Table 5: The effect of Species Character (least to most natural) on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which species character influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Character (marginal mean score) and Sidak scores a,b,c	
			Least natural (1)	Most natural (3)
Factor 1 Colour, interest and attractiveness	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	ns	ns	ns	ns
Factor 3 Native plant and invertebrate biodiversity	ns	ns	ns	ns
Factor 4 Neatness	$P = < 0.001$	11.8	(-0.557), b Lowest	(- 0.693), a Highest

'ns' indicates not significant at the 95% level

'a,b,' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

Results indicate that people rated shrub planting most natural in species character such as Fairlands Valley woodland edge, the heathers at Wisley and Hilliers as the neatest, significantly neater than shrub planting least natural in character such as the hydrangeas at Savill or the mounding arboretum – style shrubs at Hilliers.

3.4.1.iii) Flowering % Score

The flowering % score reflects the percentage of the planting which was covered in bloom at the time of the on-site walks and questionnaires and was calculated as described in Section 1.

Shrub Flowering % score, i.e.% flower cover, had a significant effect on all four Walk factors; as might be expected it had a large effect on perception **Colour, interest and attractiveness**, (24.8%, $P = < 0.001$), then a smaller effect on perception of **Neatness**, (18.9%, $P = < 0.001$), and smaller effects on both respondents' perception of their own **Psychological and physical well – being** during walks, (6.4%, $P = < 0.01$), and perception of **Native plant and invertebrate biodiversity**, (5.3%, $P = < 0.01$).

Table 6: The effect of Flowering % Score on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which % flower cover influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Flowering % score (mean score) and Sidak scores a,b,c				
			1 (0-1%)	2 (2-9%)	3 (10 – 26%)	4 (27 – 45%)	5 (46%+)
Factor 1* Colour, interest and attractiveness	P = < 0.001	24.8	(- 0.732), Lowest 5 th (55)	(- 0.329), 4 th (78)	(0.038), 3 rd (63)	(0.760) Highest 1 st (27)	(0.508) 2 nd (83)
Factor 2 Psychological and physical well - being	P = < 0.01	6.4	(- 0.712), a,b 4 th	(- 0.534), a Highest 1 st	(- 1.132), b Lowest 5 th	(- 0.661), a,b 3 rd	(- 0.628), a 2 nd
Factor 3 Native plant and invertebrate biodiversity	P = < 0.01	5.3	(- 0.416), c Lowest 5 th	(0.202), a Highest 1 st	(- 0.047), a,b,c 2 nd	(- 0.084), a,b,c 3 rd	(- 0.253), b,c 4 th
Factor 4 Neatness	P = < 0.001	18.9	(1.097), a Highest 1 st	(- 0.764), c 4 th	(- 1.187), d Lowest 5 th	(0.136), b 3 rd	(1.058), a 2 nd

'a,b,c' indicate Sidak groups showing significant differences

Factor 1*: Raw means have been substituted as marginal means not estimable. (n) given

Sidak's inestimable due to discrepancy between group sizes (huge error possible as group 4 much smaller than others)

Highest scores: bold red

Lowest scores: red

Shrub planting with a high flowering score of 4, (27 – 45%) was considered the most colourful, interesting and attractive, whereas that with the lowest flowering score of 1 (0 – 1%) was considered the least so. It is interesting that shrub planting with the highest flowering score of 5 (46%+ flower cover) was considered less attractive than that with a flower cover of 27 – 45%, suggesting there might be a threshold level of flower cover above which people find bright flowers less attractive.

The results for Factor 1 must, however be treated with caution because raw means have been substituted for the marginal mean. This ‘raw’ result incorporates the effect of multiple overlapping variables, eg., planting variables such as structure, character as well as flowering %, ie., this value does not represent the individual main effect of the variable Flowering % .

People associated shrub planting with much lower flower cover (2 – 9%) with the highest levels of well – being whilst they were walking through it, and this was also seen as providing the highest levels of native plant and invertebrate biodiversity. This is also important, as it shows that although more vibrant flowering shrubs were considered the most attractive, the potential for restoration was higher within areas of more muted green planting.

Shrub planting with the least flower, (0 – 1% flower cover) was perceived as the neatest.

3.4.1.iv) Bare Ground % Score

Percentage bare ground exposed in plantings had a significant effect on two Walk factors, **Colour, interest and attractiveness**, (9.9%, P = < 0.001), and **Neatness**, (4.3%, P = < 0.01). ‘Bare ground’ might have been a path surface or bare soil.

Table 7: The effect of Bare Ground % Score on respondents’ perceptions of their walk .The percentage effect (%) represents the extent to which % flower cover influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Bare Ground % score (mean score) and Sidak scores a,b,c				
			1 (0-1%)	2 (2-12%)	3 (13–35%)	4 (36 - 55%)	5 (56%+)
Factor 1* Colour, interest and attractiveness	P = < 0.001	9.9	(0.284) Highest 1 st (91)	(- 0.011), 3 rd (107)	(0.109), 2 nd (80)	n/a	(- 1.225) Lowest 4 th (28)
Factor 2 Psychological and physical well - being	ns	ns	ns	ns	ns	ns	ns
Factor 3 Native plant and invertebrate biodiversity	ns	ns	ns	ns	ns	ns	ns

Factor 4 Neatness	P = < 0.01	4.3	(- 0.211), b Lowest 4 th	(0.423), a Highest 1 st	(0.013), b 3 rd	n/a	(0.047), a,b 2 nd
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'ns' indicates not significant at the 95% level

'a,b,' indicate Sidak groups showing significant differences

Factor 1* Raw means have been substituted as marginal means not estimable. (n) given.

Sidak's inestimable due to discrepancy between group sizes (huge error possible as group 4 much smaller than others)

Highest scores: bold red

Lowest scores: red

These results show that people perceived shrub planting with the least bare ground exposed, (0 – 1%) as the most colourful, interesting and attractive, and that with the most bare ground exposed (56%+) as the least so. This second category represents a very immature area of hydrangea planting where the plants consisted of bare woody stems with a few green shoots. This planting was not well received by many respondents, who failed to understand why they were being asked to walk through it and considered it very unattractive. Caution must again be used when interpreting these results as they refer to 'raw' means. As in the case of flowering % score, this 'raw' result incorporates the effect of multiple overlapping variables, eg., planting variables such as structure, character and flowering, as well as Bare ground % score ie., this value does not represent the individual main effect of the variable Bare ground %.

Shrub planting with a bare ground cover 2 – 12% was considered the neatest, whereas that with the lowest cover of 0 – 1% was considered the least neat. This is significant because this is the same planting that people considered the most attractive, ie., in the case of shrub planting attractiveness clearly depends on more than neatness.

3.4.2. Background Variables

3.4.i) Educational Qualifications

In terms of background variables Educational qualifications had a significant effect on perception of Native plant and invertebrate biodiversity, (5.5 %, P = < 0.05)

Table 8: The Effect of Educational Qualifications on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which educational qualifications influenced responses to walk PCA factors.

Walk PCA Factors	Statistical significance	Percentage effect (%)	Educational Qualifications (Raw means, tukey scores, Rank 1 – 6,(n))					
			None	GCSE/O levels/Scottish standard grade	A' levels/Scottish higher grades/IB	Degree	Masters' degree	Doctorate
Factor 1 Colour, interest and attractiveness	ns	ns	ns	ns	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	ns	ns	ns	ns	ns	ns	ns	ns
Factor 3* Native plant and invertebrate biodiversity	P = < 0.05	5.5	(0.053) 3 rd (28)	(0.183) 2 nd (63)	(0.206) Highest 1st (56)	(- 0.079) 5 th (95)	(0.011), 4 th (24)	(- 0.169) Lowest 6th (9)
Factor 4 Neatness	ns	ns	ns	ns	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

Factor 3* Raw means have been substituted as marginal means not estimable due to discrepancy between group sizes. Sidaks inestimable due to discrepancy between group sizes (huge error possible as Doctorate group much smaller than others)

Highest scores: bold red

Lowest scores: red

These results indicate that people with the highest level of educational qualifications (doctorate) recorded the lowest levels of native plant and invertebrate diversity when walking through areas of shrub planting, significantly lower than people with A levels or equivalent qualifications. Because these scores are raw means and not estimable means, they also reflect variability in the planting people walked through, i.e., people with doctorates were probably aware they were walking through areas of 'non – native' planting in gardens such as Abbotsbury, and therefore rated it low in terms of nativeness. As explained previously the 'raw' mean incorporates the effect of multiple overlapping variables.

3.4.2.ii) Landscape Professionals

Respondents' status with respect to the **landscape profession** also had a significant and reasonably large effect on **Psychological and physical well – being** during walks, (11.3%, $P < 0.001$). This was the dominant background factor in the case of shrub planting.

Table 9: The Effect of being a Landscape Professional on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which being a landscape professional influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Landscape prof vs Non – landscape prof (marginal mean difference) and Sidak score	
			Landscape professional	Non - landscape professional
Factor 1 Colour, interest and attractiveness	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	0.000	11.3	(- 1.605), b Lowest	(1.605),a Highest
Factor 3 Native plant and invertebrate biodiversity	ns	ns	ns	ns
Factor 4 Neatness	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

'a,b,' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

Belonging to the landscape profession had no bearing on any of the three factors relating to the visual characteristics of the shrub planting through which respondents were walking, yet there was a significant relationship between belonging to the landscape profession and people's own psychological and physical well – being whilst they were walking through the planting. People who were members of the landscape profession recorded a significantly lower level of psychological and physical well – being than did other respondents, meaning they felt less relaxed, comfortable and less of a sense of escape from mundane routines and work than did others. As stated with reference to the combined results for all communities, this may be because the well – being factor reflected respondents' assessment of their own feelings of escape from mundane routines and work. Members of the landscape profession may either have associated being in areas of planting with work. This may apply particularly in the case of shrub planting.

3.4.3. Respondents' beliefs and values: Regressions between Walk PCA Factors and Thoughts PCA Factors

As stated in Section 1, the effects of respondents underlying beliefs and values as represented by the thoughts PCA factors were also considered. Regressions were carried out to identify possible relationships (correlations) between people's beliefs and values (thoughts PCA factors) and their perceptions (walk PCA factors).

3.4.3.i) Acceptance of non – native plant species and compatibility with native invertebrates

Thoughts Factor 3, concerning the **Acceptance of non – native plant species and their compatibility with native invertebrates** had a significant effect on perception of **Native plant and animal biodiversity**, (3.8%, $P = < 0.01$).

Table 10: Thoughts Factor 3: Acceptance of non – native plant species and compatibility with native invertebrates. The percentage effect (%) represents the extent to which thoughts PCA factor ‘Acceptance of non – native plant species and compatibility with native invertebrates’ influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percentage effect (%)	Regression coefficient	Description
Factor 1 Colour, interest and attractiveness	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	ns	ns	ns	ns
Factor 3 Native plant and invertebrate biodiversity	$P = < 0.01$	3.8	+0.186 Positive correlation	For every 1.0 increase in respondents Thoughts Fac 3 Acceptance of non – native plant species and compatibility with native invertebrates score there is a 0.186 increase in respondents Walk Fac 3 Native plant and invertebrate biodiversity score
Factor 4 Neatness	ns	ns	ns	ns

‘ns’ indicates not significant at the 95% level

Respondents expressed their beliefs and values concerning non – native plant species and their compatibility with native invertebrates through the ‘thoughts’ section of the questionnaire. As stated earlier, factor 3 gauges both ‘acceptance of non – native plant species and compatibility with native invertebrates’ and is defined by the four variables, ‘hapnat’ (I would be happy to see non – native species growing in UK parks and gardens), ‘acceptnat’ (I would accept non – native plant species in UK parks and gardens if they were better – suited to the climate than present – day species) ‘natonly’ (planting in parks and gardens should be restricted to native species) and ‘natbee’ (native plants support more native insects than non – native plants).

Results show that in the case of shrub planting, people who were accepting of non – native planting and understood that it was compatible with native invertebrates actually recorded higher levels of native plant and invertebrate biodiversity during their walks through the shrub planting. These people might also have been more educated or in possession of particular environmental knowledge, equipping them to recognise and distinguish between native and non – native biodiversity.

3.5. Overall Summary; Shrub Communities

In the case of shrub planting human visual aesthetic response to the planting was influenced more by the characteristics of the shrub planting itself than respondents’ background characteristics or underlying beliefs and values. In this case the dominant planting variable was flowering, which had a bearing on all aspects of people’s visual perceptual response, as well as

their well – being. Flowering was the largest single influence on perceptions of colour, interest and attractiveness, (24.8%), and interestingly, people saw shrub planting with a flower cover of 27 – 45% as more attractive than that with a higher percentage cover of 46+%, suggesting there might be a threshold level of flower cover beyond which perception of attractiveness declines.

The biggest single influence on people’s well – being whilst they were walking through the shrub planting was whether or not they belonged to the landscape profession, with landscape professionals recording much lower levels of restoration than non – landscape professionals. In the case of shrub planting two characteristics of the planting itself also influenced well – being; structure, with people finding most natural shrubs more restorative than least natural ones, and flowering. A relative low percentage of flower cover, (2 – 9 %) afforded people the most restorative experience when walking through shrub areas. This percentage flower cover was also associated with the highest levels of native biodiversity. This suggests that although people seek bright flower cover as an attractive stimulus, a more muted green environment provides the greatest opportunity for restoration.

In the case of shrub planting people’s beliefs and values played a minimal role in their perceptions, and yet people who were the most accepting of non – native plants and recognised their value to native invertebrates also recorded higher levels of native plant and invertebrate biodiversity whilst walking through shrub areas.

Section 4: Herbaceous Communities

4.1. Summary of Principal Components Analysis (PCA) Outcomes; Herbaceous Communities

4.1.1. Walking through the planting

As in prior sections, Table 1 shows the loading of individual walk variables such as ‘cared for’ (planting looks cared for) onto specific factors. In this case individual variables load onto three main factors

Table 1: The loading of individual attitudinal ‘walk’ variables onto specific factors

Factors (1 – 3 account for 52.258% variance)	Variables	Loadings (= / > 0.5)
Factor 1 (29.604% variance) Neatness, attractiveness, interest, colour and complexity	cared for	0.823
	attplant	0.756
	intplant	0.733
	designed	0.732
	colcomb	0.715
	tidy	0.714
	colourful	0.619
	complex	0.593
	unique	0.532
Factor 2 (13.276% variance) Psychological and physical well being	relaxed	0.831
	comfort	0.765
	escape	0.743
Factor 3 (9.378% variance) Native plant and invertebrate biodiversity and naturalness	nbees	0.756
	bees	0.696
	nnative	0.580
	natplant	0.550

Nine individual variables load onto and define the first walk factor, ‘Neatness, attractiveness, interest, colour and complexity’; ‘cared for’ (planting looks cared for), ‘attplant’, (planting is attractive), ‘intplant’ (planting is interesting), ‘designed’ (planting looks designed), ‘colcomb’ (the colour combination is attractive), ‘tidy’, (planting looks tidy), ‘colourful’ (the planting is colourful), ‘complex’ (planting is structurally complex), and ‘unique’ (the walk reveals a special unique place). As explained earlier, because there is a ‘commonality’ between the variables loading onto each factor, in the case of herbaceous planting, that perceived as attractive and interesting was also perceived as colourful with attractive colour combinations. The same planting was also perceived as cared for, designed and tidy, with walks through these areas revealing special unique places. The same pattern follows for the other two factors. The three variables referring to people’s restoration, ie ‘relaxed’ (feeling relaxed), ‘comfort’ (feeling comfortable), and ‘escape’ (being allowed to escape mundane routines and work) all load onto one factor, which has therefor been named ‘Psychological and physical well – being’. This

means that as in the case of woodland and shrub respondents, people’s relaxation was also associated with their feeling comfortable and being allowed to escape mundane routines and work. Factor 3 is a measure of people’s perceptions of ‘Native plant and invertebrate biodiversity and naturalness’. Four factors load onto this, ‘nbees’ (the number of native UK insects present), ‘bees (planting is good for butterflies, bees and other insects), ‘nnative’ (the number of native UK plant species present), and ‘natplant’ (planting looks natural). This shows that planting associated with native plant and invertebrate biodiversity was also perceived as being good for butterflies, bees and other insects, and was perceived as natural.

4.1.2. Respondents’ thoughts

Table 2 shows the loading of individual thoughts variables such as ‘globbad’ (the belief that climate change will have serious consequences) onto specific factors. In this case individual variables loaded onto three main factors.

Table 2: The loading of individual attitudinal ‘thoughts’ variables onto specific factors

Factors (1 – 3 account for 49.827% total variance)	Variables	Loadings (=/ $>$ 0.5)
<u>Factor 1 (23.010% variance)</u>		
Climate change reality	globbad	0.885
	globreal	0.869
	globchange	0.832
<u>Factor 2 (14.937% variance)</u>		
Well – being and biodiversity	likeout	0.759
	spirits	0.735
	habitat	0.733
	eco	0.628
<u>Factor 3 (11.881% variance)</u>		
Acceptance of non - native plant sp. and compatibility with native invertebrates	natonly	0.737
	natbee	0.650
	hapnat	0.640

In the case of herbaceous planting, the first factor, ‘Climate change reality’, is defined by ‘globbad’ (the belief that climate change will have serious consequences), ‘globreal’, (the belief that climate change is happening), and ‘globchange’, (belief that climate change will change the plant species most suited to grow in UK parks and gardens over the next 50 yrs), and shows that people with one of these beliefs also held the others. The second factor, ‘Well – being and biodiversity’, is defined by four individual variables; ‘likeout’ (I like being in outdoor green spaces), ‘spirits’ (outdoor green spaces lift my spirits), ‘habitat’ (plants, shrubs and trees provide valuable habitats for butterflies, bees and other insects) and ‘eco’ (insects such as flies, butterflies and bees are an important part of ecosystems). This indicates that people who said they generally like being in outdoor green spaces also said these spaces lift their spirits, appreciated planting for its habitat value and considered insects an important part of ecosystems. Factor 3 gauges both ‘Acceptance of non – native plant species and compatibility with native invertebrates’ and is defined by the three variables, ‘natonly’ (planting in parks and

gardens should be restricted to native species), 'natbee' (native plants support more native insects than non – native plants), and 'hapnat' (I would be happy to see non – native species growing in UK parks and gardens). The loading of these three variables onto the same factor indicates that people who accepted the planting of non – native species in UK parks and gardens were also aware of their compatibility with UK invertebrates, and vice versa, this is because as described in the case of shrub planting, 'natonly', and 'natbee' were scored in the opposite direction to other variables, so high scores actually indicated the view that planting should not be restricted to native species, and that non – native plants did in fact support native insects.

4.2. Summary of Analysis of Variance outcomes: Herbaceous Communities

Following the principal components analysis, multifactor analysis of variance was conducted using the Walk principal components factors as dependent. Table 3 shows the percentage contribution of each planting, motive and background variable, as well as the thoughts PCA factors, to the overall variability of respondents' perceptions of planting along the walk. The walk PCA factors represent respondents' perceptions along the walk.

4.3. Relationships between Planting Stimulus, Background Socio – demographic Variables, Beliefs and Values and Perceptions and Preferences; Herbaceous Communities

A model that indicates the relationship between planting stimulus, background socio – demographic factors, respondents' beliefs and values and their perceptions and preferences is shown in Figure 1. Only variables which are significant at $P = < 0.05$ are included in the model. Proportional arrows are used to represent the percentage effect of each significant variable; the model provides a visual account of relationships shown statistically in Table 3.

Both Table 3 and Figure 1 indicate that in the case of herbaceous vegetation communities, the five planting variables 'structure', 'character', 'private/public', 'flowering % score' and 'bare % score' had an effect on perceptions and preferences, with these aspects of the planting being more important than people's background characteristics in accounting for variability in their reactions to the aesthetic qualities of the planting along the walk, as reflected by factors 1 and 3. People's beliefs and values as represented by the thoughts factors also played a role in influencing their perceptions and preferences, with the dominance of 'well – being and biodiversity'.

Planting structure, species Character and flowering % score all had important influences on people's reactions to the planting, with the single largest effect being that of structure, (26.4%), which had a bearing on people's perceptions of the neatness, attractiveness, interest, colour and complexity of the herbaceous planting. One background factor, ethnicity, also had a bearing on people's perceptions of the planting itself.

People's perception of their own well – being whilst they were walking through the herbaceous planting was related their gender as well as their beliefs and values in relation to climate change and the general well – being and biodiversity attributes of green spaces. Only one aspect of the planting, ie' the species character, had any bearing on people's psychological and physical well – being, again suggesting that whilst the planting variables had a bearing on people's perception of the planting itself, their own mental and physical well – being were more the product of their background factors and underlying beliefs and values.

In the case of herbaceous planting, people’s beliefs and values in relation to well – being and biodiversity had a bearing on all three aspects of their perceptions. Importantly, this means that people who already appreciated outdoor green spaces for their psychological and biodiversity value were likely to react more strongly than those who had lower appreciation levels, both in terms of their perceptions of the planting and their own well – being during their one particular walk through an area of planting.

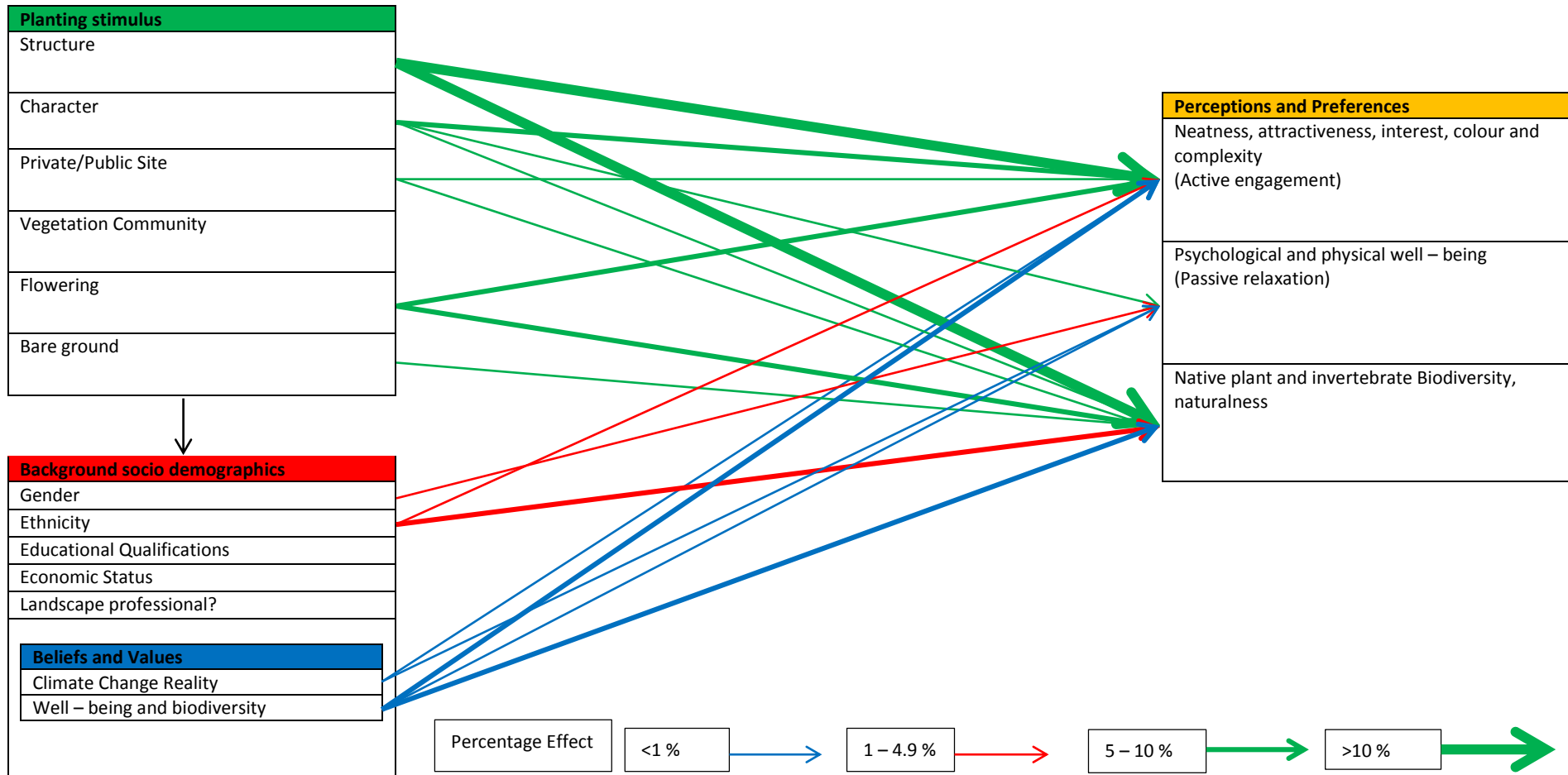
Table 3: Effect of the planting variables, background variables and thoughts factors on the walk factors and variables for herbaceous communities

Percentages indicate the proportional contribution of a planting/background variable or thoughts factor to the overall variability of the walk factors

Asterisks (*, **, *) indicate the degree to which variables and factors caused statistically significant differences in the walk factors (* = P < 0.05, ** = P < 0.01, *** = P < 0.001, ns = Not significant < 0.05)**

	Walk PCA FACTORS		
	Factor 1 Neatness, attractiveness, interest, colour and complexity	Factor2 Psychological and physical well being	Factor3 Native plant and invertebrate biodiversity and naturalness
Planting variables			
Structure	26.4 ***	ns	14.2 ***
Character	7.0 ***	4.7 ***	1.8 *
Private/public	3.5 **	ns	1.1 *
Flowering % score	5.4 **	ns	7.8 ***
Bare% score	ns	ns	2.0 *
Background variables			
Gender	ns	2.9 **	ns
Age	ns	ns	ns
Ethnicity	4.8 *	ns	5.5 **
Livurb	ns	ns	ns
Lifeurb	ns	ns	ns
Edqual	ns	ns	ns
Ecstat	ns	ns	ns
Landpro	ns	ns	ns
Landper	ns	ns	ns
Horper	ns	ns	ns
Biopro	ns	ns	ns
Envpro	ns	ns	ns
Envper	ns	ns	ns
Thoughts PCA Factors			
Factor1 Climate change reality	4.3 **	2.6 **	ns
Factor 2 Well – being and biodiversity	5.3 ***	4.1 ***	5.7 ***
Factor 3 Acceptance of non – native plant sp and compatibility with native inverts	ns	ns	ns
	272 cases	401 cases	391 cases

Figure 1: Herbaceous Vegetation Communities: Model Showing Relationships between Planting Stimulus, Background Socio – demographic factors, Beliefs and Values and Perceptions and Preferences



4.4 Multifactor Anovas showing Walk PCA factors as Dependent: Interpretation of results: Herbaceous Communities

Once the independent effect of each significant variable had been identified using a two stage analysis of variance, as explained above, post hoc multiple comparisons were carried out to distinguish where there were significant differences between groups or categories, facilitating interpretation of the results. The effects of planting variables, then motive variables, background variables and finally beliefs and values, are presented and described.

4.4.1 Planting Variables

4.4.1.i) Planting Structure

Herbaceous Planting structure had a significant effect on two Walk factors; dominantly, perception of **Neatness, attractiveness, interest, colour and complexity**, (26.4 %, $P = < 0.001$), followed by perception of **Native plant and invertebrate biodiversity and naturalness**, (14.2%, $P = < 0.001$).

Herbaceous planting structure had no effect on people’s perceptions of their own **Psychological and physical well – being** whilst they were walking through the planting.

Table 4: The effect of Structure (least to most natural) on respondents’ perceptions of their walk. The percentage effect (%) represents the extent to which structure influenced responses to walk PCA factors

Walk PCA Factors	Statistical significance	Percentage effect (%)	Structure (marginal mean score) and Sidak scores a,b,c		
			Least natural (1)	Moderately natural (2)	Most natural (3)
Factor 1 Neatness, attractiveness, interest, colour and complexity	$P = < 0.001$	26.4	(0.048), a Intermediate	(0.292), a Highest	(- 0.425), b Lowest
Factor 2 Psychological and physical well - being	ns	ns	ns	ns	ns
Factor 3 Native plant and invertebrate biodiversity and naturalness	$P = < 0.001$	14.2	(- 0.396), b Lowest	(0.309), a Highest	(0.275), a Intermediate

‘ns’ indicates not significant at the 95% level

‘a,b,’ indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

Questionnaire results show that people thought herbaceous planting which was moderately natural in structure, with some degree of human intervention, was the neatest, most attractive, interesting, colourful and complex, more so than that most natural in structure, with a complete mingling of species, (which scored the lowest for this factor), and planting that was the least natural in structure where planting was in ‘blocks’. This same moderately natural planting was also seen as providing the highest levels of native plant and invertebrate biodiversity and naturalness. Herbaceous planting least natural in structure was accurately perceived as the least natural, and perceived as providing the lowest biodiversity levels.

4.4.1.ii) Species Character

Species character had a significant though much smaller effect than structure on all three Walk factors; perception of **Neatness, attractiveness, interest, colour and complexity**, (7.0 %, $P < 0.001$), respondents' perception of their own **Psychological and physical well – being** during walks, (4.7%, $P < 0.001$), and perception of **Native plant and invertebrate biodiversity and naturalness**, (1.8 %, $P < 0.05$).

Table 5: The effect of Species Character (least to most natural) on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which species character influenced responses to walk PCA factors

Walk PCA Factors	Statistical significance	Percentage effect (%)	Character (marginal mean score) and Sidak scores a,b,c		
			Least natural (1)	Moderately natural (2)	Most natural (3)
Factor 1 Neatness, attractiveness, interest, colour and complexity	$P < 0.001$	7.0	(0.223), a Highest	(0.119),a Intermediate	(- 0.455),b Lowest
Factor 2 Psychological and physical well - being	$P < 0.001$	4.7	(- 0.273), b Lowest	(- 0.220), a,b Intermediate	(0.353), a Highest
Factor 3 Native plant and invertebrate biodiversity and naturalness	$P < 0.05$	1.8	(- 0.244), b Lowest	(0.512), a Highest	(- 0.081), a,b Intermediate

'a,b,' indicate Sidak groups showing significant differences

Highest scores: bold red

Lowest scores: red

Results show that in terms of visual aesthetic response, those areas least natural in species character (Mediterranean Bank at Abbotsbury, prairies at Wisley, The Sheffield Botanic Garden, Beth Chatto's gravel garden) were considered the neatest, most attractive, interesting, colourful and complex, yet these same areas offered the least in terms of people's own well – being. They were perceived as providing the lowest levels of native biodiversity, (potentially accurately at least for plant species), and naturalness. In contrast, people perceived areas of herbaceous planting most natural in species character (Bole Hills, Sheffield, Fairlands Valley chalk meadow, Stevenage) as the least neat, attractive, interesting, colourful and complex, yet these same areas were considered the most restorative in terms of people's psychological and physical well – being.

4.4.1. iii) Ownership and Access

The distinction between **Private gardens and public green space** had a significant though small effects on respondents' perception of both on respondents' perception of **Neatness, attractiveness, interest, colour and complexity**, (3.5%, $P = < 0.01$) and of **Native plant and invertebrate biodiversity and naturalness**, (1.1%, $P = < 0.05$)

Table 6: The Effect of ownership and access (Private Gardens vs Public Green space) on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which ownership and access influenced responses to walk PCA factors

Walk Variables	Statistical significance	Percentage effect (%)	Private Gardens vs Public Greenspace (mean score) and Sidak scores a,b,c	
			Gardens	Greenspace
Factor 1 Neatness, attractiveness, interest, colour and complexity	$P = < 0.01$	3.5	(0.204), a Highest	(- 0.279), b Lowest
Factor 2 Psychological and physical well - being	ns	ns	ns	ns
Factor 3 Native plant and invertebrate biodiversity and naturalness	$P = < 0.05$	1.1	(- 0.490), b Lowest	(0.615), a Highest

'ns' indicates not significant at the 95% level

'a,b,' indicate Sidak groups showing significant differences

Highest scores: **bold red**

Lowest scores: red

Private gardens with paid entry, such as RHS Wisley, were viewed as significantly neater, more attractive, interesting, colourful and complex, than public greenspaces with free access, such as Fairlands Valley Park in Stevenage. Private gardens experience a higher level of maintenance input than does public greenspace, creating an overall 'neater' appearance, and more is invested to create visually stimulating colourful displays of planting.

Public greenspaces were considered to provide significantly higher levels of native plant and invertebrate biodiversity and naturalness than private gardens. These are the local greenspaces which people visit sometimes on a daily basis, and are considered part of the 'natural' UK urban fabric. Gardens are perceived as exotic and known to contain plants from a range of diverse origins.

4.4.1.iv) Flowering % Score

The flowering % score reflects the percentage of the planting which was covered in bloom at the time of the on-site walks and questionnaires and was calculated as described in Section 1.

Flowering % score, i.e. % flower cover, had a significant though relatively small effect on the same two factors; perception of **Native plant and invertebrate biodiversity and naturalness**, (7.8%, $P = < 0.001$) and of **Neatness, attractiveness, interest, colour and complexity**, (5.4%, $P = < 0.01$).

In the case of herbaceous planting **flowering % score** had no effect on people's own **Psychological and physical well – being** whilst they were walking through the planting.

Table 7: The effect of Flowering % Score on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which % flower cover influenced responses to walk PCA factors

Walk PCA Factors	Statistical significance	Percentage effect (%)	Flowering % score (mean score) and rank				
			1 (0-1%)	2 (2-9%) (44)	3 (10 – 26%) (80)	4 (27 – 45%) (175)	5 (46%+) (84)
Factor 1* Neatness, attractiveness, interest, colour and complexity	P = < 0.01	5.4	n/a	(-0.777) Lowest 4th	(-0.251) 3 rd	(0.076) 2 nd	(0.492) Highest 1st
Factor 2 Psychological and physical well-being	ns	ns	ns	ns	ns	ns	ns
Factor 3 Native plant and invertebrate biodiversity and naturalness	P = < 0.001	7.8	n/a	(- 0.350) 3 rd	(- 0.357) Lowest 4 th	(0.089) 2 nd	(0.868) Highest 1st

'ns' indicates not significant at the 95% level

*Raw means have been substituted as marginal means not estimable due to discrepancy between group sizes
Sidak's inestimable due to discrepancy between group sizes (huge error possible as group 4 much larger than others)

Highest scores: **bold red**

Lowest scores: red

These results (Table 7) indicate that people considered herbaceous planting with the highest flowering score of over 46% flower cover as the neatest, most attractive, interesting, colourful and complex. This same planting was also viewed as the most biodiverse and natural. In the case of herbaceous planting, in contrast to results for shrub planting, there appears to be no threshold level of flower cover beyond which perceived attractiveness declines. In the case of shrub planting, perceived attractiveness peaked at a flower cover of 27 – 45%, but once flower cover exceeded this level, perceived attractiveness declined. Planting with the lowest levels of flower cover for the herbaceous sites sampled (2 – 9% cover) was considered the least attractive, with low scores for all the other variables associated with this factor.

Some caution must be exercised in the interpretation of these results, as the results for factor 1 reflect raw mean values. This ‘raw’ result incorporates the effect of multiple overlapping variables, eg., planting variables such as structure, character as well as Flowering %, ie., this value does not represent the individual main effect of the variable Flowering %.

4.4.1.v) Bare Ground % Score

Percentage bare ground exposed in plantings had a significant albeit small effect on one Walk factor, respondents’ perception of **Native plant and invertebrate biodiversity and naturalness**, (2.0%, $P = < 0.05$). ‘Bare ground’ might have been a path surface or bare soil.

Table 8: The effect of Bare Ground % Score on respondents’ perceptions of their walk. The percentage effect (%) represents the extent to which bare ground % influenced responses to walk PCA factors

Walk PCA Factors	Statistical significance	Percentage effect (%)	Bare Ground % score (mean score) and Sidak scores a,b,c				
			1 (0-1%)	2 (2-12%)	3 (13–35%)	4 (36 - 55%)	5 (56%+)
Factor 1 Neatness, attractiveness, interest, colour and complexity	ns	ns	ns	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	ns	ns	ns	ns	ns	ns	ns
Factor 3 Native plant and invertebrate biodiversity and naturalness	$P = < 0.05$	2.0	(-0.487), b Lowest 3 rd	(-0.045), a,b 2 nd	(0.720), a Highest 1 st	n/a	n/a

‘ns’ indicates not significant at the 95% level. ‘a,b,’ indicate Sidak groups showing significant differences . **Highest scores: bold red**, Lowest scores: red

These results (Table 8) indicate that in the case of herbaceous planting, people associated planting with the highest levels of bare ground exposed as the most biodiverse and natural, and those with the least bare ground as the least biodiverse and natural. This is a perplexing result, as it might have been expected that people would associate a more complete vegetation cover with a natural environment and higher levels of native biodiversity, but the opposite was the case.

4.4.2. Background Variables

4.4.2.i) Gender

Gender had a significant although small effect on respondents' perception of their own **Psychological and physical well – being** during walks, (2.9 %, $P = < 0.01$), but did not have a bearing on their visual perceptions of the planting itself.

Table 9: The Effect of Gender on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which gender influenced responses to walk PCA factors

Walk Variables	Statistical significance	Percentage effect (%)	Gender (mean difference) and Sidak score	
			Female	Male
Factor 1 Neatness, attractiveness, interest, colour and complexity	ns	ns	ns	ns
Factor 2 Psychological and physical well - being	$P = < 0.01$	2.9	(0.340), a Highest	(- 0.340), b Lowest
Factor 3 Native plant and invertebrate biodiversity and naturalness	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

'a,b,' indicate Sidak groups showing significant differences

Highest scores: **bold red**

Lowest scores: red

In the case of herbaceous communities, as in all vegetation communities, (Table 9), women reported significantly higher levels of **Psychological and physical well – being** during walks through herbaceous planting, than did men, meaning that women felt a greater sense of relaxation, feeling comfortable and being allowed to escape from mundane routines and work.

4.4.2.ii) Ethnicity

Ethnicity had a significant effect on respondents' perception of **Neatness, attractiveness, interest, colour and complexity** (4.8%, $P < 0.05$), and **Native plant and invertebrate biodiversity and naturalness**, (5.5%, $P < 0.01$).

Table 10: The Effect of Ethnicity on respondents' perceptions of their walk. The percentage effect (%) represents the extent to which ethnicity influenced responses to walk PCA factors

Walk Variables	Statistical significance	Percentage effect (%)	Ethnic Group (Raw mean score, Rank and (n))												
			White British/Irish	White (other)	Mixed white/bl Caribbean	Mixed white/Asian	Mixed (other)	Asian (Indian)	Asian (Pakistani)	Asian (Chinese)	Asian (other)	Black African	Black Caribbean	Black (other)	Arab
Factor 1 *Neatness, attractiveness, interest, colour and complexity	$P < 0.05$	4.8	(0.012) 3 rd (n=340)	(0.112) 2 nd (n=27)	(n/a)	(- 0.966) 5 th (n= 4)	(- 2.532) Lowest 7 th (n=1)	(0.966) Highest 1 st (n=4)	(n/a)	(- 0.135) 4 th (n=4)	(- 1.173) 6 th (n=3)	(n/a)	(n/a)	(n/a)	(n/a)
Factor 2 *Psychological and physical well - being	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Factor 3 *Native plant and invertebrate biodiversity and naturalness	$P < 0.01$	5.5	(0.080) 3 rd (n=346)	(- 0.608) 5 th (n=29)	(n/a)	(-1.162) Lowest 7 th (n=4)	(1.524) Highest 1 st (n=1)	(0.349) 2 nd (n=4)	(n/a)	(0.077) 4 th (n=4)	(- 0.668) 6 th (n=3)	(n/a)	(n/a)	(n/a)	(n/a)

'ns' indicates not significant at the 95% level

*Raw means have been substituted as marginal means not estimable due to discrepancy between group sizes. The group 'White British' dominates, (340 respondents), with a relatively small number of people in other groups.

Highest scores: bold red

Lowest scores: red

As explained in the case of all vegetation communities, (Section 1), the raw mean of limited value as this 'raw' result incorporates the effect of multiple overlapping variables – eg., planting variables such as structure and character, flowering, background variables such as educational qualifications as well as ethnicity itself – ie., this value does not indicate the individual main effect of the variable Ethnicity . In this case the highest raw mean score for Neatness, attractiveness, interest, colour and complexity, was recorded for the Asian Indian group consisting of just 4 individuals. They were all members of the same family, who viewed the herbaceous Oudolf borders at RHS Wisley. The high score reflects the characteristics of the planting, (Structure, character, flowering) as well as educational qualifications, gender mix and ethnicity. In the case of scores for native plant and invertebrate biodiversity and naturalness, the highest score (mixed other) represents just one individual.

4.4.3. Respondents' beliefs and values: Regressions between Walk PCA Factors and Thoughts PCA Factors

As stated in Section 1, the effects of respondents underlying beliefs and values as represented by the thoughts PCA factors were also considered. Regressions were carried out to identify possible relationships (correlations) between people's beliefs and values (thoughts PCA factors) and their perceptions (walk PCA factors).

4.4.3.i) The Belief in the Reality of Climate Change

Respondents' underlying beliefs and values were represented by Thoughts PCA factors. Thoughts Factor 1, concerning the acceptance of the **reality of Climate change** and its potential consequences had a significant effect on both perception of **Neatness, attractiveness, interest, colour and complexity**, (4.3%, $P = < 0.01$), and a smaller effect on respondents' perception of their own **Psychological and physical well – being** during walks, (2.6%, $P = < 0.01$)

Table 11: Thoughts Factor 1: Climate change reality. The percentage effect (%) represents the extent to which thoughts PCA factor 'Climate change reality' influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percent age effect (%)	Regression coefficient	Description
Factor 1 Neatness, attractiveness, interest, colour and complexity	$P = < 0.01$	4.3	+0.147 Positive correlation	For every 1.0 increase in respondents' Thoughts Fac 1 Climate change reality score there is a 0.147 increase in respondents' Walk Fac 1 Neatness, attractiveness, interest, colour and complexity score
Factor 2 Psychological and physical well - being	$P = < 0.01$	2.6	+0.153 Positive correlation	For every 1.0 increase in respondents' Thoughts Fac 1 Climate change reality score there is a 0.153 increase in respondents' Walk Fac 2 Psychological and physical well – being score
Factor 3 Native plant and invertebrate biodiversity and naturalness	ns	ns	ns	ns

'ns' indicates not significant at the 95% level

Respondents expressed their beliefs and values concerning the reality and consequences of climate change of through the 'thoughts' section of the questionnaire. As stated earlier, the thoughts factor, 'Climate change reality', is defined by 'globbad' (the belief that climate change will have serious consequences), 'globreal', (the belief that climate change is happening), and 'globchange', (belief that climate change will change the plant species most suited to grow in UK parks and gardens over the next 50 yrs)

Respondents who reported stronger beliefs in the reality, potentially serious consequences and planting implications of climate change, recorded slightly higher levels of; Factor 1,

Neatness, attractiveness, interest, colour and complexity, and Factor 2, Psychological and physical well – being during walks through herbaceous planting.

People who held these stronger beliefs in the reality and consequences of climate change are likely to be the same people who showed an appreciation of the psychological and biodiversity value of outdoor green spaces below (Table 12). These people were informed about the reality of climate change and might have been more highly educated, or have possessed particular environment – related knowledge. They would therefore feel positive psychologically and physically about the walk experience.

4.4.3 ii) Well – being and biodiversity value

Thoughts Factor 2, **Well - being and the value of biodiversity** in green spaces had a significant effect on perception of all three Walk factors; **Native plant and invertebrate biodiversity and naturalness**, (5.7%, $P = < 0.001$), **Neatness, attractiveness, interest, colour and complexity**, (5.3%, $P = < 0.001$), and a very small effect on respondents’ perception of their own **Psychological and physical well – being** during walks, (0.35%, $P = < 0.001$).

Table 12: Thoughts Factor 2: Well – being and biodiversity value. The percentage effect (%) represents the extent to which thoughts PCA factor ‘Well – being and biodiversity’ influenced responses to walk PCA factors.

Walk Variables	Statistical significance	Percent age effect (%)	Regression coefficient	Description
Factor 1 Neatness, attractiveness, interest, colour and complexity	$P = < 0.001$	5.3	+0.180 Positive correlation	For every 1.0 increase in Thoughts Fac 2 Well being and biodiversity there is a 0.180 increase in Walk Fac 1 Neatness, attractiveness, interest, colour and complexity
Factor 2 Psychological and physical well - being	$P = < 0.001$	4.1	+0.207 Positive correlation	For every 1.0 increase in Thoughts Fac 2 Well being and biodiversity there is a 0.207 increase in Walk Fac 2 Psychological and physical well - being
Factor 3 Native plant and invertebrate biodiversity and naturalness	$P = < 0.001$	5.7	+0.224 Positive correlation	For every 1.0 increase in Thoughts Fac 2 Well being and biodiversity there is a 0.224 increase in Walk Fac 3 Native plant and invertebrate biodiversity and naturalness

Respondents expressed their beliefs concerning the potentially restorative qualities of outdoor green spaces and the value of biodiversity through the ‘thoughts’ section of the questionnaire. As stated earlier, in the case of herbaceous planting, the thoughts factor ‘Well – being and biodiversity’, is defined by four individual variables; ‘likeout’ (I like being in outdoor green spaces), ‘spirits’ (outdoor green spaces lift my spirits), habitat’ (plants, shrubs and trees provide valuable habitats for butterflies, bees and other insects) and ‘eco’ (insects such as flies, butterflies and bees are an important part of ecosystems).

In the case of herbaceous planting, people who reported a higher general level of appreciation of outdoor green spaces and valued habitat biodiversity via their ‘thoughts’ recorded slightly

higher levels of; Factor 1, Neatness, attractiveness, interest, colour and complexity, Factor 2, Psychological and physical well – being, and Factor 3, Native plant and invertebrate biodiversity and naturalness, during walks through herbaceous planting, than did those who reported a lower general level of appreciation.

As stated with respect to all vegetation communities, this is important, because it means that people who were already predisposed to feeling positive about planting and the psychological and biodiversity value of green outdoor environments perceived the planting they actually walked through as more colourful and attractive, neater, with higher levels of native plant and invertebrate biodiversity than people who were less predisposed to feel this way. A higher level of psychological and physical well – being was also associated with their walk experience than for people who were less predisposed to feel this way.

5.1. Overall Summary; Herbaceous Communities

In the case of herbaceous planting, as with the other communities, people's visual aesthetic response to the planting was related more to the qualities of the planting itself than their background socio – demographic factors, yet people's underlying beliefs and values also had a role.

The planting structure, character and flowering were the three most important aspects of the planting affecting perception, with structure having the largest single influence on people's perceptions of neatness, attractiveness, colour and complexity. Herbaceous planting moderately natural in structure with some degree of human intervention was the most preferred in terms of overall attractiveness, and this was also perceived as the most biodiverse and natural. Considering character, interestingly, that least natural (Mediterranean Bank, prairie planting and Beth Chatto's gravel garden) was perceived as the neatest, most attractive, interesting, colourful and complex, yet this character was considered the least restorative to walk through. In contrast, planting most natural in character (Bole Hills Sheffield and Stevenage Fairlands Valley Park chalk meadow) was viewed as the least attractive and interesting, yet it was rated as the most restorative. This suggests that in terms of visual aesthetic stimulation, people seek a more exotic, brightly flowering type of planting, yet if they seek calm and relaxation, more muted, low key, green, familiar planting proves more restorative. The herbaceous planting with the highest percentage flower cover was perceived as the most interesting, attractive, biodiverse and natural, and in contrast to shrub planting, where perceived attractiveness declined above a certain flower cover, there appeared to be no threshold level of flowering cover above which perceived attractiveness declined.

Although ethnicity also had a bearing on people's perceptions of visual aesthetic qualities of herbaceous planting, due to the discrepancy between group sizes resulting from the relatively low number of people from ethnic minority groups taking part in the survey, the specific role of ethnicity was impossible to interpret.

People's assessment of their own psychological and physical well – being whilst walking through the planting was related to one planting variable, character, as discussed above, yet gender and people's underlying beliefs and values were also important, with women experiencing more restoration than men. Focusing on beliefs and values, as in the case of all communities, people who were well informed about climate change and already recognised the psychological benefits and biodiversity value of outdoor natural spaces both responded

more positively than others to the aesthetic qualities of the planting and reported higher levels of psychological and physical well – being whilst walking through the planting than did others.

Section 5: Relationships between perceived attractiveness and perceived biodiversity, well – being and perceived biodiversity and perceived attractiveness and well – being

In order to assess the extent to which there was an overlap between the vegetation most preferred by people and that they perceived as the most biodiverse, two separate relationships were considered; the relationship between perceived attractiveness and perceived biodiversity, and that between psychological and physical well – being and perceived biodiversity.

When gauging ‘preference’ it was considered important to address both perceived attractiveness and well – being because there has for some time been convincing evidence that ‘preference’, involves more than a judgement of scenic beauty, or perceived attractiveness, (Arthur et al., 1977).

This work therefore seeks to understand the relationships between both perceived attractiveness and perceived biodiversity and well – being and perceived biodiversity. Although some research has suggested that human well –being arises from a positive aesthetic response to a natural environment, (Laumann et al. 2001; Van den Berg, 2003), there is other evidence which contradicts this, (Martens et al., 2011). To clarify this, the relationship between perceived attractiveness and psychological and physical well – being for people walking through areas of woodland, shrub and herbaceous planting was also investigated.

Previous work focusing on human reactions to varying biodiversity, (Fuller et al., 2007), or perceived biodiversity, (Dallimer et al., 2012) has focused on well – being and has neglected the role of perceived attractiveness. For the landscape architect seeking to create public spaces which improve human aesthetic experience, this is a serious omission.

5.1. The relationship between perceived attractiveness and perceived plant and invertebrate biodiversity

To determine the relationship between questionnaire respondents’ perceptions of the attractiveness and biodiversity value of the planting they walked through, a Pearson product – moment correlation was carried out between scores for ‘attplant’, i.e., the perceived attractiveness of the planting, and scores for the four separate indicators of biodiversity; ‘nspec’, (perceived number of different plant species present overall), ‘nnative’, (perceived number of native UK plant species present), ‘bees’, (perceived value of planting for butterflies, bees and other insects) and ‘nbees’, (perceived number of native UK insects present). Perceptions of both plant and invertebrate diversity were therefore considered. Statements relating to native diversity were incorporated to explore the relationship between preference and native biodiversity.

Statistical outcomes of the correlation (Pearson’s ‘r’ values) were assessed according to the descriptors in table 1 below;

Table 1: Descriptors of various sized correlation coefficients, (after de Vaus, 2002)

Pearson’s ‘r’ value	Verbal descriptor
0.01 – 0.09	Trivial
0.10 – 0.29	Low – Moderate

0.30 – 0.49	Moderate – Substantial
0.50 – 0.69	Substantial – Very Strong
0.70 – 0.89	Very Strong
0.90 – 0.99	Near Perfect

Table 2: The correlation between attractiveness and perceived biodiversity value

Perceived Attractiveness and Perceived Biodiversity								
		Nspec		Nnative	Bees		Nbees	
Woodland	Pearson Corr. Sig. (2 – tailed) N	0.218 0.000 567	Low - Moder ate	Not sig	0.462 0.000 565	Moder ate - Substa ntial	0.278 0.000 567	Low - Mode rate
Shrub	Pearson Corr. Sig. (2 – tailed) N	0.170 0.002 336	Low - Moder ate	Not sig	0.416 0.000 333	Moder ate - Substa ntial	0.185 0.001 335	Low - Mode rate
Herbaceous	Pearson Corr. Sig. (2 – tailed) N	0.200 0.000 472	Low - Moder ate	Not sig	0.373 0.000 470	Moder ate - Substa ntial	0.279 0.000 470	Low - Mode rate
Variables measuring Perceived Biodiversity Nspec : Perceived number of different plant species present overall Nnative: Perceived number of native UK plant species present Bees: Perceived value of planting for butterflies, bees and other insects Nbees: Perceived number of native UK insects present								

In the case of woodland, shrub and herbaceous planting (all communities), there was a significant relationship between perceived attractiveness and perceptions of Nspec, (number of different plant species present overall), Bees, (value of planting for butterflies, bees and other insects) and Nbees, (number of native UK insects present), i.e., there were significant positive correlations between how attractive people perceived the planting to be and three out of the four indicators of perceived biodiversity. Attractiveness was related to perceptions of plant species diversity, the perceived value of the planting for butterflies and bees and other insects, and to the number of native insects people perceived to be present within the planting at the time of their walk. Interestingly, there was no relationship between people’s perceptions of attractiveness and the number of native UK plants they perceived to be present.

The strongest relationship identified here was that between perceived attractiveness and the perceived value of the planting for butterflies bees and other insects. Planting viewed as particularly good for butterflies, bees and other insects was considered the most attractive.

Perceived attractiveness was also related to the number of UK insects people perceived to be present in the plantings. Plantings viewed as good for UK insects also were also perceived as attractive, although in this case the relationship was weaker.

Results also indicated that people found planting they perceived as richer in plant species diversity to be more attractive. This has important implications for the landscape architect. It suggests that the overall attractiveness of woodland, shrub and herbaceous areas might be enhanced by increasing the plant species diversity.

There was no significant relationship between perceived attractiveness and Nnative, (the perceived number of UK plant species present) for any community. The lack of any relationship between perceived attractiveness and the number of UK plant species people perceived to be present in the area they walked through indicates that people did not discriminate between native and non – native planting in terms of attractiveness, and supports other evidence that questionnaire respondents were generally very accepting of non – native planting.

5.2. The relationship between psychological and physical well – being and perceived biodiversity

To determine the relationship between questionnaire respondents’ psychological and physical well – being whilst walking through the planting and their perceptions of the biodiversity value of the planting, a Pearson product – moment correlation was carried out between psychological and physical well – being scores, and those for the four separate indicators of biodiversity detailed above. As discussed in Sections 1 – 4, psychological and physical well – being was gauged with reference to the three individual variables ‘comfort’, (feeling comfortable during the walk), ‘escape’ (being allowed to escape mundane routines and work) and ‘relaxed’ (feeling relaxed during the walk).

Statistical outcomes of the correlation (Pearson’s ‘r’ values) were again assessed according to the descriptors in table 1 above.

Table 3: Correlation between psychological and physical well – being and perceived biodiversity value

Psychological and physical well – being and Perceived Biodiversity						
		Nspec		Nnative	Bees	Nbees
Woodland	Pearson Corr. Sig. (2 – tailed) N	Not sig		Not sig	Not sig	Not sig
Shrub	Pearson Corr. Sig. (2 – tailed) N	0.168 0.003 312	Low - Moder ate	Not sig	Not sig	Not sig
Herbaceous	Pearson Corr. Sig. (2 – tailed) N	Not sig		Not sig	0.213 0.000 422	Low - Moder ate Not sig
<p>Variables measuring Psychological and Physical well – being The three variables loading onto the same factor in the PCA were; Comfort: Perception of feeling comfortable during walk Escape: Perception of being allowed to escape from mundane routines and work during walk Relaxed: Perception of feeling relaxed during walk</p> <p>Variables measuring Perceived Biodiversity Nspec : Perceived number of different plant species present overall Nnative: Perceived number of native UK plant species present Bees: Perceived value of planting for butterflies, bees and other insects</p>						

	Nbees: Perceived number of native UK insects present
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In the case of shrub planting there was a significant low – moderate correlation between psychological and physical well – being and Nspec, (number of different plant species present overall). This means that in the case of shrub planting a relationship was identified between people’s well – being and perceived plant diversity. People felt a greater sense of well – being in the shrub areas that they perceived to be more varied and species rich. This is an important finding for landscape architecture; earlier evidence has indicated that amongst our respondents, shrub planting was the least popular of the three vegetation communities. This indicates that increasing the plant species diversity of shrub planting in car parks, business parks and town centres might make it more attractive to the public.

In the case of herbaceous planting there was a significant low – moderate correlation between psychological well – being and Bees, (value of planting for butterflies, bees and other insects) This means that questionnaire respondents recorded higher levels of well – being in the areas of herbaceous planting they thought would be better for butterflies, bees and other insects. This may be related to higher levels of flower cover, which people associated with pollinators, although earlier evidence indicated that in shrub areas lower levels of flowering were associated with the highest levels of well – being and that in herbaceous planting there was no link between flowering and well – being.

No further significant relationship between psychological well – being and any other indicator of perceived biodiversity value occurred across the three communities. This in itself indicates that the perceived ‘nativeness’ of the planting had no role to play in people’s well – being.

5.3. The relationship between perceived attractiveness and psychological and physical well – being

To determine the relationship between the perceived attractiveness of the planting and questionnaire respondents’ psychological and physical well – being a Pearson product – moment correlation was carried out between perceived attractiveness and psychological and physical well – being scores.

Statistical outcomes of the correlation (Pearson’s ‘r’ values) were again assessed according to the descriptors in table 1 above.

Table 4: Correlation between attractiveness and psychological and physical well – being

Perceived Attractiveness and Psychological and physical well – being			
		Psychological and physical well – being	
Woodland	Pearson Corr. Sig. (2 – tailed) N	0.161 0.000 522	Low - Moderate
Shrub	Pearson Corr. Sig. (2 – tailed) N	0.401 0.000 312	Moderate - Substantial
Herbaceous	Pearson Corr. Sig. (2 – tailed) N	0.267 0.000 422	Low - Moderate

	<p>Variables measuring Psychological and Physical well – being</p> <p>The three variables loading onto the same factor in the PCA were;</p> <p>Comfort: Perception of feeling comfortable during walk</p> <p>Escape: Perception of being allowed to escape from mundane routines and work during walk</p> <p>Relaxed: Perception of feeling relaxed during walk</p>
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Significant relationships between perceived attractiveness and psychological well-being were recorded in the case of all three communities. In the case of woodland and herbaceous communities the correlation was low – moderate, whereas in the case of shrub planting it was moderate – substantial. This means that for our respondents there was some link between their perceived attractiveness of the planting and their own psychological and physical well – being whilst they were walking through it. Consistent with findings detailed above in 5.2 and 5.3, the link between perceived attractiveness and well – being was strongest in shrub areas, which is again interesting for the landscape architect. This suggests that increasing the plant species diversity of shrub areas as described above might increase public aesthetic appreciation as well as well – being.

In contrast to some findings, (Laumann et al., 2001), in the case of our respondents, the relationship between perceived attractiveness and psychological and physical well – being was not strong, meaning that people walked through areas of planting they perceived as attractive, yet these same areas did not necessarily invoke feelings of well – being and restoration. Equally some people felt a sense of well – being or restoration whilst walking through an area of planting without perceiving it as attractive. This might be related to the different planting stimuli producing these reactions. It has already been shown that in terms of attractiveness people seem to favour bright flowering plants, whereas more low – key muted greens have been associated with high levels of well – being.

5.4. Relationships between perceived attractiveness, perceived biodiversity and well – being; a summary

Focusing on the overlap between planting preferred by people and that they perceived as the most biodiverse, for all vegetation communities there was a clear overlap between planting people perceived as the most attractive and that they perceived as the most biodiverse, in terms of plant diversity, the value of the planting for insects and the value of the planting for UK insects. Interestingly, people did not associate attractiveness with native UK plant species, giving more weight to the evidence that our respondents were generally very accepting of non – native plants. The relationship between well – being and perceived biodiversity was less clear, yet the link between increased well – being and plant species diversity in shrub areas gives further weight to the argument that increasing the species diversity of shrub areas would improve people’s experiences and opinions of public shrub planting. This research indicated some relationship between perceived attractiveness and well – being for all communities. It is suggested that the lack of a strong relationship is probably because for most people perceptions of attractiveness are triggered by looking at bright flowering plants, yet well – being is associated with quieter, muted green planting. This is very important for the landscape architect who needs to provide both to meet changing human needs.

Part Three

Public Perception of Planting: On site Interviews; Results and Analysis

Introduction

As explained in the Methods section, themes emerging from the analysis and interpretation of the questionnaire data informed the content and approach of the semi – structured interviews. The themes emerging from respondents' perceptions of the walk through an area of planting included 'attractiveness', 'feeling relaxed', or a sense of physical/psychological well – being, tidiness, insect biodiversity, as well as colour and flowering. The interview was designed to address these themes in relation to the planting structure and character, yet other themes were allowed to emerge through the interviews. Pre – determined research themes relating to respondents' thoughts and beliefs were also addressed. These included beliefs in relation to climate change, non – native plant species and broader environmental issues. A flexible approach to this part of the interview allowed interviewees the opportunity to focus on additional issues relevant to them personally.

Thirty four semi – structured interviews were conducted from 20th March – 31st July 2014, with a sub – set of the original respondents who had completed the on - site walks and questionnaires in 2012 or 2013. The intention was to conduct one interview per 'walk site' (33 in total), but this proved impossible, as did sampling across the age range and achieving a balance between male and female interviewees. Questionnaire respondents' contact details were obtained for all 33 sites, yet many failed to reply to emails and phone calls, and others were unavailable for interview on the appointed dates. Interviews were conducted representing walks at 24 sites. In some cases two or even three interviewees originally walked through the same area of planting, e.g. Wisley Wildflower meadow, as these individuals were very keen to take part in the interview process.

With the exception of the three interviews focusing on the two Sheffield sites, where the interviews took place in the Landscape Department in the Arts Tower, all interviews were conducted in the locations of the original walk sites. These included Abbotsbury Subtropical Gardens, Hilliers, Beth Chatto's Garden, RHS Wisley, The Crown Estate, Torquay seafront and Fairlands Valley Park in Stevenage. In the case of the garden locations, indoor office/meeting room/café locations were arranged in collaboration with the garden curators. In the case of the two public locations, appropriate indoor/outdoor café locations were used. The three interviews conducted in the Landscape Department at Sheffield were considered pilot interviews, but were also incorporated into the final data set.

Interviewees were initially asked to recall and describe their own walk through the planting, during Spring – Autumn 2012 or 2013, (Woodland, shrub or herbaceous), before being presented with a panoramic image of the planting along their 'walk', on the day of the walk. They were then presented with a selection of eight (nine in two cases) different panoramic images of planting along different walks of the same vegetation community, i.e., woodland, shrub or herbaceous planting, which included the image showing their 'own' walk. This same

set of eight images was then used to explore the themes above, for example interviewees were asked to imagine which three areas of planting they would find the most attractive to walk through. The interviewees were then prompted to justify their selections. In order to focus specifically on the role of planting structure and character, interviewees were then presented with a smaller selection of 2 or 3 images, from which they had to select their preferred walk. Additional images were then used to address the issue of seasonal change. Interviewees were presented with a panoramic photograph of an area of planting of their specific vegetation community at two different times of year, in order to discuss the impact of seasonal change on perception and preference. An additional set of images was used across all communities to discuss flowering and colour. This set of five images included panoramic photographs of either herbaceous or shrub planting of one dominant colour, (yellow, pink, blue/mauve, pale cream), as well as a meadow showing mixed colours. Interviewees were then shown photographs of two walks in each of the 'other' vegetation communities, for example, those who originally walked through woodlands were shown areas of herbaceous planting and shrub planting. The images were specifically chosen to represent contrasting styles (character/structure). This was to gain a wider perspective on these other communities than would have been the case if only the people walking through that community had commented on it.

The final part of the interview focused on the interviewee's thoughts, beliefs and values. Issues discussed included climate change, the inclusion of non – native species in UK parks and gardens as well as broader environmental concerns. Again, other themes and ideas were allowed to emerge. In this section just one image was used as a stimulus; the panoramic photograph of the Mediterranean Bank at Abbotsbury subtropical Gardens, representing an example of 'non – native' planting.

All interviews were audio – recorded and later transcribed in full. The resulting transcripts were analysed qualitatively. Research themes informed by the questionnaires and pre – determined research themes relating to respondents' thoughts provided the initial broad framework for categorisation of interviewees' comments (extracts). Within this broad framework, extracts taking a particular slant or standpoint were grouped together. Recurring emergent themes were flagged up for particular attention, and extracts again classified according to interviewees' responses.

Table 1, (below) provides a summary of the interviews conducted in relation to sites and the three vegetation communities, whereas Table 2 focuses specifically on the socio - demographic composition of the interview sample.

The gender balance of the interview sample was uneven, with more female than male interviewees; (49% male, 59% female), although this overall imbalance was entirely the result of a dominance of female interviewees in the case of herbaceous planting interviews. Nine interviews were carried out with interviewees who originally walked through woodland planting, (5 male, 4 female), eight who originally walked through shrub areas, (4 male, 4 female), and seventeen who walked through areas of herbaceous planting, (5 male, 12 female). In four cases interviewees requested to bring a 'partner' along to the interview. The partner did not play a dominant part in the interview, yet did contribute at times, and has been included in Table 1, for later reference.

The socio – demographic profile, (Table 2), shows that interviewees demonstrated a broad range of educational qualifications. Nine percent of interviewees had no recorded educational qualifications, 18% had GCSE/O' level equivalent, 23% A' level or equivalent, 38% a first degree, 9% a masters' degree and one interviewee, (3%), had a doctorate. There was a distinct lack of young interviewees, with none in the youngest group, 16 – 24, 3 interviewees (9%) from 25 – 34 and a further 3 (9%) from 35 – 44. Seven interviewees (21%) were 45 – 54, and 11 (32%) 55 – 64, with 10, (29%) over 65. Thirty one interviewees, (91%) identified themselves as White British /Irish, with only three other ethnic groups represented. There was one White (Swedish) interviewee, one Mixed White/Asian and one Asian Indian. These patterns partially reflect the demographic composition of the much larger questionnaire sample. Of the 34 interviewees, 5, (15%) were currently or had in the past been employed in a Landscape/Environmental role.

Table 1: Interview Results: Summary by Vegetation Community

Walk Site	ID	Gender	Age	Ethnicity	Edqual	Landpro	Professional/volunteer/interest in horticulture/landscape design/environment
Woodland							
Torquay Kings Gardens	M1	M	55-64	White British/Irish	O levels	No	Interest in gardening and growing food.
Torquay Princess Palms	F1	F	45 – 54	White British/Irish	None	No	Interest in gardening.
Wisley Eucalypts	M2	M	45 – 54	White British/Irish	Degree	No	Interest in gardening and landscape design.
Wisley Eucalypts	F2	F	55 – 64	White British/Irish	Degree	No	Personal interest in agriculture, gardening, Landscape des, environment, arts, biology.
Abbotsbury Jungle Ride	F3	F	55 – 64	White British/Irish	Degree	No	Keen gardener and lover of landscape and outdoors.
Wisley Wild Garden	M3	M	55 – 64	White British/Irish	Degree	No	Interest in ag, gardening, biology. Volunteers – gardening, nature conservation.
Wisley Wild Garden	M4	M	55 – 64	White British/Irish	Degree	No	Interest in outdoor recreation.
Fairlands V Arboretum	M5	M	35 – 44	White British/Irish	Degree	No but degree in conservation management and volunteers.	Professional, volunteer, personal interest in environment and nature conservation. Degree in conservation management.
Fairlands V Monk's Wood complex	F4	F	45 – 54	White British/Irish	None	No	Interest in local wildlife and wildflowers.
Shrub							
Valley Gardens Punchbowl	F5	F	45 – 54	White British/Irish	Master s'	No but ex architect	Ex architect, interest in landscape architecture.

					degree		
Wisley Heathers	M6	M	25 – 34	White British/Irish	GCSEs/ O levels	Yes	Professional landscape, environmental/conservation. Interest in the arts, biology. Spends as much time as possible outside gardening on personal/professional level.
Hilliers Heathers	F6	F	65+	White other (Swedish)	Degree	No	Interest gardening, environment and nature conservation, arts.
Savill Garden Spring Wood	M7	M	65+	White British/Irish	O levels	No	Enjoys visiting gardens.
Hillers Native – looking arboretum style shrubs	M8 F7	M F	65+	White British/Irish	Degree	No	Personal interest gardening, environment and nature conservation, arts.
Hillers Native – looking arboretum style shrubs	F8	F	55 – 64	White British/Irish	O levels	No	Has garden and enjoys gardening.
Fairland V Native woodland edge	M9	M	55 – 64	White British/Irish	Degree	No	Personal interest agriculture, hort, Landsc. arch, env and nature cons., biol. Esoteric philosophy, design engineer.
Fairland V Native woodland edge	F9	F	45 – 54	White British/Irish	A levels	No	Likes outdoor recreation in local parks.
Herbaceous							
Wisley trad herb borders	M10 F10	M F	65+	White British/Irish	Degree	No	Personal interest gardening, the arts, biological sciences.
Wisley Oudolf borders	F11	F	35 – 44	White British/Irish	Doctorate	No	Personal interest in gardening .
Sheffield Botanic Garden Prairie	F12	F	25 – 34	White British/Irish	A levels	No	Personal interest in gardening and growing food, env/nature cons., biol.
Sheffield Botanic Garden Prairie	M11	M	45 – 54	White British/Irish	Degree	No	Professional – biological sciences/botany.
Beth Chatto Wet Garden	F13	F	25 – 34	White British/Irish	Masters' degree	No	Interest – growing food, the arts, gardening, env /nature cons.
Sheffield Bole Hill Rec	M12	M	35 – 44	Mixed	A levels	No but	Allotment Ranger.

Ground				white/asian		env/nature conservation	Professional Env/nature conservation.
Abbotsbury Mediterranean Bank	F14	F	65+	White British/Irish	A levels	No	Enjoys visiting gardens.
Abbotsbury Mediterranean Bank	F15	F	65+	White British/Irish	O levels	No	Personal interest growing food, gardening.
Beth Chatto Gravel Garden	F16	F	45 – 54	White British/Irish	None indicated RHS lev 2 diploma	No but professional hort interest	Profess hort, interest landsc. Design, the Arts. Keen gardener. Has new allotment.
Beth Chatto Gravel Garden	F17	F	65+	White British/Irish	Masters' degree	No	Interest in dry garden.
Wisley Prairie	F18	F	55 – 64	Asian Indian	A levels	No	Personal interest in growing food, gardening, landscape des., env/nature cons.
Wisley Prairie	F19	F	65+	White British/Irish	Degree	No	Interest in the Arts. Visits a lot of gardens and properties.
Wisley Olympic wildflower meadow	M13 F 20	M F	55 - 64	White British/Irish	A levels	No	Knowledgeable re biodiversity issues and invertebrate habitats. Personal interest in growing food, gardening, env/nature cons/biology sci.
Wisley Olympic wildflower meadow	F21	F	55 – 64	White British/Irish	A levels	No	Keen photographer of wildlife and landscape. Loves woodlands.
Wisley Olympic wildflower meadow	F22 M14	F M	65+	White British/Irish	O levels	No	Horticultural volunteer.
Fairlands V Grasshopper trail meadow	F23	F	65+	White British/Irish	A levels	No	Personal interest growing food, gardening. Spends all summer out in her garden. Also landsc. Des., env/nature conserve. Arts and Biol.
Fairlands V Grasshopper trail meadow	M15	M	55 – 64	White British/Irish	Degree	No but ex teacher involved with environment	Very supportive of natural environments.

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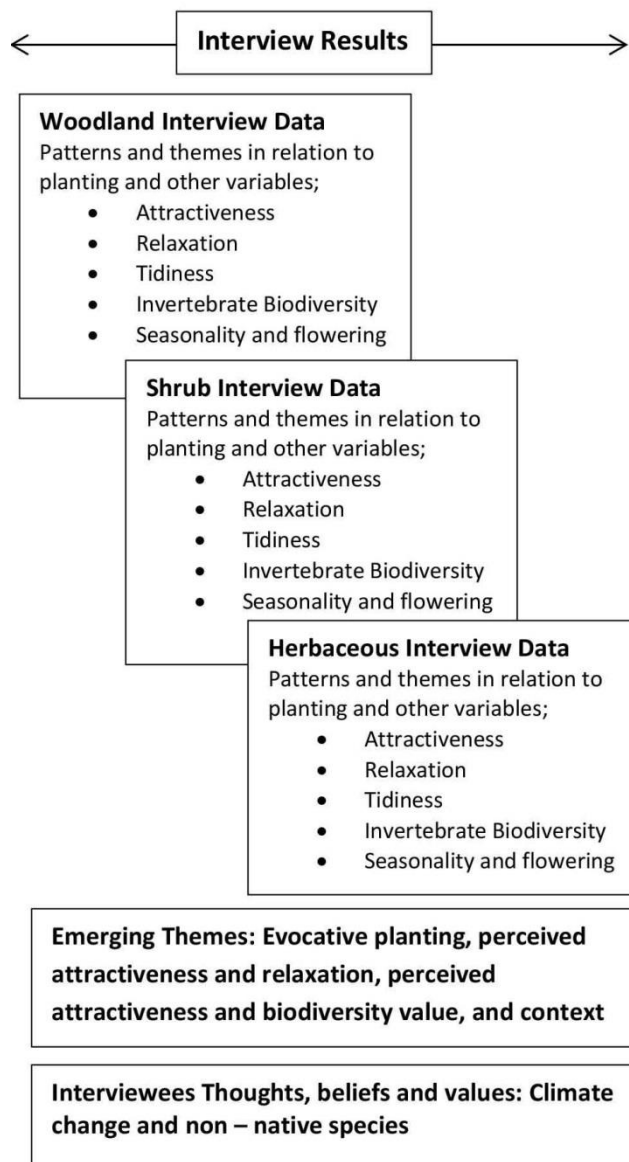
Table 2: Interviewees' Socio - demographic Profile

Gender							
Woodland Communities (n = 9)		Shrub Communities (n = 8)		Herbaceous Communities (n = 17)		Overall (n = 34)	
M	5 (56%)	M	4 (50%)	M	5 (29%)	M	14 (41%)
F	4 (44%)	F	4 (50%)	F	12 (71%)	F	20 (59%)
Age							
Woodland Communities (n = 9)		Shrub Communities (n = 8)		Herbaceous Communities (n = 17)		Overall (n = 34)	
25 – 34	0	25 – 34	1 (12.5%)	25 – 34	2 (12%)	25 – 34	3 (9%)
35 – 44	1 (11%)	35 – 44	0	35 – 44	2 (12%)	35 – 44	3 (9%)
45 – 54	3 (33%)	45 – 54	2 (25%)	45 – 54	2 (12%)	45 – 54	7 (21%)
55 – 64	5 (56%)	55 – 64	2 (25%)	55 – 64	4 (23%)	55 – 64	11 (32%)
65 +	0	65 +	3 (37.5%)	65 +	7 (41%)	65 +	10 (29%)
Ethnicity							
Woodland Communities (n = 9)		Shrub Communities (n = 8)		Herbaceous Communities (n = 17)		Overall (n = 34)	
White British/Irish	9 (100%)	White British/Irish	7 (88%)	White British/Irish	15 (88%)	White British/Irish	31 (91%)
		White (Swedish)	1 (12%)			White (Swedish)	1 (3%)
				Mixed White/Asian	1 (6%)	Mixed White/Asian	1 (3%)
				Asian Indian	1 (6%)	Asian Indian	1 (3%)
Educational Qualifications							
Woodland Communities (n = 9)		Shrub Communities (n = 8)		Herbaceous Communities (n = 17)		Overall (n = 34)	
None	2 (22%)	None	0	None	1 (6%)	None	3 (9%)
GCSE/O' level (or equiv)	1 (11%)	GCSE/O' level (or equiv)	3 (37.5%)	GCSE/O' level (or equiv)	2 (12%)	GCSE/O' level (or equiv)	6 (18%)
A level (or equiv)	0	A level (or equiv)	1 (12.5%)	A level (or equiv)	7 (41%)	A level (or equiv)	8 (23%)
Degree	6 (67%)	Degree	3 (37.5%)	Degree	4 (23%)	Degree	13 (38%)
Masters' degree	0	Masters' degree	1 (12.5%)	Masters' degree	2 (12%)	Masters' degree	3 (9%)
Doctorate	0	Doctorate	0	Doctorate	1 (6%)	Doctorate	1 (3%)
Landscape or Environmental professional?							
Woodland Communities (n = 9)		Shrub Communities (n = 8)		Herbaceous Communities (n = 17)		Overall (n = 34)	

Yes	1 (11%)	Yes	2 (25%)	Yes	3 (18%)	Yes	5 (15%)
No	8 (89%)	No	6 (75%)	No	14 (82%)	No	29 (85%)

The interview results and interpretation are presented in five sections, as illustrated in figure 1 below.

Figure 1: Diagrammatic representation of the presentation of interview results and interpretation



The first three sections focus on the analysis of interviewees' comments (interview extracts) relating to the themes informed by the analysis and interpretation of questionnaire data. The interviews are analysed according to vegetation community; woodland, shrub, then herbaceous, although extracts are also included from interviewees who walked through a different community, but then commented separately on the other communities in a separate part of the interview. The themes addressed in the case of each community include the overall attractiveness of the planting, how relaxing people thought it would be to walk through it, tidiness, invertebrate biodiversity and seasonality.

The fourth section addresses emerging themes. Themes include; evocative planting, the relationship between what is perceived as attractive planting and planting that makes interviewees feel relaxed, attractiveness and perceived biodiversity and context.

The final section addresses the interviewees' thoughts, beliefs and values, focusing specifically on the predetermined research themes of climate change and non – native species.

Part Three

Public Perception of Planting: On site Interviews; Results and Analysis

Introduction

As explained in the Methods section, themes emerging from the analysis and interpretation of the questionnaire data informed the content and approach of the semi – structured interviews. The themes emerging from respondents' perceptions of the walk through an area of planting included 'attractiveness', 'feeling relaxed', or a sense of physical/psychological well – being, tidiness, insect biodiversity, as well as colour and flowering. The interview was designed to address these themes in relation to the planting structure and character, yet other themes were allowed to emerge through the interviews. Pre – determined research themes relating to respondents' thoughts and beliefs were also addressed. These included beliefs in relation to climate change, non – native plant species and broader environmental issues. A flexible approach to this part of the interview allowed interviewees the opportunity to focus on additional issues relevant to them personally.

Thirty four semi – structured interviews were conducted from 20th March – 31st July 2014, with a sub – set of the original respondents who had completed the on - site walks and questionnaires in 2012 or 2013. The intention was to conduct one interview per 'walk site' (33 in total), but this proved impossible, as did sampling across the age range and achieving a balance between male and female interviewees. Questionnaire respondents' contact details were obtained for all 33 sites, yet many failed to reply to emails and phone calls, and others were unavailable for interview on the appointed dates. Interviews were conducted representing walks at 24 sites. In some cases two or even three interviewees originally walked through the same area of planting, e.g. Wisley Wildflower meadow, as these individuals were very keen to take part in the interview process.

With the exception of the three interviews focusing on the two Sheffield sites, where the interviews took place in the Landscape Department in the Arts Tower, all interviews were conducted in the locations of the original walk sites. These included Abbotsbury Subtropical Gardens, Hilliers, Beth Chatto's Garden, RHS Wisley, The Crown Estate, Torquay seafront and Fairlands Valley Park in Stevenage. In the case of the garden locations, indoor office/meeting room/café locations were arranged in collaboration with the garden curators. In the case of the two public locations, appropriate indoor/outdoor café locations were used. The three interviews conducted in the Landscape Department at Sheffield were considered pilot interviews, but were also incorporated into the final data set.

Interviewees were initially asked to recall and describe their own walk through the planting, during Spring – Autumn 2012 or 2013, (Woodland, shrub or herbaceous), before being presented with a panoramic image of the planting along their 'walk', on the day of the walk. They were then presented with a selection of eight (nine in two cases) different panoramic images of planting along different walks of the same vegetation community, i.e., woodland, shrub or herbaceous planting, which included the image showing their 'own' walk. This same

set of eight images was then used to explore the themes above, for example interviewees were asked to imagine which three areas of planting they would find the most attractive to walk through. The interviewees were then prompted to justify their selections. In order to focus specifically on the role of planting structure and character, interviewees were then presented with a smaller selection of 2 or 3 images, from which they had to select their preferred walk. Additional images were then used to address the issue of seasonal change. Interviewees were presented with a panoramic photograph of an area of planting of their specific vegetation community at two different times of year, in order to discuss the impact of seasonal change on perception and preference. An additional set of images was used across all communities to discuss flowering and colour. This set of five images included panoramic photographs of either herbaceous or shrub planting of one dominant colour, (yellow, pink, blue/mauve, pale cream), as well as a meadow showing mixed colours. Interviewees were then shown photographs of two walks in each of the 'other' vegetation communities, for example, those who originally walked through woodlands were shown areas of herbaceous planting and shrub planting. The images were specifically chosen to represent contrasting styles (character/structure). This was to gain a wider perspective on these other communities than would have been the case if only the people walking through that community had commented on it.

The final part of the interview focused on the interviewee's thoughts, beliefs and values. Issues discussed included climate change, the inclusion of non – native species in UK parks and gardens as well as broader environmental concerns. Again, other themes and ideas were allowed to emerge. In this section just one image was used as a stimulus; the panoramic photograph of the Mediterranean Bank at Abbotsbury subtropical Gardens, representing an example of 'non – native' planting.

All interviews were audio – recorded and later transcribed in full. The resulting transcripts were analysed qualitatively. Research themes informed by the questionnaires and pre – determined research themes relating to respondents' thoughts provided the initial broad framework for categorisation of interviewees' comments (extracts). Within this broad framework, extracts taking a particular slant or standpoint were grouped together. Recurring emergent themes were flagged up for particular attention, and extracts again classified according to interviewees' responses.

Table 1, (below) provides a summary of the interviews conducted in relation to sites and the three vegetation communities, whereas Table 2 focuses specifically on the socio - demographic composition of the interview sample.

The gender balance of the interview sample was uneven, with more female than male interviewees; (49% male, 59% female), although this overall imbalance was entirely the result of a dominance of female interviewees in the case of herbaceous planting interviews. Nine interviews were carried out with interviewees who originally walked through woodland planting, (5 male, 4 female), eight who originally walked through shrub areas, (4 male, 4 female), and seventeen who walked through areas of herbaceous planting, (5 male, 12 female). In four cases interviewees requested to bring a 'partner' along to the interview. The partner did not play a dominant part in the interview, yet did contribute at times, and has been included in Table 1, for later reference.

The socio – demographic profile, (Table 2), shows that interviewees demonstrated a broad range of educational qualifications. Nine percent of interviewees had no recorded educational qualifications, 18% had GCSE/O' level equivalent, 23% A' level or equivalent, 38% a first degree, 9% a masters' degree and one interviewee, (3%), had a doctorate. There was a distinct lack of young interviewees, with none in the youngest group, 16 – 24, 3 interviewees (9%) from 25 – 34 and a further 3 (9%) from 35 – 44. Seven interviewees (21%) were 45 – 54, and 11 (32%) 55 – 64, with 10, (29%) over 65. Thirty one interviewees, (91%) identified themselves as White British /Irish, with only three other ethnic groups represented. There was one White (Swedish) interviewee, one Mixed White/Asian and one Asian Indian. These patterns partially reflect the demographic composition of the much larger questionnaire sample. Of the 34 interviewees, 5, (15%) were currently or had in the past been employed in a Landscape/Environmental role.

Table 1: Interview Results: Summary by Vegetation Community

Walk Site	ID	Gender	Age	Ethnicity	Edqual	Landpro	Personal profile/Other details
Woodland							
Torquay Kings Gardens	M1	M	55-64	White British/Irish	O levels	No	Interest in gardening and growing food. Used to be in catering. Moved to Torquay with wife 5 yrs ago on retirement. Used to take holidays here. Wife says it's 'gone downhill', but he thinks you just see a different side of a place when you live there
Torquay Princess Palms	F1	F	45 – 54	White British/Irish	None	No	Interest in gardening. Works in bingo hall in Torquay but off work due to shoulder injury sustained at work. Moved to Torquay from Swindon yrs ago. Has son, grandson. Problem with Torquay is town centre – or lack of – all charity shops.
Wisley Eucalypts	M2	M	45 – 54	White British/Irish	Degree	No	Interest in gardening and landscape design. Ex military. Very ordered, very, 'to the point'.
Wisley Eucalypts	F2	F	55 – 64	White British/Irish	Degree	No	Personal interest in agriculture, gardening, Landscape des, environment, arts, biology. Has own allotment and spends a lot of time there. Very keen on plants. Seemed a bit nervous?
Abbotsbury Jungle Ride	F3	F	55 – 64	White British/Irish	Degree	No	Keen gardener and lover of landscape and outdoors. Tanned and leathery. Former geography teacher.
Wisley Wild Garden	M3	M	55 – 64	White British/Irish	Degree	No	Interest in ag, gardening, biology. Volunteers – gardening, nature conservation. Daughter doing PhD (Biodiversity, legumes), he brought me an article on well - being and greenspace
Wisley Wild Garden	M4	M	55 – 64	White British/Irish	Degree	No	Professional actor, ex - police
Fairlands V Arboretum	M5	M	35 – 44	White British/Irish	Degree	No but degree in conservation managment	Keen cyclist, dog walker. Crosses park several times/day. Professional, volunteer, personal interest in environment and nature conservation. Degree in conservation management. Now long term sick/disabled

						and volunteers.	
Fairlands V Monk's Wood complex	F4	F	45 – 54	White British/Irish	None	No	Wearing yellow. Orchid spotter. Saw a ghost..a man? In Monk's wood. Jolly, chatty, friendly. Two border collies. Long term sick/disabled
Shrub							
Valley Gardens Punchbowl	F5	F	45 – 54	White British/Irish	Masters' degree	No but ex architect	Ex architect, interest in landscape architecture.. Very enthusiastic about the Punchbowl, photography, bright colours. Wearing bright pink
Wisley Heathers	M6	M	25 – 34	White British/Irish	GCSEs/O levels	Yes	Was in army before working in the city, now landscaper. Professional ag, hort, landscape, environmental/conservation. Interest in the arts, Biology. Spends as much time as possible outside gardening on personal/professional level and makes wooden craft furniture.
Hilliers Heathers	F6	F	65+	White other (Swedish)	Degree	No	Interest gardening, env and nature cons, arts and boil. Lives Isle of Wight and rents out cottages. Loves colour
Savill Garden Spring Wood	M7	M	65+	White British/Irish	O levels	No	Wife not very mobile. Clear views, decisive. Not too chatty
Hillers Native – looking arboretum style shrubs	M8 F7	M F	65+	White British/Irish	Degree	No	Personal interest gardening, env and nature conserve, arts. Ex - navy. Daughter in NZ, son airline pilot in Canada. Loves trees, loves tidy (wife doesn't). Doesn't like wildflowers.
Hillers Native – looking arboretum style shrubs	F8	F	55 – 64	White British/Irish	O levels	No	Talked about 3 acre garden, buying another 45, buying a bluebell wood
Fairland V Native woodland edge	M9	M	55 – 64	White British/Irish	Degree	No	Personal interest ag, hort, Landsc. arch, env and nature cons., biol. Esoteric philosophy, design engineer. Walks across park twice a day to go to his elderly mother's. Looks after her garden.

Fairland V Native woodland edge	F9	F	45 – 54	White British/Irish	A levels	No	Registered nurse. Works part time at the Lister hosp. Daughter works Costellos café in the park.
Herbaceous							
Wisley trad herb borders	M10 F10	M F	65+	White British/Irish	Degree	No	Personal interest gardening, the arts, biological sciences. Hearing aid and white linen jacket
Wisley Oudolf borders	F11	F	35 – 44	White British/Irish	Doctorate	No	Accountant. Lives in Poole and came with a friend. Personal interest in gardening Had read about Sheffield naturalistic planting style and was interested to know more. Very precise and business like. Exacting in descriptions
Sheffield Botanic Garden Prairie	F12	F	25 – 34	White British/Irish	A levels	No	Personal interest in gardening and growing food, env/nature cons., biol. Full time student but long term sick/disabled. Talked about grandparents
Sheffield Botanic Garden Prairie	M11	M	45 – 54	White British/Irish	Degree	No	Professional – biological sciences/botany Did undergrad Sheffield
Beth Chatto Wet Garden	F13	F	25 – 34	White British/Irish	Masters' degree	No	Teaching assistant – lives locally 20 mins away. Interest – growing food, the arts, gardening, env /nature cons.
Sheffield Bole Hill Rec Ground	M12	M	35 – 44	Mixed white/asian	A levels	No but env/nature conservation	Sheffield City Council Allotment Ranger Professional Env/nature conservation
Abbotsbury Mediterranean Bank	F14	F	65+	White British/Irish	A levels	No	No details. Arrived late so started interview immediately. No clear interests indicated
Abbotsbury Mediterranean Bank	F15	F	65+	White British/Irish	O levels	No	Personal interest growing food, gardening. Hearing aids. Volunteers Fleet Air Arm museum. Was WREN in WW2.
Beth Chatto Gravel Garden	F16	F	45 – 54	White British/Irish	None indicated RHS lev 2 diploma	No but professional hort interest	Profess hort, interest landsc. Design, the Arts. Medical receptionist in Essex. Keen gardener. Has new allotment.
Beth Chatto Gravel Garden	F17	F	65+	White British/Irish	Masters' degree	No	Interest in dry garden as lives in Essex (dry) and looking for inspiration
Wisley Prairie	F18	F	55 – 64	Asian	A levels	No	Personal interest in growing food, gardening, landsc. Des.,

				Indian			env/nature cons. Born in India, moved to Nigeria in 1960 and grew up there. Lived in Oxford when own children young. Interesting comments on tidiness and order.
Wisley Prairie	F19	F	65+	White British/Irish	Degree	No	Interest in the Arts. Came with friend. She visits a lot of gardens and properties
Wisley Olympic wildflower meadow	M13 F 20	M F	55 - 64	White British/Irish	A levels	No	Owned some land and had been creating own 'meadow'. Keen on grasses. Knowledgeable re biodiversity issues and invertebrate habitats. Personal interest in growing food, gardening, env/nature cons/biology sci.
Wisley Olympic wildflower meadow	F21	F	55 – 64	White British/Irish	A levels	No	Keen photographer of wildlife and landscape. Son partner of Becca Lovell at Exeter Uni (well – being). Loves woodlands
Wisley Olympic wildflower meadow	F22 M14	F M	65+	White British/Irish	O levels	No	Horticultural volunteer at Nyman's. Very organised, to the point. Sometimes serious. Husband much more laid – back.
Fairlands V Grasshopper trail meadow	F23	F	65+	White British/Irish	A levels	No	Personal interest growing food, gardening. Spends all summer out in her garden. Also landsc. Des., env/nature conserve. Arts and Biol. Grandmother – walks through woodland with grandsons and has written stories about tree characters
Fairlands V Grasshopper trail meadow	M15	M	55 – 64	White British/Irish	Degree	No but ex teacher involved with environmental edcn	Very supportive of natural environments. Likes to see little formal work in natural spaces. Dislikes order.

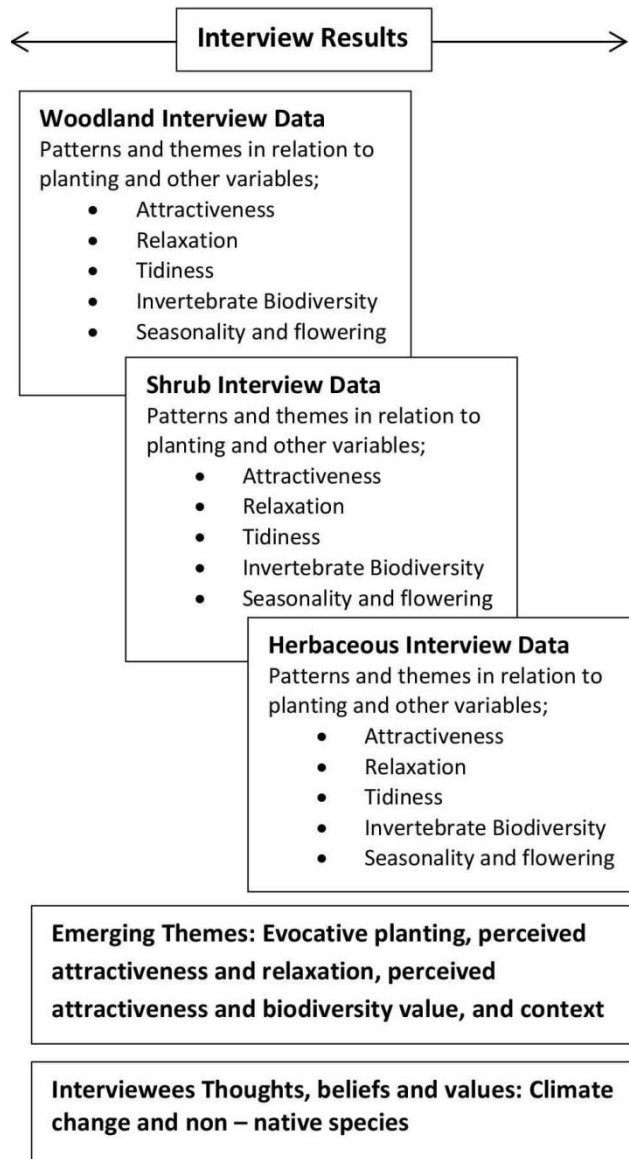
Table 2: Interviewees' Socio - demographic Profile

Gender							
Woodland Communities (n = 9)		Shrub Communities (n = 8)		Herbaceous Communities (n = 17)		Overall (n = 34)	
M	5 (56%)	M	4 (50%)	M	5 (29%)	M	14 (41%)
F	4 (44%)	F	4 (50%)	F	12 (71%)	F	20 (59%)
Age							
Woodland Communities (n = 9)		Shrub Communities (n = 8)		Herbaceous Communities (n = 17)		Overall (n = 34)	
25 – 34	0	25 – 34	1 (12.5%)	25 – 34	2 (12%)	25 – 34	3 (9%)
35 – 44	1 (11%)	35 – 44	0	35 – 44	2 (12%)	35 – 44	3 (9%)
45 – 54	3 (33%)	45 – 54	2 (25%)	45 – 54	2 (12%)	45 – 54	7 (21%)
55 – 64	5 (56%)	55 – 64	2 (25%)	55 – 64	4 (23%)	55 – 64	11 (32%)
65 +	0	65 +	3 (37.5%)	65 +	7 (41%)	65 +	10 (29%)
Ethnicity							
Woodland Communities (n = 9)		Shrub Communities (n = 8)		Herbaceous Communities (n = 17)		Overall (n = 34)	
White British/Irish	9 (100%)	White British/Irish	7 (88%)	White British/Irish	15 (88%)	White British/Irish	31 (91%)
		White (Swedish)	1 (12%)			White (Swedish)	1 (3%)
				Mixed White/Asian	1 (6%)	Mixed White/Asian	1 (3%)
				Asian Indian	1 (6%)	Asian Indian	1 (3%)
Educational Qualifications							
Woodland Communities (n = 9)		Shrub Communities (n = 8)		Herbaceous Communities (n = 17)		Overall (n = 34)	
None	2 (22%)	None	0	None	1 (6%)	None	3 (9%)
GCSE/O' level (or equiv)	1 (11%)	GCSE/O' level (or equiv)	3 (37.5%)	GCSE/O' level (or equiv)	2 (12%)	GCSE/O' level (or equiv)	6 (18%)
A level (or equiv)	0	A level (or equiv)	1 (12.5%)	A level (or equiv)	7 (41%)	A level (or equiv)	8 (23%)
Degree	6 (67%)	Degree	3 (37.5%)	Degree	4 (23%)	Degree	13 (38%)

Masters' degree	0	Masters' degree	1 (12.5%)	Masters' degree	2 (12%)	Masters' degree	3 (9%)
Doctorate	0	Doctorate	0	Doctorate	1 (6%)	Doctorate	1 (3%)
Landscape or Environmental professional?							
Woodland Communities (n = 9)		Shrub Communities (n = 8)		Herbaceous Communities (n = 17)		Overall (n = 34)	
Yes	1 (11%)	Yes	2 (25%)	Yes	3 (18%)	Yes	5 (15%)
No	8 (89%)	No	6 (75%)	No	14 (82%)	No	29 (85%)

The interview results and interpretation are presented in five sections, as illustrated in figure 1 below.

Figure 1: Diagrammatic representation of the presentation of interview results and interpretation



The first three sections focus on the analysis of interviewees' comments (interview extracts) relating to the themes informed by the analysis and interpretation of questionnaire data. The interviews are analysed according to vegetation community; woodland, shrub, then herbaceous, although extracts are also included from interviewees who walked through a different community, but then commented separately on the other communities in a separate part of the interview. The themes addressed in the case of each community include the overall attractiveness of the planting, how relaxing people thought it would be to walk through it, tidiness, invertebrate biodiversity and seasonality.

The fourth section addresses emerging themes. Themes include; evocative planting, the relationship between what is perceived as attractive planting and planting that makes interviewees feel relaxed, attractiveness and perceived biodiversity and context.

The final section addresses the interviewees' thoughts, beliefs and values, focusing specifically on the predetermined research themes of climate change and non – native species.

Section 1: Woodland Interviews

Introduction

Nine interviews were conducted with respondents who had originally walked through woodland areas of planting. The gender balance was relatively even: 5 males, (56%), and 4 females, (44%). Interviewees were all aged between 35 – 64. One (11%) was 35 – 44, 3 (33%) were 45 – 54 and 5 (56%) were 55 – 64. All described themselves as White British/Irish. Two interviewees (22%) had no recorded educational qualifications, 1 (11%) had GCSEs/O' levels /equivalent, and 6 (67%) had a first degree. One interviewee had been employed in a professional environmental role in the past.

After discussing their own walk experience and their remembered planting along the walk respondents were presented with eight images of woodland planting with varying character/structure in relation to semi – natural planting, as shown in figure 1. The images were all A4 in size and were arranged in no particular order on a table/desk in front of the interviewee. The two interviewees who had walked through the palms in Torquay were shown an additional photograph of the palms with under bedding, as was present at one of the Torquay sites during the walks. Themes which were then discussed in relation to the eight images included overall attractiveness, relaxation, tidiness and invertebrate biodiversity. In order to focus specifically on the role of planting structure and character, interviewees were then presented with a smaller selection of 3 images, from which they had to select their preferred walk, (figures 2, 3 and 4). In order to discuss the impact of seasonal change on perception and preference, interviewees were presented with panoramic photographs of two different woodland areas of planting, one of each set taken in spring, (April 2012), and another taken in early Autumn, (September 2012), (figure 11). These images were taken during on – site walks with questionnaire respondents. Other interviewees (those focusing on shrub and herbaceous planting) were shown photographs of two contrasting areas of woodland, as shown in figure 5. They were asked if either area drew them in, or if they would like to walk through either of these areas.

Character similarity to semi natural vegetation

Structural similarity to semi natural vegetation

Low

Med

High

Low

Med

High

Torquay Kings Gardens



Torquay Princess Gardens



Wisley Arboretum



Stevenage Fairlands Arboretum



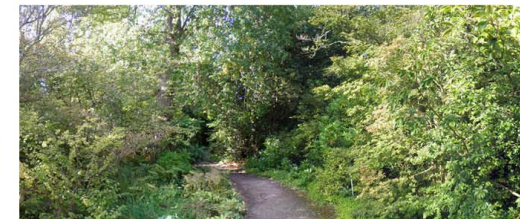
Wisley Eucalypts



Beth Chatto Wood



Abbotsbury Jungle Ride



Wisley Wild Gdn



Stevenage Monk's Wood complex

Figure 1: Images used to discuss overall attractiveness, relaxation, tidiness and invertebrate biodiversity

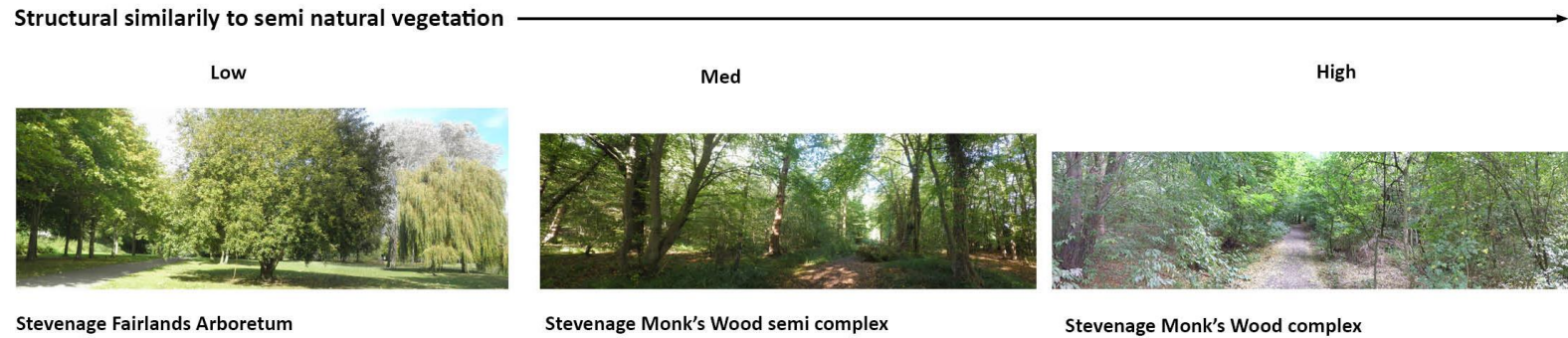


Figure 2: Structural Variability: Images used to discuss overall preference in relation to structure (interviewees who originally walked through woodland more like semi – natural in character)

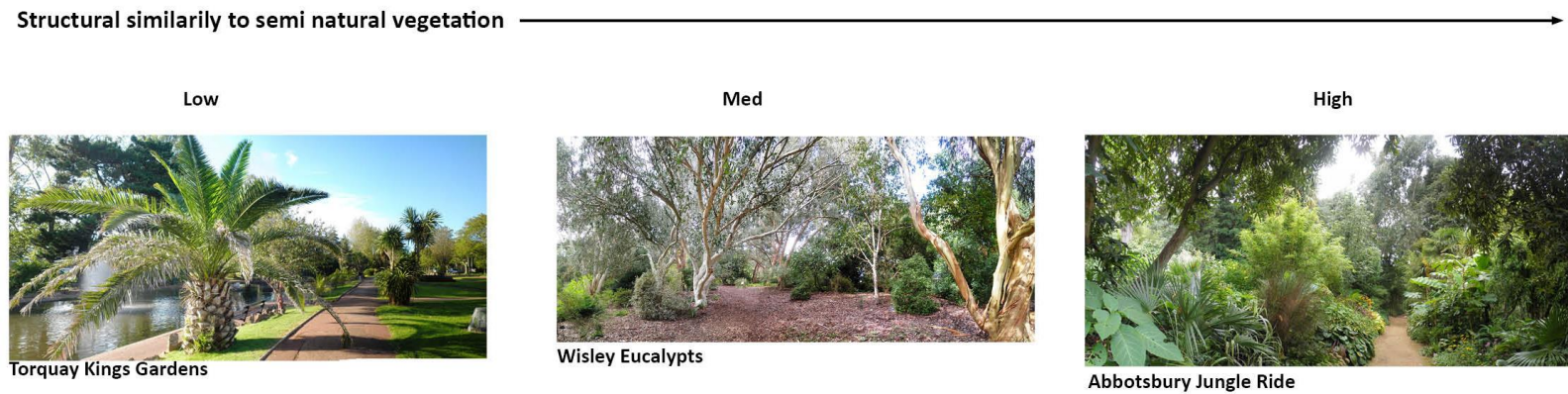


Figure 3: Structural Variability: Images used to discuss overall preference in relation to structure (interviewees who originally walked through woodland least like semi – natural in character)

Figure 4: Character Variability: Images used to discuss overall preference in relation to species character

Character similarity to semi natural vegetation



Figure 5: Images used to discuss woodland preference with herbaceous and shrub interviewees



1.1. The overall Attractiveness of Woodland Planting

Through discussions of overall attractiveness of the areas shown in Figures 1, 2, 3 & 4 with the nine woodland interviewees, and discussions of woodland attractiveness relating to Figure 5 with herbaceous and shrub interviewees, five sub – themes emerged. These were; **form and appearance in relation to species character, planting structure, flowering and colour, evocative planting, and perceived biodiversity/wildlife value.** The first three themes are discussed here, whereas the others are addressed via, ‘emerging themes’.

1.1.1. Overall attractiveness of woodland planting: Form and appearance in relation to Species Character

Positive reactions to planting with an unfamiliar species character (5/9 interviewees, 2 xM, 3xF) were confined to the eucalypts at Wisley and Abbotsbury Jungle Ride, whereas most of the negative reactions (5/9 interviewees, 4xM, 1xF) were targeted at the Torquay palms. These were rejected mainly because they appeared out of context in the UK landscape. Interviewees repeatedly referred to their preference for something more, ‘natural’. Two interviewees, (M2 and F4) rejected the palms (Cordyline ‘australis’), purely because they were non – native.

i) Positive Reactions to planting least natural in form and appearance

Five out of nine (2xM – M1,M3, 3xF – F1,F2, F3) interviewees chose woodlands least natural in character as the most attractive, or these appeared in their selection of the three woodlands they would find most attractive to walk through. Four chose the eucalypts at Wisley.

Interviewees appreciated the form and appearance of the trees. Many found the shape of the trunks, and the peeling bark particularly attractive. These views are encapsulated by the two comments below;

M1: Yes, I’m going to go for this one first, (Eucalypts) because I do like the... shall I say ‘rawness’ of it, I think that’s the word I would use... You look at all the trees, they’re sort of regimented to a point, but if you look, they are all different shaped, bends, you know.

F2: Indeed, and I think these tree shapes and these bark patterns and the way the light plays upon the bark...and through the foliage is absolutely beautiful.

One interviewee seemed to appreciate the eucalypts specifically because their appearance was unfamiliar;

F2: Heeerrrrr (exhales loudly)...You see this has got a strange...almost an eeriness..(Eucalypts) about it, I don’t know not eeriness, I don’t want to say that...it’s just a bit different, isn’t it? It’s something we’re not accustomed to seeing, and I would find this interesting.

Abbotsbury Jungle Ride, the multi – layered woodland least like semi - natural, was also appreciated for the variety and form of leaves;

F3: I would prefer to walk through this one (Abbotsbury Jungle Ride) because I think it’s going to be more interesting to walk through there’s a bigger variety of leaf, texture and shape and colour, and I think it’s probably because it’s got some tropical stuff in it..that I really like, so I would love to walk through this one, more than these, (the other seven)

When presented with three areas of woodland of different species character in relation to semi – natural, (as in Figure 4), another interviewee chose Abbotsbury Jungle Ride because of the sheer size of the plants;

HH: If I asked you to walk through these, which of these do you think would be the most enjoyable to walk through, for you..if there is one?

F1: Yeah, I would say that one, (Abbotsbury).. I suppose erm, bigger plants...and that one I would go in, actually I would go in all of them, but I think this one mostly I think. Bigger plants...



Figure 6: Species character; the form and appearance of the Wisley eucalypts was considered attractive. Interviewees referred to ‘bends’ bark patterns and ‘a rawness’

ii) *Negative reactions to planting least natural in form and appearance: Appreciation of semi – natural woodland*

In contrast, 5/9 interviewees (4xM – M2, M3, M4, M5, 1XF – F4) rejected the palms at Torquay because their appearance and form were so dissimilar to what they perceived as semi – natural, or indeed, ‘natural’ in a particular part of the UK. These interviewees appreciated woodlands that were semi – natural in appearance and form. In many cases they stated either implicitly or explicitly that to see more palm trees in the UK was or would be out of context. The issue of context comes through particularly strongly here and is discussed later as a theme emerging from the interviews;

M2: I’ve travelled around the world and lived also in a number of different countries, and one of the things that I’ve always enjoyed about coming home to England is the English countryside..and one of the things I’ve noticed is how much planting now includes non – native species and I’ve built up as I’ve got older a don’t know..dislike is perhaps too strong a word, but I don’t like palms and pampas grass and those things that I regard as so artificial as to be unattractive in our native environment.

F4: Well I don’t like (palms) that cos it’s too...it’s not like native is it?

M4: I mean that looks a fairly formal...arrangement...(palm) that looks unnatural to this country, I mean I’m assuming it’s your Torquay type..yep, the English Riviera and all that. No thanks not for me.

M3: The feeling I get about ..that one (palm), okay, if I’d gone to Hawaii, fine...



Figure 7: Species character; several interviewees rejected less familiar forms such as the Torquay palms (top) and Abbotsbury Jungle Ride (second) as artificial and unnatural



They preferred Wisley Wild Garden (third here) and Stevenage Fairlands Valley complex woodland (bottom), seeing these as more 'natural'



The same interviewee (M2), who had travelled and lived in a number of different countries, immediately rejected the Eucalypts and Abbotsbury Jungle Ride in favour of Wisley Wild Garden and Stevenage Monk's wood; when presented with the four woodland images in Figure 4;

HH: ..And the reasons that you would like to walk through these, (Wisley Wild Garden, Stevenage Fairlands Monks wood complex), are the same as you gave before?

M2: Absolutely, that as far as I can tell from the pictures, and with my limited knowledge, these are more in keeping with our current countryside and climate.

When considering the eight images, (Figure 1) at the beginning of the interview, another interviewee chose his local woodland, Monk's Wood, Stevenage as the most attractive, on the grounds that it looked more 'natural';

M5: It's more natural...it's more natural to me.. from what I know...natural spaces... I could be wrong but it looks like a natural UK woodland... I do like things to be natural yeah...

iii) Appreciation of both more exotic and semi – natural woodlands

One of the nine interviewees expressed appreciation for both woodlands which looked more exotic in species character, and those more like semi natural areas;

F3: I would prefer to walk through this one (Abbotsbury Jungle Ride) because I think it's going to be more interesting to walk through..there's a bigger variety of leaf, texture and shape and colour...

F3: I think I would go for this one, (Stevenage Monk's Wood complex), for the third one, because its more natural, so you are going through a very natural area here, which I think if I was walking through, I would find quite calming and, yes I would like that.

1.1.2. Overall attractiveness of woodland planting: Planting Structure

When asked to select the three areas of planting they would find the most attractive to walk through from those in Figure 1, four interviewees (2xM, 2xF) showed a preference for a closer, denser structure more like a semi – natural woodland. The arboretum style of woodland least natural in structure was considered too formal and planned. In contrast, two interviewees found open arboretum style planting to be the most attractive. One of these interviewees was actually surprised by his own selection. One of the nine interviewees expressed appreciation for both close structures more like semi – natural woodland planting, and open structures. This was the same female interviewee who appreciated both more exotic and semi natural species characters;

i) Appreciation of multi – layered 'close' structures most natural in structure and rejection of openness

F3: Well, I think this one, (Abbotsbury Jungle Ride), is still the most attractive..because I like the lush planting, I like the close planting, I like..I just like the way different shapes have been put together but it's very lush, so that's really nice.. I don't..I think they are a little bit boring, (arboreta – both Fairlands V and Wisley), and I think that might be too formal, (palms)

M1: As you see I've not gone for the opener one... I don't like them so much (arboretum style)...

M4: Okay if I dismiss that and I dismiss that..? They look formal and put and planted...and that's not so much me...similarly that....you can see a type developing here...can't you...Erm..I think I like that...and I like that..and that...(1– Monks Wood Stevenage, 2 – Beth Chatto's woodland, 3 – Eucalypts)

F4: That's too open...That's too regimented (Fairlands arboretum),

ii) Appreciation of openness in woodland structure

M3:the one I've chosen as my first (Fairlands Valley Arboretum)..it's just trees and grass..if I look closely there may be other things, but it's, it's fairly simple, so I would have thought that I would have preferred the one with more points of interest, more different plants, but actually, just trying to look at it straight and say which would I rather be walking through, it's that one (Fairlands arboretum), and I think it's partly because its more open.

iii) Appreciation of both 'close' and 'open' woodland structures

F3: Well, I think this one, (Abbotsbury Jungle Ride), is still the most attractive..because I like the lush planting, I like the close planting, I like..I just like the way different shapes have been put together but it's very lush, so that's really nice..

F3: I like this one though, (Eucalypts), because it's more open, and I think the trees are really interesting..

1.1.3. Overall attractiveness of woodland planting: flowering and colour

There was very little visible flowering in any of the images used in the main woodland interviews, the exception being the bright blue and red underbedding beneath the *cordyline australis* planting at Princess Gardens in Torquay, (Figure 8). This image was used only when discussing woodlands with the two residents of Torquay who had done their woodland walks and questionnaires in Torquay.

The Torquay resident, (F1), who had originally walked through Princess Gardens chose this as the most attractive of the nine woodland sites shown to her. As well as recalling times spent here with her granddaughter, as described above, she voiced particular appreciation for the colour in the planting;

F1: Well, it's lovely and it's colourful..erm and it's bright, cheerful... and you've got all the flowers, different flowers all around the seafront.

Interviewees from herbaceous and shrub sites were also shown a photograph of woodland including flower. When asked to imagine walking through either Wisley Wild Garden or Stevenage Monk's wood with bluebells, nine interviewees responded particularly positively to the prospect of walking through a bluebell wood, such as Monk's wood, Stevenage. Many referred to the smell of the bluebells, as well as their visual appeal;

M10: Well, walking through a bluebell wood is always not only attractive to look at but there's the smell of the bluebells and so on, and it's the spring..

HH: So if you had the prospect of walking through any of these areas, are there any particularly that you would be drawn in by, that you would enjoy?

F19: The bluebell wood ..

HH: And why do you find that particularly interesting or attractive?

F19: They're just stunning aren't they, bluebell woods, with the light, the dappled light coming in..and the lime..all the trees are just coming into leaf. It's sort of bright lime colour coming in. And you get the smell of the bluebells..that's brilliant! I'm into bluebell woods!



Figure 8: Woodland planting; the impact of flowering and colour. Although dramatically different in structure and character, both the formal bedding under the palms in Torquay and naturalistic bluebell wood in Fairlands Valley Stevenage, produced positive reactions

1.2. Woodland planting and relaxation

The potential of the areas of planting shown in Figures 1, 2, 3 & 4 to induce a state of relaxation was discussed with the nine woodland interviewees, and the potential of areas of planting in Figure 5 was discussed with herbaceous and shrub interviewees, resulting in the emergence of five sub - themes. These were; **form and appearance in relation to species character, planting structure; enclosure v openness, lifecycle stage, and water.**

1.2.1. Woodland planting and relaxation: Form and appearance in relation to species character

Three interviewees, (2xM, 1xF) reacted particularly positively to woodland planting most like semi – natural in form and appearance, considering this to have the greatest potential to induce relaxation. One of these, (M2), again voiced his dislike of exotic woodlands such as the eucalypts, palms and subtropical planting at Abbotsbury, seeing this as out of context in the UK. Two female interviewees, (F3, F22) commented specifically on the negative feelings induced by walking through dense, dark coniferous woodland. Although they did not see images of coniferous woodland, the memory was evoked by the contrasting positive reaction towards the more open beech woodland with bluebells;

i) Appreciation of semi – natural woodland and negative reactions to planting least natural in form and appearance

HH: Do you want to say anything about why you like that one (Monks wood)?

F21: And so, I think part of it is that for me man hasn't yet managed to make anything better than nature. We haven't got it. We can't make it better than nature does it. Nature doesn't always do it. Nature an awful lot of the time doesn't get it right. We wouldn't plant a bluebell wood, because well..we wouldn't cos it's just all one flower..but by golly! When you get a good bluebell wood there is Nothing..! (with emphasis). And I hadn't realised ..but people travel the world to come to England to see bluebell woods. I hadn't realised how special they were...

This interviewee, (M2), again voices his strong dislike of non – native planting which he views as out of context in the UK;

M2: Okay, I can actually tell you that these..(1 – Fairlands Arboretum, 2 - Fairlands Valley complex woodland, 3 – Wisley Wild Garden)...are the sort of environments I find relaxing...but those..(Palms, Abbotsbury) the least.

HH: And why do you find these three particularly relaxing do you think? What is it about them?

M2: Erm...they seem to me to be more typical of the countryside that I enjoy being in. I like open spaces.. But as I've previously indicated..On the other hand..these ones over here.. ..(Palms, Abbotsbury, Eucalypts) This would be fine if I was in Australia, (Eucalypts) fine if I could understand there'd been some transfer of planting in Africa..I could have seen that. This reminds me of sort of the promenade in the S of France..or Cleethorpes (Palms)..or something similar. And this at first looks quite attractive (Abbotsbury Jungle Ride) but it's a sort of garden I would have expected to wander through in Hong Kong and I would be feeling extremely hot and sticky with the humidity if I was walking through a garden like that.

ii) Reactions to coniferous woodland

F3: I don't find coniferous woodland very relaxing. I think that can be quite dark...and forbidding. So I don't really like walking through fir trees, coniferous, pine trees..I don't find that very relaxing. I think if you walk through beech forest and you see bluebells - that's amazing,

HH: And why do you think you are particularly drawn to this woodland (Stevenage Monks wood, bluebells)?

F22: Well because of the bluebells really, and they're mostly deciduous trees aren't they, rather than conifers and again I like those sorts of woodlands, because you get more growing on the ground, so I'm a fan of deciduous woodlands.. It's very peaceful I think walking through these sorts of woodlands. Because that one isn't too dense....some woods, probably because they've got conifers are a little dense sometimes and you are slightly worried...but generally, walking through deciduous woodlands at this time of year...even in the summer they don't seem to be claustrophobic somehow, when the leaves are out.

1.2.2. Woodland planting and relaxation: Planting structure: enclosure v openness

Considering woodland structure and relaxation potential, in contrast to the views expressed about enclosure in coniferous woodland, above, four interviewees, (3xM – M4, M5, M8, 1xF – F6) found the enclosure created by a multi-layered woodland structure most relaxing. Two of these referred to being, 'embraced' by the planting. In contrast, five interviewees, (1xM – M3, 4xF – F3, F4, F11, F13) thought they would feel more relaxed walking through an open woodland with better visibility;

i) Appreciation of multi – layered enclosed structure as relaxing

M4: Yes....it's easy to get over – analytical about this but I think, going through here, and here, these two, (Wild Garden, Abbotsbury Jungle Ride) it seems as if the bulk of the vegetation is at about head height, so it would to a degree restrict your view, you would be

taking in just what's near to you, rather than that one (Beth C) which is much lower. It's bigger, so in terms of relaxing, almost embraced by the environment...

Decisions: 1 – Monk's Wood, 2 – Eucalypts, 3 - Beth C (all enclosed)

HH: Is that..why do you find them relaxing do you think?

M5: Again, because they're natural, more natural looking...they're not so well – kept, well, they are managed, but they're not so well – kept. They're more enclosed, as well, which I quite like.

HH: And..I'll ask you both..what is it about this area you like, (Monk's wood bluebells)?

M8: I'll give you one guess! It's trees, it's woodland, it's a combination of well..again, you're going to have a peaceful environment. You probably are there (Wild garden) as well, but, I don't know, I just, I find it attractive, with the tall stuff around me, and that again..(Wild garden)

ii) Appreciation of openness in woodland structure

Other interviewees felt more relaxed by the prospect of walking through open woodlands with better visibility;

M3: the same for my first one..(1 - Fairlands Arboretum) and relaxing, equally, that one (2 - Beth Chatto woodland) looks as if it would feel relaxing..I think it's partly because there's more there but it's lower..I wouldn't feel hemmed in..its once again partly the openness.

HH: Thank you, you've explained the first two. Now can you say why you find that one (3 – Monks Wood complex) relaxing?

M3: I suspect once again because it's fairly open, so I don't feel hemmed in, whereas with this one (Abbotsbury Jungle Ride) , for example, there's an obvious path but I would feel that there's too much clamouring for my attention...and the planting here is also higher..so you can see less far, whereas this is slightly more open. I think a lot of it is to do with the feeling of being either enclosed, or not...

F3: I think if you walk through any sort of woodland that is open, so you can see through, erm..I think that just lifts the spirit!

Two further interviewees reacted negatively to the enclosure of Wisley Wild Garden;

F11: and it also looks...although there is light coming down, there are also really dark, dense bits and I'm sort of thinking 'what's lurking in there?', I wouldn't walk down there on my own.

F13: yes, that is a bit enclosed isn't it? That's probably it actually. (Wild garden)

1.2.3. Woodland planting and relaxation: Water

One interviewee, (F2), commented on the water visible in Kings Gardens, Torquay as a relaxing influence;

Decisions: 1 – Beth Chatto woodland, 2 – Palms Kings Gardens Torquay, 3 – Abbotsbury Jungle Ride

F2: Well I think this ...actually (Palms Kings Gardens Torquay)..I think water..is always very relaxing. And there's an opportunity to have a sit down here, maybe have a drink or something like that..

1.2.4. Woodland planting and relaxation: Lifecycle stage

Another interviewee, (M1), commented on the changing need for relaxation. As he was retired he no longer felt he had to 'get away' from the stresses of work;

M1 - P'raps because I'm retired, you know, relaxation's a different ball – game, I don't know!

HH: Yes, because you're not seeking so much to get away..

M1: Escape from work! That's right, yes.

1.2.5. Woodland planting and relaxation: Sensory experience beyond the visual

When discussing relaxation in relation to walking through the different woodland areas, six interviewees in total (3xM – M8, M9, M14; 3xF – F1, F9, F22) referred to sensory experiences beyond the visual. This included references to peaceful traffic – free environments, the sound of birdsong, the sound of wind through the trees and deeper spiritual meanings.

A Torquay resident, (F1), reacted particularly positively to the peaceful traffic – free environments of gardens such as RHS Wisley and Beth Chatto's Garden. Although she was not told the context of these woodlands explicitly she saw them as 'gardens', something different to the public environment of the Torquay seafront. In a similar way, a Stevenage resident referred to the peace and lack of traffic in Monk's wood;

F1: Like I said they are all nice 'cos they're all near enough the same thing, here....erm then you can walk through...peace and quiet, cos these alright (palms) you've got the traffic..er but in the gardens, you know, you wanna bit of peace, and that be it with the birds and everything, away from the noise, yeah.

HH: What do you think about walking through the bluebell wood? You said you liked the feeling of that. Can you describe that?

F9: I find it very relaxing...and you are away from everything. Usually cars are not about, and it's usually quite peaceful...and you can look, you look in the distance and it's just trees, and bluebells when the bluebells are out. It's a feeling of being on holiday really, isn't it.

Another interviewee imagines the birds he might hear in Stevenage Monk's wood;

HH: And why do you think you are particularly drawn to this woodland (Stevenage Monks wood, bluebells)?

M14 (husband of F22): It's probably the feeling of the bird sound as well. It's not there but..

And another evokes the sound of the wind through trees;

M8:apart from... the other thing you get with trees which you might not get there, is sound, if it's windy. You notice it here (at Hilliers). On a windy day you get that beautiful sound of the wind in the trees. It's just another dimension I guess.

A Stevenage resident, (M9), explained how areas of ancient semi – natural woodland such as Monk’s Wood were a real source of relaxation for him. These areas held a particular spiritual significance;

M9: Right, I have to say that when I walk through woods, I feel the presence of the trees. Erm, It’s probably just me, but I can feel....this may just sound completely rubbish to you, I feel the vibration of the trees, large trees. I see the aura around trees. I can walk through trees, erm, I don’t know if you know the woods round here?

1.3. The tidiness and order of woodland planting

Considering the eight images in Figure 1, all nine woodland interviewees were asked to choose the three they thought looked the most tidy or designed, as opposed to being natural – looking. Once the decisions had been made, interviewees were asked to justify them. In doing this, 5/9 woodland interviewees (4xM – M1, M2, M3, M4, 1xF – F2) referred to aspects of structure and layout. Three interviewees referred to aspects of maintenance and council intervention. Two of this group were Torquay residents, (M1, F1) who were acutely aware of the council presence attending to planting along the seafront.

1.3.1. The tidiness and order of woodland planting: Structure and layout

Most interviewees chose the three/four areas of arboretum – style planting with a least natural structure as the most tidy. They commented specifically on the layout and formality of this planting, which was accurately perceived as ‘unnatural’;

M1: Yeah...well I think this (Princess palms) is tidy, because I do think it’s really laid – out tidy ..I mean this looks tidy because it is regimented to a point (Princess palms), you know, the beds are laid out specifically, they’re not random, you know, so that’s what makes it partly look tidy. That’s part of its tidiness. These (looking at others) it’s more of a rough and ready woodland, you know, more to the habitat type thing...

F2: Well that must be number 1, mustn’t it, for being the most tidy (Palms)? That must be number two (Fairlands Arboretum), because it’s obviously very carefully planted and there’s probably space between the trees, as they have here (Palms), and probably that, actually isn’t it (Wisley Arboretum)?

HH: That’s fine, absolutely. And what is it about them, can you put it into words?

M4: There’s a sense of things being ‘put’, you’ve got an avenue of trees, an avenue isn’t going to occur naturally...again, this variety of trees, the different variety suggests the hand of man (Wisley arb)...it’s not a grove of silver birch, or a grove of ash or whatever, it’s that feel of stuff being placed.

1.3.2. The tidiness and order of woodland planting: Maintenance and council intervention

Three interviewees, (M1, F1, F3), commented on the degree to which the woodland planting appeared ‘cared for’ or maintained. This was particularly the case with the two Torquay residents, (M1, F1) who both commented on input from the council;

M1: .. it’s (Princess palms) always been manicured is the word I think I’d use. They are down there this morning doing some tidying around.... well again, you know, because of the upkeep of them, that’s how you look at the tidiness to a point...Again, with this one, (Kings

palms) they clean the paths and what have you. That's what makes them tidy...these are more sort of natural (others)

F1: the council looks after the flowers and the plants and the grass. They cut it down. Yes it's lovely (Princess palms) and again, the council looks after the greenery and everything (Kings Gardens)

F3: Well, I think that one is the neatest, to me, (palms), just looking at it, definitely. I think this is tidy, because it's so well kept, (Abbotsbury Jungle Ride), ...and I think this one is tidy, (Fairlands Arboretum), this one just with the trees and the..obviously the grass has been cut...and the path is well swept..



Figure 9: The three areas of arboretum – style woodland – least like semi – natural were accurately perceived as the most tidy or designed, mainly because of their formal layout and the clear spacing between the trees

1.3.3. The tidiness and order of woodland planting: Attitudes to tidy woodland planting

Once interviewees had justified their choice of the three most tidy areas, discussion then moved onto the interviewee's reaction or preference in relation to tidy planting, sometimes linking this to personal tidiness and a reflection on why the interviewee thought they reacted in that way. Reactions fell into three categories; two of the nine interviewees, (M2 and F1) showed a positive appreciation of tidy woodlands, three, (M4, F3 and F4) rejected tidy woodland in favour of more naturalistic planting and two interviewees, (M3 and F2) referred to the importance of context. In addition, one interviewee, (F3), made the distinction between regimented planting and that which looked cared for. A further interviewee, (M5) made a link between tidiness and the biodiversity level of woodlands.

i) Attitudes to tidy woodland planting: Positive appreciation of tidy planting and tidiness

When asked about their preference for tidy woodland planting and possible links to other aspects of their lives, two interviewees, (F1 and M2) voiced appreciation of tidiness;

HH: Okay, and do you like things that are tidy?

F1: Yes, yes.

HH: Whether it's plants, or generally in life do you like tidiness? Or just in plants?

F1: Mostly in plants in gardens and like, you know when me and my husband we go a walk down the seafront or go somewhere different like go into a gardens yeah, I do like to see tidy. And alright, the seafront is bright, and cheerful, the gardens have got lovely plants and they got, as long as it's tidy...

The second interviewee, (M2), linked his appreciation of tidiness to his military background;

HH: Do you generally like tidy planting or is that really not a concern for you?

M2: I..my wife will tell you that because of my military upbringing that I am very regimented and I like things to be square and straight and everything like that..and I suspect she's right.

HH: That's interesting..therefore it translates..

M2: Though actually, because of that criticism I try and fight it!

ii) Attitudes to tidy woodland planting: Rejection of tidy planting and tidiness

Three interviewees, (M4, F3 and F4) held quite strong negative views on tidy woodland planting, rejecting it for its 'unnatural' appearance. The first one (M4) linked his appreciation of informal planting to being an 'anarchic actor', whereas a Stevenage resident, (F4) attributes her appreciation of naturalistic planting to her mother's influence.

M4: Well, we're back at the three that I eliminated (Ranks 1 – Torquay Palms, and others – Wisley and Fairlands arboreta second equal)..and I don't find tidy and neat natural in nature....I'm not a formal gardens person...I'm sorry there's no more to that really....No, not formal gardens, not border plants, council displays of union jacks, no, no, not me.

HH: You much prefer the more informal?

M4: Yes.. Oh, us anarchic actors, that's what it is!

F4:you see I don't like seeing trees in straight lines...what annoys me about when they plant new forests, they will plant them in straight lines..

HH: Yes, I was going to say, do you like tidy planting?

F4: No, I like it, 'mish mash', natural. I mean it's very nice..but not my cup of tea. It's very, erm, I mean, I'm fussy..I think the trouble is I've grown up with a mother that likes higgledy piggledy, so she, her garden she's sort of like an old Victorian garden it's got all sorts of bits and pieces in it, it's just full, you know? And it overflows and I've probably got it from her...not that I do gardening but...

iii) Attitudes to tidy woodland planting: Tidiness in context

Two interviewees, (M3, F2), expressed the view that tidy woodland planting was appropriate in some contexts, but not in others;

HH: Do you like things being tidy?

M3: Yes. I don't say it would be my preference, necessarily, but I don't particularly object to tidy of this type (Torquay palms) I mean if I was in Bournemouth and there was a garden just off the sea front like that, that's fine, quite pleasant to stroll through. Somewhere like this, is probably nicer if you are going for a long walk in the countryside because that looks more natural (Monks wood) And on the whole I prefer natural, but not when it's created natural.

HH: Let's go onto what you started with..Do you like woodland areas that are tidy, or not particularly? Or you might like some, and you might not like others?

F2: Erm..err ph..I never..I doesn't impinge on me one way or another....it's not a factor...I mean..there's a place for everything isn't there? There's definitely a place for something like that. (Palms) It's a very nice well – kept area, it's probably quite easy to maintain. It you know, it looks very pleasant and yeah, you probably need an area like that, but not all areas like that. Yes so, diversity and a bit of variety...

iv) Attitudes to tidy woodland planting: regimented versus 'cared for'

One interviewee, (F3), thought it important to distinguish between the two cues to recognising 'tidy' woodland planting. She appreciated a well – maintained area, but did not like things to look too ordered;

F3: Erm, I like it to look well cared for and so I suppose, tidiness is part of that, but I don't like things to be regimented. That's the difference, so when I say tidy, I mean cared for, as opposed to all regimented. I mean this is tidy, but I don't necessarily like it because it's very, very, very formal, it's almost like Chelsea..every blade of grass, (palms) That's just a bit over the top. I don't like things..this is just a woodland, so I'm not expecting it to be...tidy, but even so it looks cared for..

v) Attitudes to tidy woodland planting: Links to biodiversity

One interviewee rejected tidy woodlands in favour of those more like semi – natural in structure because he perceived the latter as more beneficial for the environment;

M5: I prefer them to be to have an element..like that (Monks Wood) of not really being tidy, and from what I know, the less tidy they are, the more beneficial for the environment...

1.4. Woodland planting and invertebrate biodiversity

Interviewees were asked to choose the three areas of woodland in Figure 1 that would be the most beneficial for native UK insects, including butterflies and bees, and then to explain their decisions. Interviewees' justifications fell into four categories; three interviewees, (2xM, 1xF) referred to **visible flowers and attractiveness to pollinators**. Four interviewees, (3xM, 1xF) referred to **habitat in relation to species character and structure**, Two interviewees (1xM, 1xF) chose areas with which they were **familiar**, where they had seen insects, and one male interviewee referred to the presence of **water**.

1.4.1. Woodland planting and invertebrate biodiversity: Visible flowers and pollinators

Three interviewees, (M1, M3, F2) focused on pollinators and referred to visible flowering which would attract them;

M1: This one (Abbotsbury) because I think again, there's a lot of flowery – type items that I think can attract your butterflies.. And again, because this is quite open, (Beth Chatto) but there is plenty of things for the birds to come in, they're on the trees etcetera, and you've got the flora, the nectar for the bees..that's why I'm looking at that.

M3: Yes – Choices – 1 – Abbotsbury Jungle Ride, 2 – Beth Chatto's woodland, 3 – Monks wood complex Stevenage.

HH: Okay, can you explain how you made those decisions?

M3: Yes. Not particularly scientific, but then I'm not a scientist. I'm assuming that because in these three I can see more flowering plants or potentially flowering plants, then they are more likely to be attractive..although I do remember that oak trees had more insect population than anything else, so maybe I've got it wrong, but that's how it seems to me...because there's more variety, so there are more things that are likely to attract bees.

1.4.2. Woodland planting and invertebrate biodiversity: Habitat and species character and structure

Four interviewees, (M2, M1, F3 and M5) focused more on habitat, referring to aspects of woodland species character and structure. Considering species character, the first interviewee, (M2), acknowledged that native bees would be happy to feed off non – native plant species;

HH: What do you think it is about these that would make them the best?

M2: Well, again I was, I confess I was looking for what I suppose was a mixture of the most natural habitat and the variety of flora that might support that..but I can understand that our native bees, assuming they were native, would be quite happy to feed off other imported species, for example in this picture here..(Beth C)

Three further interviewees, (M1, F3 and M5) focused on woodland structure referring to habitat, plant diversity and ground cover;

HH: Okay. The next one is, which three do you think would be the best for native UK insects, including butterflies and bees, but not exclusively butterflies and bees, so all insects?

M1: ...well this one I can imagine...you've got the undergrowth for insects, etcetera, anyway. You know, I've been watching a bit of Springwatch and again, I take something from that, the fact that you see the chain of insects upwards, and you can imagine that would be that..with the older wood you get insects get themselves in there and course that starts a chain off all the way through...that's why I put that one first (Eucalypts).

F3:..Because I think they're..these are a little bit too homogeneous sort of thing, you want it more open and more varied...

M5: That one's got a lot of erm, ground cover, the trees are fairly old looking, and that one looks fairly unmanaged compared to that one and that one I know there are quite a lot of bird species, which in turn mean insects.

1.4.3. Woodland planting and invertebrate biodiversity: Familiarity

Two interviewees, both Stevenage residents, (M5, F4), chose more familiar local areas of woodland where they had experience of the insect population;

F4: Can I choose my own one, (Monk's Wood)?...Cos I know there is plenty of insects and bugs and things in our woods...butterflies, lots of butterflies this year.

HH: So why did you straight away choose this one?

F4: That's our wood. 'Cos I know, I know there's lots of insects down that part. And for the same reason, (With Beth C and Wild Garden), it's the same sort of environment.

M5: It's a toss - up really between that one and that one, but because I know that one..(Fairlands arb)



Figure 10: Monks wood complex (top) and Fairlands Valley arboretum (bottom): Stevenage residents chose local woodlands in Fairlands Valley Park as the best of the eight areas in Figure 1 for UK Insects

1.4.4. Woodland planting and invertebrate biodiversity: Water

One interviewee, (M1), referred to the presence of water as a factor which would encourage insects;

M1: that's showing water, (Kings Gardens, palms), again, water would attract say dragonflies and that sort of thing, but there's a possibility in this type of thing you might find little ponds, you know, and get that sort of thing as well. (Abbotsbury)

1.5. Seasonality in relation to woodland planting

In order to discuss the impact of seasonal change on perception and preference, interviewees were presented panoramic photographs of two different woodland areas of planting, the Wild Garden and arboretum, both at Wisley, one of each set taken in spring, (April 2012), and another taken in early Autumn, (September 2012), (figure 11). These images were taken during

on – site walks with questionnaire respondents. Interviewees were asked which area they thought would be the most attractive, then the most relaxing to walk through.

Interviewees' responses fell into three categories; the majority of interviewees, 7/9 (3xM, 4xF) expressed a strong preference for both the Wild Garden and Arboretum in spring, when new buds and foliage was emerging. As well as commenting on the new growth and appearance of specific flowers, interviewees seemed to see this as a new beginning, and a type of symbol of, 'new hope for the year', as one interviewee, (M1), stated. Two (male) interviewees expressed positive reactions to autumn, one (M3) in relation to the arboretum at Wisley, and one in a more general sense. Finally, five interviewees (3xM, 2xF), expressed an appreciation for woodland planting in all seasons, or that they could appreciate the attractions of these two areas in both spring and autumn.

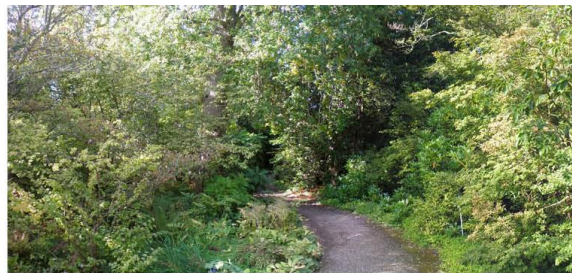
1.5.1. Seasonality in relation to woodland planting: Appreciation of spring

Seven out of nine interviewees, (M1, M2, M3, F1, F2, F3, F4) showed a real enthusiasm for both Wisley Wild Garden and the Arboretum in spring, expressing this as their preferred time of year for the reasons described above;

Figure 11: Seasonal changes in woodland planting: Wisley Wild Garden and Arboretum 2012



Wisley Wild Garden April 2012



Wisley Wild Garden September 2012



Wisley Arboretum April 2012



Wisley Arboretum September 2012

i) Wisley Wild Garden

HH: The first one, that you've already seen (Shows photo Wild Garden in Sept), and this is the same woodland area, (shows Photo spring), and what I'm asking you here is if I was to invite you to walk through, which of these two, or at which time of year would you find it most attractive?

F4: Spring, spring, because I was born in the springtime, so just for me everything's just starting anew...

HH: So, if you were invited to walk through these areas, erm, which of these is most attractive to you personally?

F1: Spring... 'Cos that's when all the flowers and all the blossom sort of comes out, round about the springtime...don't get me wrong...when did you say that one was?, (other photo)

HH: Early September.

F1: That's when they sort of ...sort of dying off a little bit, but I bet its still nice to go through, to still have a look. The flowers and the birds, but I think that one is more, because it's all coming up now.

One interviewee, (M3), comments on the variety of different greens visible in spring as an attractive aspect of the woodland at this time of year;

M3: .. this one (spring) also has more interest for me because there are things that are in blossom and leaf and things that aren't. This is for me typical summer..everything's green. By the end of summer all greens look very much the same, whereas earlier in the year there are so many different types of green, and points of interest and colour and whatever. Yes, I prefer that one.

ii) Wisley Arboretum

HH: This one you've seen already (Wisley arboretum in September) ..That was early autumn, and this is the same area in Spring;

M1: Yes, I would prefer that one (spring), 'cos I can see plenty going on. As I was saying before, you've got your tulips coming through and I just love spring flowers. Spring for me is the time of year that I really..it's my favourite season, 'cos I always say that it's the start of a new year. You see the bulbs coming through, new hope for the year and that, so I always will go for a springtime one. Don't get me wrong I love the autumn, because I love the colours on the leaves, you know, but there's not so much going on as there (in spring)

F3: I think, I think you'd have to say the spring...it's not just for the trees then, it would be for the daffodils, because I love daffodils...and also you see there'd be a little bit of blossom, you see that very very lovely green on the shoots where the trees are just beginning to come through. That would be a very nice experience. I think here, admittedly we are beginning to get into Autumn....but I wouldn't go to somewhere with a lot of coniferous looking for Autumn colour, I would go to see beech trees..I wouldn't go there, so I would prefer to be here (the spring photo)

1.5.2. Seasonality in relation to woodland planting: Appreciation of autumn

A minority of two male interviewees, (M3 and M4), expressed a preference for woodlands in autumn. The first interviewee, M3, appreciated the Wild Garden in Spring, yet refers specifically to the variety of colours in the planting of Wisley Arboretum in autumn;

M3: ...whereas this, because its autumn has the trees having gone different colours...I think on balance I'd plump for the autumnish one, because with the planting that's there, there is quite a variety of colours. If they were all the same trees they would probably be less interesting, but I think yes, the autumn one of that pair.

Another, (M4), made more general comments recalling memories of a travelling on a narrowboat through the autumn countryside;

M4: It's a liking for the time of year I think...I actually like the autumnal feel, I like, you know..mists and mellow fruitfulness...I remember years ago we used to have a narrowboat and my favourite time of year was the first frosts..when it's blue sky, cold, smoke going

straight up from a chimney..chugging along the canals..and the countryside around. That sort of lived in feel, the feel of...sigh...not finality, because things are going to come up again, but just the last bits before winter hits...hanging on there..I hope that makes some sort of sense..

1.5.3. Seasonality in relation to woodland planting: Appreciation of different seasons and seasonal change

Five interviewees, (M5, M1, M12, F2 and F4) emphasised their appreciation of seasonal change in woodland areas. When commenting on Wisley Arboretum, two interviewees, (M5 and F2) talked about the attractions of both autumn and spring;

HH:Do you find one of these more attractive than the other?

M5: No, not really. I'd say equally. It's sort of parkland really isn't it? I mean that's nice because it's autumn and the leaves are changing, and that is quite nice, but equally, that's got the daffodils, so that's nice as well.

F2: Interrupts..I don't know! Because I love the autumn, I love the colours, but on the other hand, the same thing as the other woodland walk, you've got the trees breaking, you've got the flowers, so each would be..no I would be happy..

At different points in the interview, other interviewees expressed this same appreciation of seasonal change;

HH: So a lot of what you like about these places in the way they change.

F4: Yeah. You know you can see it ...you walk through the valley (Fairlands Valley) and then you look the following day and the canopy's getting thicker...and you come through a couple of days later and think, the canopy's here. All of a sudden, covered....I know a couple or few years back now, erm Autumn started very early and by the time, the end of August everything had gone...which apparently its doing this year, but I think we're gonna hang on a bit, we're getting some water now aren't we?...No, as I say, I just love woods..at any time of the year

1.6. Woodland Interviews; a summary

Considering overall attractiveness, many interviewees showed an acceptance and appreciation of non – native woodland planting, particularly the eucalypts at Wisley and 'subtropical' woodland at Abbotsbury. The eucalypts were mentioned repeatedly for their interesting branches and bark patterns. In contrast, the *Cordyline australis* planting in Torquay provoked polarised reactions, with some very negative comments focused particularly on how 'out of context' this type of planting looked in the UK. Woodlands most natural in species character were considered the most relaxing to walk through. In terms of both overall attractiveness and relaxation potential, interviewees were divided in relation to woodland structure. Some expressed the preference for most natural multi-layered woodlands, whereby the vegetation 'embraced' them, whereas others expressed a preference for more openness with better sight lines. There was some evidence of a gender divide here, with two female interviewees expressing a particular dislike of enclosed woodland planting. Woodland planting of different characters and structures was generally considered attractive if there was an under planted flowering herbaceous ground cover.

Interviewees used the layout /structure and the perceived level of maintenance of the planting as cues for 'tidiness'. Some interviewees voiced a preference for tidy woodland, but others rejected this in preference for a more naturalistic experience. Interestingly, interviewees often reflected on their own views, linking these to childhood or employment experiences, and showing an awareness of these influences. One recognised that 'layout' and 'care' were two very distinctive aspects of tidiness. Interviewees were aware of woodland invertebrate biodiversity and many commented on the overall wildlife value of woodlands in relation to attractiveness. This is addressed in 'emerging themes'. Many focused on pollinators when asked to comment on insects. In terms of seasonality, most interviewees showed a preference for woodland areas in spring over autumn, commenting on new beginnings, although some emphasised that it was seasonal change itself that they valued in woodland environments.

Section 2: Shrub Interviews

Introduction

Eight interviews were conducted with respondents who had originally walked through areas of shrub planting. The gender balance was even: 4 males, (50%), and 4 females, (50%).

Interviewees were drawn from a range of age groups, although the older groups were better represented. One interviewee (12.5%) was aged 25 – 35, 2 (25%) were 45 – 54, 2 (25%) were 55 – 64, and 3 (37.5%) were over 65. Seven interviewees (88%) described themselves as White British/Irish, and 1 (12%) as White Swedish. Three (37.5 %) had GCSEs/O' levels /equivalent, 1 (12.5%) had A' levels /equivalent, 3 (37.5%) a first degree, and 1 (12.5%) a masters' degree.

One interviewee had been employed as an architect in the past and another was a practising landscape designer.

After discussing their own walk experience and their remembered planting along the walk respondents were presented with eight images of shrub planting with varying character/structure in relation to semi – natural planting, as shown in figure 1. The images were all A4 in size and were arranged in no particular order on a table/desk in front of the interviewee. Themes then discussed in relation to the eight images included overall attractiveness, relaxation, tidiness, and invertebrate biodiversity in relation to planting. In order to focus specifically on the role of planting structure and character, interviewees were then presented with a smaller selection of 2 images for each, from which they had to select their preferred walk, (Figures 2 & 3). Interviewees were presented with panoramic photographs of two different areas of shrub planting at two different times of year, in order to assess the impact of seasonal change on perception and preference, (Figure 11). One of these two areas, (the Punchbowl, Valley Gardens), was also discussed with the woodland and herbaceous interviewees.

Woodland and herbaceous interviewees were also shown photographs of two contrasting areas of shrub planting. These were the same two images as were used to assess shrub interviewees' response to variability in planting structure, (Figure 2). They were asked if either area drew them in, or if they would like to walk through either of these areas.

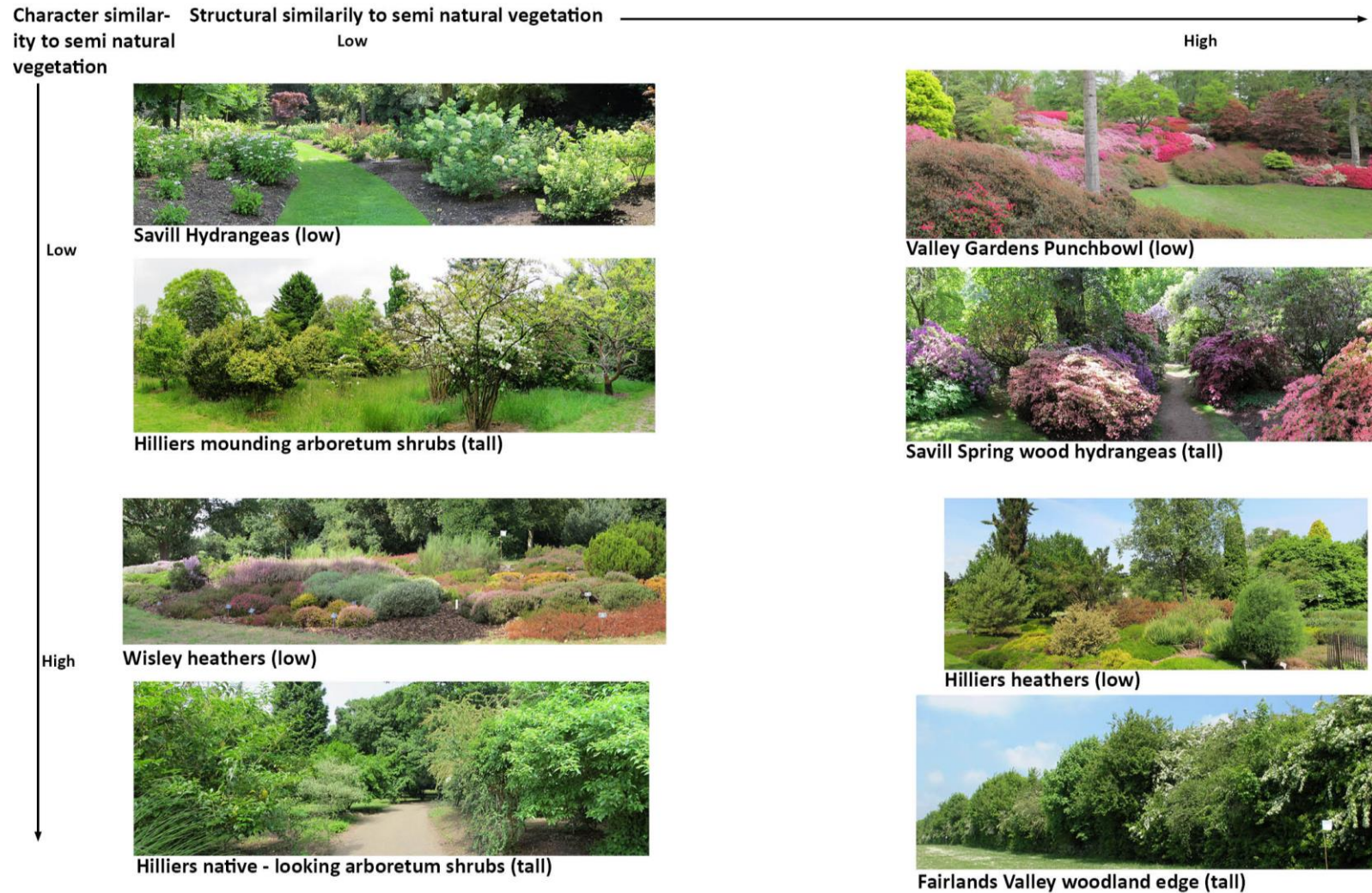


Figure 1: Images used to discuss overall attractiveness, relaxation, tidiness and invertebrate biodiversity

Structural similarity to semi natural vegetation



Low



Wisley heathers

High



Hilliers heathers

Figure 2: Structural Variability: Images used to discuss overall preference in relation to structure

Character similarity to semi natural vegetation

Low



High



Figure 3: Character Variability: Images used to discuss overall preference in relation to species character

2.1. The overall Attractiveness of Shrub Planting

Six sub – themes emerged through discussions of overall attractiveness of the areas shown in Figures 1, 2, and 3 with the eight shrub interviewees and discussions of shrub attractiveness relating to Figure 2 with herbaceous and woodland interviewees. These were; **holistic response to form and appearance, species character, flowering and colour, planting structure, tidiness, and negative reactions to heathers and designed heather planting,**

2.1.1. Overall attractiveness of shrub planting: Holistic response to form and appearance

After selecting the three areas of shrub planting from Figure 1 which they thought they would find the most attractive to walk through, two of the eight shrub interviewees, (F5 and M9), justified their choices with reference to several aspects of the form, texture, colour and height of the planting. One of these interviewees commented on the potential wildlife value of the chosen three;

F5: You asked in terms of...

HH: Overall attractiveness, if you were to walk through as you walked through the Punchbowl...I know for some of them it might mean walking next to it..but you can walk through here and through here..

F5: So the Punchbowl's number one because I like it for its form, shape, colour, ambience, experience. The second one would be the walk towards the Punchbowl (Spring Wood no 2 tho not actually on the walk towards Punchbowl)...rhododendrons, azaleas. The third one would be this one. - (Hilliers heathers) I like the variety of the types of foliage, lots of different shapes and colours and textures and plants. It just looks quite interesting .

M9:..... I would say that those three (1 – Punchbowl, 2 – Hilliers heathers, 3 – Spring wood (variety, form etc) contrast mono – Fairlands woodland edge) give me a wide variety of colour, foliage, shrubs, height, profile. If you look at this, (Fairlands woodland edge in contrast) it's almost shall we say a monoculture of grass, with hedging...With the three I've listed there are different size, height and variety of shrubs and trees, different colour, different foliage and would potentially attract far more wildlife.

2.1.2. Overall attractiveness of shrub planting: Species character

Including the two interviewees above, (F5 and M9), 8/9 shrub interviewees responded very positively to planting with a species character least natural in form and appearance, seeing this as the most attractive. As well as the positive reactions to bright, colourful rhododendron planting, (above), two further interviewees, (M7 and F6) responded very positively to the form and appearance of the hydrangeas at Hilliers. It might be significant that most of the areas of shrub planting least natural in form and appearance were also flowering with bright blooms. Interviewees might have been responding to the flower rather than species character per se. In contrast, one remaining shrub interviewee, (M6), a landscape professional, thought shrub planting most natural was most attractive. This planting was dominantly green, rather than bright and colourful

i) Positive Reactions to planting least natural in form and appearance

When choosing the three areas of shrub planting from Figure 1 which they would find the most attractive to walk through, two interviewees, (M7, F6) selected the Hydrangea planting, least natural in character. Both focused on an appreciation of the plants themselves;

HH: So you've said quite a bit about why you like this one that's number 2. Can you say any more about why you like this one (Hydrangeas)?

M7: I can say more why I don't like the other ones more than why I like those....it's always easier..but I mean maybe something is to do with the fact that I like a bit of form, (hydrangeas) I do like hydrangeas..

ii) Negative reactions to planting least natural in form and appearance: Appreciation of semi - natural shrub planting

Another interviewee, (M6), a landscape professional, preferred planting that looked more 'natural' in species character, referring specifically to a preference for what he perceived as, 'maybe native plants';

HH: So what made you choose those do you think?

M6: I like woodland, and they're typical, certainly this one and this one, maybe native plants, (Native Woodland Edge Stevenage, Hilliers mounding shrubs) and they look quite natural, they don't look too engineered. Obviously that one (Hilliers native looking shrubs) is more than the rest of them but yeah, I like something that looks a bit more natural and it's not quite so much of an assault..I mean the colours are lovely in there (Punchbowl) but it's quite an assault on the senses. I like something to be quite natural, to relax you as it were, so yeah. It's mainly because they look like native species, from what I can see here, and it's quite an easy thing to look at.

This evidence supports findings from earlier research, (Ozguner et al., 2007; Zheng et al, 2011) indicating that landscape professionals often have 'taught' opinions which diverge from those of the wider population in general.

2.1.3. Overall attractiveness of shrub planting: Flowering and Colour

When considering the 8 shrub images in Figure 1, 88%, 7 out of 8 shrub interviewees chose colourful flowering shrub areas as those they would find most attractive to walk through. The vivid pinks of the azaleas (Punchbowl) and rhododendrons (Spring Wood) were perceived as particularly attractive, yet some interviewees, (F8, M10, F6) also chose the less obvious colours of Wisley heathers amongst their three most attractive areas. Some interviewees, all female, (F5, F9 and F1) all linked their preference for colourful shrub planting to a general appreciation of colour, and preference for bright colours, specifically pink, in clothing;

HH: If I invited you to walk through any of these different areas, which three do you think you would find the most attractive? And could you possibly rank them 1,2 & 3, and then we'll talk about it?

M8: Well, I mean number 1 effectively picks itself doesn't it? It has to be that one, (Punchbowl). I mean that's in terms of colour, and mixture of trees and shrubs, I like that very much...erm...pause...he he he (laughing)....Two and three are pretty close, but erm, number one's outstanding!

The same Torquay resident, (F1), who had shown real appreciation of the colourful bedding plants of Princess palms became very animated when the image of the Punchbowl in full flower was revealed;

F1: Ohhh! Oh that's pretty! That is pretty! That is lovely! Erm yeah....I say this even before you show me the other.....you've got the pathway and you got all the flowers and you got all the colourfuls, 'cos I'm a colourful..see the reason why I'm going for colourful is I like colour! I like colour!

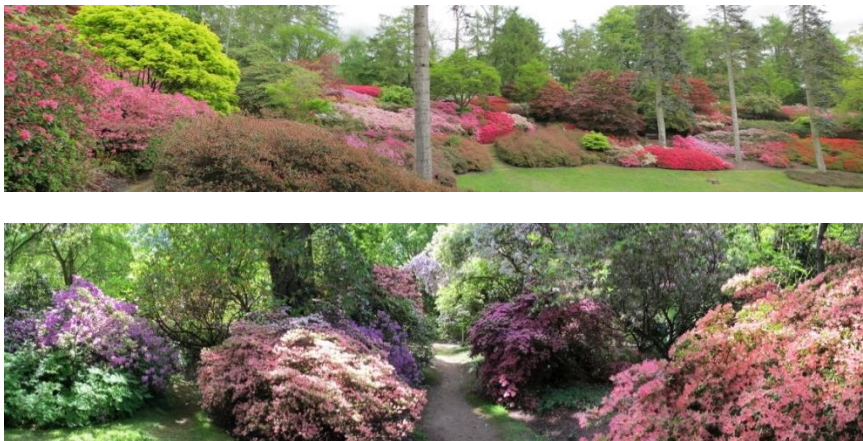


Figure 4:
Vibrant pink
rhododendron
shrub planting
at the
Punchbowl
(top) and
Spring Wood
(bottom)

The interviewee who had originally done her questionnaire and walk at the Punchbowl in May 2013 was particularly enthusiastic about the bright pink flowers;

F5: Okay I like the combination of the vivid greens and the pinks. I am wearing purple and pink, though you can't see that on the tape. I like bright colours. And this was fairly early on in the season so the greens were still really vivid, the variety of the shades of pink too, because there's not just one or two, lots, and reds..there are acers in there too.

One interviewee, (F8), explicitly stated that she would not find the less colourful greens of the native – looking arboretum – style shrubs attractive, and that, 'one always goes for colour', choosing Wisley heathers and the Spring Wood in preference;



Figure 5: Hilliers semi –
natural arboretum – style
shrubs were rejected by
one interviewee who
stated, 'one always goes
for colour'.

F8: Oh, okay, gosh..attractive. I wouldn't say that's attractive (native looking arb shrubs), one always goes for colour ...erm, because that's got loads of colour...I think actually that appeals to me, that appeals to me a lot, and this one, and probably, probably this one...

In contrast, and as discussed earlier, the remaining interviewee, (M6), a landscape professional, chose the three least colourful areas of shrub planting as the most attractive; (1 – Stevenage native woodland edge, 2 – Hilliers mounding arboretum – style shrubs, 3 - Hilliers

native looking shrubs). Preferring more naturalistic planting, he referred to the vibrant colours of the Punchbowl as ‘an assault on the senses’



Figure 6: The greener, less colourful shrub planting of Fairlands Valley woodland edge (top), Hilliers mounding arboretum – style shrubs (middle) and Hilliers native – looking arboretum style shrubs (bottom) were preferred by the landscape professional, (M6), because they were more natural – looking, less engineered and ‘not so much of an assault’ as the colours of the Punchbowl

2.1.4. Overall attractiveness of shrub planting: Planting structure

Focusing on the structure of shrub planting, the majority of interviewees preferred the varied heights of Hilliers heathers, to the flatter planting of Wisley heathers. In total six interviewees, (2xM, 4xF), expressed this view. No interviewees expressed a preference for the flatter heathers at Wisley. Opinions on the different areas of heather planting were also derived from woodland and herbaceous interviewees.

HH: Now, we’re going to move to two different ones, which you’ve also commented on before (Hilliers heathers and Wisley heathers)

F5: These are heathers aren’t they? So they aren’t that new actually..they’re just not very big. ...That one (Hilliers heathers). I prefer that one because this (Wisley heathers) looks too tame and the low level nature of the bushes doesn’t do anything at all for me. It looks like it needs some height, more height and a bit more random height than it’s got. This (Hilliers heathers) just looks interesting, inviting to me. It wouldn’t to everybody but it does to me.

HH: If this was the decision you had to make, which of those two do you think you would enjoy walking through the most?

M9: Probably that one, (Hilliers heathers). It’s got more variation in height and profile.

F15: I find that a bit flat. Probably if you walked through it you would see lots more of interest, but from this it looks very very flat and a bit boring (Wisley heathers). That one looks attractive (Hilliers heathers).

Figure 7: Interviewees imagined walking through the varied heights of Hilliers heathers would be more attractive and interesting than walking through the flatter heathers at Wisley



2.1.5. Overall attractiveness of shrub planting: Tidiness

In the case of two interviewees, (F9 and M8), tidiness was considered to contribute to the overall attractiveness of shrub planting;

HH: What do you like about this one, (Hydrangeas)?

F9: Erm, it is tidy. It's been well thought – out. The grass is well – cut, and it's got pretty plants in there..

The other interviewee felt particularly strongly about this;

M8: Ahh no, yes...I'll put that to one side...as my wife will tell you I do like things that appear neat and well ...well – looked after I 'spose..I don't know...

The same interviewee found perceived untidiness very unattractive;

M8: That puts me off I'm afraid. It really does, (Hilliers mounding arboretum – style shrubs). Mmm difficult, difficult..

HH: What do you think it is about that that puts you off?

M8: The unkempt nature of the place. It's just untidy, unkempt. The grass that's here is patchy. I just don't find that an attractive place to be. That I do...well I find all the other places attractive to be.....



Figure 8: This area of mounding arboretum – style shrubs was considered unattractive by one interviewee due to its 'untidy, unkempt' appearance

2.1.6. Overall attractiveness of shrub planting: Negative reactions to heathers and designed heather planting

Although some interviewees responded positively to the colours of Wisley heathers, (see Emerging themes; Flowering and colour), six interviewees reacted negatively to the appearance of heather planting, particularly that at Wisley, which was perceived as flat, uninteresting and static. In explaining their negative reactions to heather planting at Wisley and Hilliers, two interviewees, (F17 and F19) referred to context. Interestingly, all negative reactions to heathers came from female interviewees, (F3, F21, F23, F12, F17, F19).



Figure 9: Wisley heather planting provoked some very negative reactions

i) Negative reactions to heathers

When asked to comment on the prospect of walking through heather planting one of the woodland interviewees referred to the 'static' nature of this type of shrub planting;

F3: I'm not that keen on ..this is all, erm these are all heathers? They don't turn me on at all, I'm afraid..I don't know why..they're just, I wouldn't go out of my way to go and see them. I don't know what it is about heathers, I can't articulate it, but I just don't think they're very..I think it's because they're so low. They don't grow, do they? There's no swaying in the breeze..you know, there's no movement..I think that's probably what it is. I know they are a plant, and these are all static..but I think they are too static, I think that's what it is, yes. They're low, they're static. They don't do anything. So I wouldn't go out of my way to look at heathers..

.. Another interviewee, (F21), associated heather planting with elderly people and the lack of maintenance required;

F21: ..this (Wisley heathers) is really nice..I haven't got old enough to really appreciate it yet! That sounds dreadful..

HH: Yes, that's interesting! Why do you think that? Why do you associate that with an elderly person and being old?

F21: Because it's relatively low maintenance, you know, you could do that in your garden. It's the sort of thing that you see in, you see little heather beds in bungalow gardens and they're low maintenance, they just leave them there and they have the occasional trim. And I think also because it's looking down on the ground

A further interviewee, Stevenage resident, (F23), was quite scathing about heathers;

HH: And what about these shrub areas, have you got any thoughts about these?

F23: Do you know what? They're better than concrete! Ha,ha,ha! (laughing)..This one I like better (Hilliers). That's a bit more natural – looking. It's pretty ..it's kind of not very natural – looking, but again I would much prefer it to walking along pavements

A Sheffield resident, (F12), rejected heathers because they appeared to be 'tame' and offered little in terms of visible wildlife;

F12: Yes. I think I'd find that (Heather garden, Hilliers) the least inviting..cos it looks quite tame and on display and you might not see much wildlife..

ii) Heathers in context

Two further interviewees, (F17 and F19), referred particularly to their preference for seeing heathers in their natural context rather than in a designed urban setting;

F17: Well, you see heather should be on moorland.....so it's in the wrong setting! I think that's what that is, because heather's beautiful on moorland, so that's probably my least favourite, (Wisley heathers)

HH: Why do you think you don't like heathers?

F19: I don't know..just do nothing for me! I spose if you were in like a Scottish..when they are completely covered... I suppose it could be nice..

2.2. Shrub planting and relaxation

The theme emerging via discussion of the potential of the areas of shrub planting shown in Figures 1, 2, 3 to induce a state of relaxation was **planting structure** and **enclosure**.

2.2.1. Shrub planting and relaxation: Planting structure; enclosure

When asked to say which of the eight areas of shrub planting in figure 1 would be the most relaxing to walk through, 2/8 shrub interviewees, one male, one female, (F5, M6) chose areas which they perceived to be enclosed. In justifying this they said that the height and enclosure made them feel calm and relaxed. Interestingly, no interviewees referred to any fear of threats from potential assailants who could be hiding in areas of dense shrubbery.

F5: Maybe it's enclosed, the height of the trees around makes me feel like that.... I think the enclosed feel of this (native – looking arboretum shrubs) makes me feel more calm. Not that I've ever thought about that before for two seconds, but now you're asking me I think maybe I feel more relaxed when I'm less exposed.

HH: Okay, so you've chosen this one again. Do you think you could explain those choices?

M6: I think it's probably something to do with the height of these..(Woodland edge), cos they look quite high, I know it sounds a bit strange, but then, the colours in there, you've got quite a lot of dark in there, you've got a nice open field, with something that looks quite dense at the side, so yes, that's relaxing for me. Number 2 (Spring wood) - once again, I think it's something to do with the height, the mixture of light and darks in there, the colours..it's quite an enclosed space that you'd walk through, so it's almost sort of enveloping you sort of thing. So I think for me it must be something to do with the fact that you are enclosed within a certain area and you've got height, almost comforting if you like! Yes, that's probably what I think..whereas that..you know the one I chose before (Hilliers native looking shrubs) it's a bit too open and sparse for it to be relaxing for me..a bit strange, I don't know why....

2.3. The tidiness and order of shrub planting

Considering the eight images in Figure 1, all eight shrub interviewees were asked to choose the three they thought looked the most tidy or designed, as opposed to being natural – looking. Once the decisions had been made, interviewees were asked to justify them. Interviewees' justifications fell into three main categories; structure and layout, (5/8 interviewees, 2xM, 3xF), maintenance and paths, (3/8 interviewees, 1xM, 2xF), and the role of colour, (2/8 interviewees, 1xM, 1xF).

2.3.1. The tidiness and order of shrub planting: Structure and layout

When choosing and justifying the areas of shrubs they saw as the tidiest, the majority of shrub interviewees (5/8, M7, M6, F5, F6, F8) focused specifically on the layout and formality of the planting. Wisley heathers and the Hydrangeas were accurately perceived as planned and 'unnatural' in structure. The Punchbowl and Spring wood were also perceived as 'unnatural', although this was probably also a reaction to the of the extreme and vivid colours present, which did not appear 'natural' in the English landscape;

HH: So, the final one using these eight is, I'm looking at which look the most neat and tidy of these in terms of planting, as opposed to being natural. So, numbers 1, 2 and 3, which do you think are the tidiest?

M7: If you take tidiness as obviously planted I think you've got to take these three (=Punchbowl, Spring Wood, Hydrangeas). Which order do you take them? I'm not sure the order makes any difference... I mean that's obviously planted, and that is as well..but these others are much more natural than these three

HH: So which are the tidiest to you (of the eight images)?

F6 : When I look at them now, well, that's obviously very planted up, (Wisley heathers), and tidy.....but this one is obviously tidy because things have been planted in order, (hydrangeas).

HH: Okay. Again...really quick decisions. What led you to make those decisions?

M6: It's visual, straight away. Obviously, you've got nice straight edges there, (Hydrangeas), you've got uniformity of planting. And here (Punchbowl), you've basically got all uniform planting, the same as here.

2.3.2. The tidiness and order of shrub planting: maintenance and paths

A minority of 3/8 shrub interviewees (M8, F9 and F7) referred to the tidiness in relation to perceived levels of care and maintenance. One interviewee who particularly appreciated tidy planting, (M8), explained that he always focused on the cleanliness and maintenance of the path as a cue to the level of care.

M8: Well, as my wife knows the first things I look at, I tend to notice is the footpath. I get very irritated by badly treated footpaths but that's nothing to do with the garden really. No I like, obviously the vegetation has been well tended. The plants are tidy, if you like. Erm.. I think that's really what I'm looking for..Well - manicured plants. And cleaned – up paths, you know?

2.3.3. The tidiness and order of shrub planting: The role of Colour

Two interviewees, (F6 and M7), discussed the link between colour and tidiness. One, (F6), suggested that colour per se (in the case of the Punchbowl) was an indicator of tidiness, and commented that she thought tidy gardeners particularly appreciated vivid colours. Another, (M7), stated that the vivid colours probably just highlighted the differences between plants and made the deliberate nature of planting more obvious;

HH: So which are the tidiest to you (of the eight images)?

F6 :....this one is also tidy, you know in its colouration..(Punchbowl)...Cos that's interesting as well, about tidy gardeners. What's your impression of their colour schemes? This is my view – they often like the yellow, the orange, the red, you know, very bright.

HH: Do you think the colour has anything to do with it, or not really? (as the ones chosen were the most colourful, in flower)

M7: I think the only way the colour comes into it is in the fact that you can distinguish all the bits that are in there...it brings them out much plainer..you have to look very carefully to see exactly what you've got in this picture here. Here you can see all the different sort of plants, which makes it so much more obviously planted, same as this one (Punchbowl and Spring wood).

2.3.4. The tidiness and order of shrub planting: Attitudes to tidy shrub planting

The discussion then moved onto the interviewee's reaction or preference in relation to tidy planting, sometimes linking this to personal tidiness and a reflection on why the interviewee thought they reacted in that way. Four out of the eight shrub interviewees expressed a clear preference or otherwise. Of these, 3/4 (2xM, 1xF) expressed positive appreciation, whereas one, (F6), expressed a negative opinion.

i) Appreciation of tidy shrub planting

Two of the three shrub interviewees expressing a preference for tidy shrub planting, (F8 and M6), openly linked this to some aspect of their background or past experience. Interviewee F8 attributed her love of tidy planting and tidiness in general to her education in a Roman Catholic convent, whereas interviewee M6 had been in the army. The other interviewee, (M8) had been a member of the navy before retirement;

HH: And do you like tidiness in planting?

F8: Well, my husband will tell you, I was educated at a Roman Catholic convent boarding school, and yes, tidiness was next to godliness...was next to cleanliness, so yes I do like tidy! I get very annoyed with my husband, he pulls up a weed and then just drops it, so I come along behind him and pick them up. I do like tidiness!

HH: And the next question leading on from there..Do you like things that are tidy, and neat?

M6: I like things to be either really, really tidy, ultra - tidy, or no, not really..if they are something like that that's a lot more natural, if you like, I like that as well, but there's no in between.

It's probably my background (previously army)...if something's..and certainly with my own garden and my own house, I can't stand, I don't like mess anywhere, but if you've got something quite natural in the way it's growing, it looks like it's almost sorted itself out naturally..but I don't like mess. I like straight..If you are going to do something like that I'd say have straight edges, uniformity. I like it to look like it's doing something..and you know, not imitate nature, but do something that's blatantly been planned if you like.

ii) Rejection of tidy planting

Another interviewee, (F6), showed a preference for less tidy planting;

HH: I was going to ask you, do you like tidy planting? So you're not..

F6: I'm a wildly untidy gardener. I'm not desperately keen on tidy planting at all. I like plants, you know, I love it when something comes up that ...woopee! Ha ha...

HH: So you don't like regimented planting?

F6: No! That's not me! Well, you know they have their place I 'spose, but I would never be a regimented gardener. Are you?

2.4. Shrub planting and invertebrate biodiversity

Interviewees were asked to choose the three areas of shrub planting in Figure 1 that would be the most beneficial for native UK insects, including butterflies and bees, and then to explain their decisions. Justifications fell into four categories. Six out of eight shrub interviewees, (2xM, 4 x F), referred to the presence of visible flowers and their value to pollinators, three, (2xM, 1xF) referred to habitat, species character and structure, two, both female referred to the lack of human intervention as a factor, and one interviewee, (M9) saw the issue holistically, referring to seasonality, flowering and habitat.

2.4.1. Shrub planting and invertebrate biodiversity: Visible flowers and pollinators

Six interviewees, (2xM – M8, M6, 4XF – F5, F6, F8, F9), focused on pollinators and referred to visible flowering;

F5: That one first (mounding arboretum shrubs), that one third (Punchbowl) and that one second (Hilliers heathers) And the reasons, ..do you want the reasons?... Well, they need pollen don't they, so they need flowers.

HH: Thank you. Now the next thing I'm asking you is, which three do you think will be the best for native UK insects, including butterflies and bees, but not only butterflies and bees?

F6: I think probably, I mean all the ones with ..this is my ignorance really...where there's a lot of flower. I mean that's obviously where they would....and the colouring, where they would move to.. because you know, these and this..because this is a lot of heather..isn't it? Well, of course they would be whizzing around..And, are they azalea or rhododendrons?

2.4.2. Shrub planting and invertebrate biodiversity: Habitat and species character and structure

Three responses, (2xM – M6, M7, 1xF – F5), considered habitat, referring to the aspects of shrub species character and structure which they thought would be beneficial to insects;

F5: Native bees don't discriminate between native and non – native plants do they? Right..insects. I'm thinking that's good for insects .. That's what I'm thinking, habitat. That looks nice (Mounding arboretum shrubbery) because of all the grasses..I think ticks for example would like to live in there... there's a variety of trees, shrubs, and tall grass makes you think of insects as well. Again similar reasons with this – there's a variety of planting, a variety of different types – trees, shrubs and ground stuff, And this, the Punchbowl, again they've got trees, and its shelter as well, it's quite sheltered. The trees are going to provide cover I would have thought.

2.4.3. Shrub planting and invertebrate biodiversity: Lack of human intervention

Two interviewees, (F5 and F8), acknowledged that a lack of human intervention might be beneficial to insects;

F5: It looks fairly untampered with by humans..there's a high area of undisturbed plants that people can't walk over so that's also up there (native – looking arb shrubs) ...people aren't going to be walking into it too much. That looks fairly undisturbed....it looks quite established. I don't think that insects would get crushed too much (Hilliers heathers)...obviously there's lots of flowers here (Punchbowl) but there's lots of people here as well..there would be..there usually are... so that may upset the insects

2.4.4. Shrub planting and invertebrate biodiversity: Holistic view of pollinators and habitat linked to seasonality

One interviewee, (M8), provided a very comprehensive answer, referring to flower, habitat and the impact of seasonality on wildlife benefits;

M9: It would be very easy to choose the same three again...but thinking about different insects and what the wildlife would need at different times of the year, I could pick an entirely separate group of three. All of them could give a wide range of habitat and feeding to wildlife. It depends what you are looking at...I mean this time of year here, (in the photo) the hawthorn's out. That's ideal for some. You look at this one, for example, you've got trees in bloom, I don't know if it's a cherry, probably not..But even the ones where you don't see foliage or flowers in bloom, there's still other things, it's a habitat for wildlife, which is needed.



Figure10: Several interviewees perceived both Hilliers native – looking arboretum style shrubs (top), and mounding arboretum – style shrubs, (bottom), as beneficial to wildlife. 'Trees', (shrubs) and tall grass offered habitat benefits and they both looked relatively undisturbed by human activity

2.5. Seasonality in relation to Shrub Planting

In order to discuss the impact of seasonal change on perception and preference, the eight shrub interviewees were presented with panoramic images of two different shrub areas of planting; the Spring Wood at the Savill Garden, photographed in April 2013 and then in June 2013, and the Punchbowl, Valley Gardens, photographed in mid – May then in August 2013. The two images of each site demonstrated a clear contrast in the amount of visible flower present, (Figure 9). These images were taken during on – site walks with questionnaire respondents. Herbaceous and woodland interviewees were also shown the contrasting images of the Punchbowl, in order to widen the sample size. Interviewees were asked which of the two areas in turn they would find the most attractive, then the most relaxing, to walk through.

Interviewees' reactions and comments were focused on reference to the amount of colour present and their preference or otherwise for vivid, colourful shrub planting. In total, 26 interviewees expressed a clear opinion, and four categories of response emerged; Most interviewees, (13/26), chose shrub planting in full flower, (the Punchbowl in May, Spring wood in June) as the most attractive, yet the majority of these same respondents, (9/13) thought the greens of the Punchbowl in August, and sparser, more muted colours of the Spring Wood in April, were more relaxing. A minority of interviewees, (4/26), all female, were extremely enthusiastic about the bright pinks of particularly the Punchbowl in full flower, and scarcely acknowledged the planting in any other state. Thirdly, many interviewees, (11/26) expressed a general preference for the subtler greens of the Punchbowl in August, seeing these as more attractive than the vivid pinks of May. In this same group, some interviewees saw Spring Wood as both more attractive and relaxing in April, when colours were more muted. Fourthly, two male interviewees appreciated the merits of shrub planting at the two different times of year, and were unable to express a preference

Figure 11: Seasonal changes in shrub planting: Savill Spring Wood in April and June 2013 and the Valley Gardens Punchbowl in May and August 2013



Savill Spring Wood Rhododendrons April 2013



Savill Spring Wood Rhododendrons June 2013



Valley Gardens Punchbowl May 2013



Valley Gardens Punchbowl August 2013

2.5.1. Seasonality in relation to shrub planting: Full flower /more flower as most attractive, no flower /less flower as most relaxing

Of the 26 interviewees expressing a view about flowering and seasonality in shrub planting, thirteen, (ie 50%, 3xM – (M8, M1, M7), 10xF – (F16, F3, F23, F19, F12, F14, F5, F1, F9, F17)), were of the opinion that the vivid colours of the Punchbowl in May or Spring wood in June were more attractive than the more muted colours of the plantings in August and April respectively. Of these, nine interviewees, (3xM, 6xF) thought that the more muted colours of August and April would be more relaxing to walk through.

i) Punchbowl, Valley Gardens

Interviewees reacted strongly to the vivid colours of the Punchbowl in flower. Many perceived these as more attractive than the greens of August, although the latter were considered to offer greater potential for relaxation. Comments by interviewees F16, M8 and F3 encapsulate this position;

HH: Which of these would you find the most attractive to walk through?

F16: The brightly coloured one..cos I'd just go, 'Wow!', (laughing..) I'm very drawn to bright colours.

HH: So now we go to the second question, which for you would be the most relaxing to walk through?

F16: Well I think it's got to be the green one, because the..erm..the reddy pink one is sort of like really stimulating, so that's the opposite to relaxing isn't it, you know? I'd be quite hyped up looking at that..I'd be going, 'ooh, ooh! Look at that!..oh look there's something else there!' I'd be on a mission..whereas with this I'd stroll through the green...



Figure 12: The Punchbowl in May (top, in full flower), was considered more attractive by many interviewees, yet the same walk in August (bottom, greens) was thought to offer more relaxation potential

HH: Which would you find the most attractive to walk through, at which time of year, do you think?

M8: Ahhh well, I think that's a no brainer. That one ..with the colour.

HH: And which of those two do you think would be the most relaxing to walk through?

M8: That one, (greens). It's a question of interest or relaxation again. If I just want to walk somewhere and forget something dreadful, or think of something good, or just think of nothing, that's the place you go, (greens). Because this, this is going to excite the brain, (in flower). That sounds a ridiculous thing...!

HH: No, I totally understand.

M8: That sets you thinking, whereas this is like mowing the grass this, (greens)

F3: Yes, exactly. So I wouldn't say that was the most relaxing thing you could do, but it's certainly the most fantastic..if you want that Wow! Oh yes.

HH: Yes, there is a difference with some things. With the woodland areas you found some of the same areas to be attractive, and relaxing, didn't you, but when there's so much colour...

F3: I think then, it can be, it can be too stimulating, so then it's not that relaxing, really. I don't think it's a very relaxing place to walk through, because, to be honest, when they're really all there it's an assault on the senses..it's so bright. I don't think...I think you go there for the 'Wow factor', but you don't go there to relax. Here, I think here if you wanted to have a relax and just wanted to sit, maybe listen to the birds or just generally stare into space, this is probably more relaxing, (greens – August). This is really, this is quite an assault on the senses when you see it..It's almost unreal, as though someone's painted it but used the wrong colours..

ii) Spring Wood

Interviewees' reactions to seasonal change in Spring Wood were less extreme, although a similar pattern emerged. Two, (M7 and F14), perceived the fuller flower of June as more attractive, yet the more muted colours of April more relaxing. Comments by interviewee M7 summarise this perspective;

HH: Which of these two would you find the most attractive?

M7: Everything's out here..it's all well - formed, and this is all starting to come out. Pause...This hits you much harder doesn't it? (full flower), I think I'd have to go for that one. ..Because of the colour, the instant colour, you can see, I mean you can see all the colour starting to come out round here but here they're more out and you've got the white..I don't know what that is actually..

HH: Okay, now, the other question is, which one of these two do you think would be the most relaxing to walk through?

M7: Well I think probably the other one...because that's attacking you all the time isn't it? If attacking's the right word..yes, yes, that's much more relaxing, yes (less flower).

2.5.2. Seasonality in relation to shrub planting: Full flower /more flower as most attractive, overall appreciation of colour

i) Punchbowl, Valley Gardens

Four female interviewees, (F5, F1, F9, F17) expressed real enthusiasm for the vibrant colours of the Punchbowl, linking their appreciation to a general preference for bright colours. One of them, (F9), went on to express her general appreciation of pink as a colour.

The first interviewee, (F5), thought the Punchbowl in flower would be both the most attractive and relaxing for her to walk through;

HH: What I'd like you to think about is which of these is the most attractive, which would you find the most attractive to walk through, and then which do you think would be the most relaxing to walk through?

F5: Erm, to be honest I know green's typically a more relaxing colour than that lot (all the pinks)..but I probably would find...relaxing...I'd find them both a relaxing place..but you get more stimulation from the colours I guess..when it's in full bloom..I would be looking for the colour, so for me I would find it more relaxing to be there with the colours even though typically green relaxes you more..I'd be frustrated. Because I'm a keen photographer, I'd be frustrated there wasn't colour to photograph.

F5:..yes it's the intensity of the colours I like (in the Punchbowl), and the vivid bright green., light bright green.

A Stevenage resident, (F9), linked her preference for colourful planting to general colour preference;

F9: They are both attractive. I do like both, but the one with the colour in it. I love pink!

HH: You love pink.

F9: Yeah..(laughing)! I love pink....Erm, yees, erm. I do, I would buy things that were pink. I'd have a pink car if my husband let me! My daughter would love a pink car!

ii) Spring Wood, Savill Garden

The same Stevenage resident, above, (F9) expressed a preference for the Spring wood in June, (full flower), in terms of both attractiveness and relaxation potential;

HH: And why do you think that is? What is it about each one that you find attractive?

F9: Both of them have got flowers, they've got colour, erm and again, you feel you are walking through a wooded area.

HH: And then if I asked you that other question about, 'relaxing'. Which do you think would be the most relaxing to walk through? Is that difficult to answer?

F9: I think this one here...early summer...Erm..I think that feeling of you've got the summer ahead of you as well. Everything's just blooming....it's the beginning of the summer..Oh, you can see the greenery of the trees coming..I still find this is prettier, because it's fuller, fuller of colour..and it's nice and green.

2.5.3. Seasonality in relation to shrub planting: Green/less flower as most attractive and relaxing

In contrast to the interviewees above, 11/26 interviewees, (4xM (M6, M5, M3, M15), 7xF (F2, F6, F8, F4, F11, F15, F22)), rejected the vivid pinks of the Punchbowl and Spring Wood in full flower. The greens of the Punchbowl in August and subtler flowering of the Spring Wood in April were preferred, in terms of both attractiveness and potential for relaxation.

i) *Punchbowl, Valley Gardens*

The position described above was expressed most strongly in the case of the Punchbowl, where the vivid pinks and reds were described as ‘an assault’, by three interviewees. Other terms used included, ‘gaudy’, ‘blowsy’, and over – the – top. These interviewees expressed a general preference for the greens of the Punchbowl in August. Comments by interviewees F2, F6, M6, M3, F4 and F15 illustrate these views well;



Figure 13: Many interviewees showed a strong preference for the greens of the Punchbowl, and Spring Wood in Spring, over the intense colours of full flowering. This was in terms of both attractiveness and relaxation potential.

HH: We’re going to start with that, (shows image Punchbowl in flower). That was taken in May last year, in the Valley Gardens, and this one is the same area, later in the year, in August, (shows image). So if you had the opportunity to walk through that area at these two different times of year, which do you think you would find the most attractive to walk through?

F2: Interrupts..I prefer this! You see I find this riot of colours almost a bit too much..so I would, I love green anyway. So I would find that a bit too ..much...Yes, cos that’s almost assaulting your eye balls isn’t it...you know - they are all out at the same time and then they’re all blimmin dead at the same time, whereas this – look at all these different shades of green. Do you know the eye can detect more shades of green than anything? Any other colour...maybe that’s because there are more shades of green..than any other colour..I don’t know..

F6: It’s all very blowsy and it’s incredible colours and so on, but at the same time you almost feel it’s unnatural because it’s so colourful, you know? It’s not my type of ...I wouldn’t choose to go there for the colours, but I love this, (In August) with the greenery, and that’s again back to the fact that I love the natural colouring. That I feel almost abnormal.

HH: Which of these two, if I invited you to walk through would you find the most attractive do you think? Which of the two?

M6: It's probably going to be the one that's taken later in the year, because it's..I love flowers, but I like green, and there are so many types of green in there..and I think, I just think it's much more calming.

ii) Spring Wood, Savill Garden

Two further interviewees, (F6 and M8), appreciated the Spring Wood in terms of both its attractiveness and relaxation potential;

HH: The other one, this is the same area, (showing two photos). This one was taken on the last day of April last year, and this was later, in early June.

F6: There I would immediately say, oh, I love this because that's spring, you know, it's all coming up. It's just, you know, you can see...Yes, I love spring!

HH: And relaxation?

F6: Mmm the lovely dappled light...Definitely that would be (Spring)....It's funny when you have pictures put in front of you and you have to make a choice....

2.5.4. Seasonality in relation to shrub planting: Appreciation of both seasons

Two interviewees, (M9, M4), refused to express a preference for either season viewed, describing the merits of each;

i) Punchbowl, Valley Gardens

M4: On this occasion I find it very difficult to differentiate, because I can see the vividness of the colours would make it a lovely visit in spring, but then the tones of green in the autumn one..it's a different sort of feeling. To say one is more attractive than the other..?

HH: You don't find one more attractive than the other?

M4: No, no, not really. I mean there's a part of me that says the spring one is a bit garish, but that said, you know, a splash of colour is...I mean it's like asking to compare one artist and two paintings and..

ii) Spring Wood, Savill Garden

HH: In terms of attractiveness, do you find one of those images more attractive than the other, or not so?

M9: Not so...erm...they both have, shall we say, equal attractiveness, but in different ways. This one is visually more up – front. This one, as you start to look at the detail you can see there's a range of colours and blooms. You've obviously got the difference in the foliage and trees etcetera..

2.6. Shrub Interviews; a summary

Considering overall attractiveness, seven out of eight interviewees responded most positively to colourful flowering non – native rhododendrons, with the one exception being a younger, practising landscape professional, who preferred shrubs to look greener, native or natural. It can be argued that he demonstrated the 'taught' views of a design elite, which have been

shown to differ from those of the general population, (Ozguner et al., 2007; Zheng et al., 2011). In contrast, in terms of relaxation potential, most interviewees, (including those from the woodland and herbaceous interviews), thought that shrubs of more muted varied greens would be more relaxing to walk through.

Interestingly, the two interviewees who referred to shrub structure and enclosure did so in a positive sense, saying that enclosed planting would make them feel more relaxed. No interviewees referred to perceiving threats from potential assailants in relation to denser shrubs. As in the case of woodland planting, interviewees used both layout and perceived levels of care as cues to tidiness, yet here flowering was also considered an indicator of tidiness. Again, some interviewees expressed a strong preference for tidy shrub planting, and as in the case of woodland interviewees, they reflected on this, attributing it to some aspect of their upbringing or past. The value of shrubs to invertebrate biodiversity was recognised, with many interviewees focusing on the value of flowers to pollinators. A few did recognise more sophisticated habitat and seasonally related aspects of the planting.

Heather planting, particularly the flatter heather planting at Wisley, was not well – received by most interviewees. Although two appreciated the colours of these heathers they were generally perceived as flat, boring, static and out of context; interviewees would rather have seen heather in a semi – natural moorland environment.

Section 3: Herbaceous Interviews

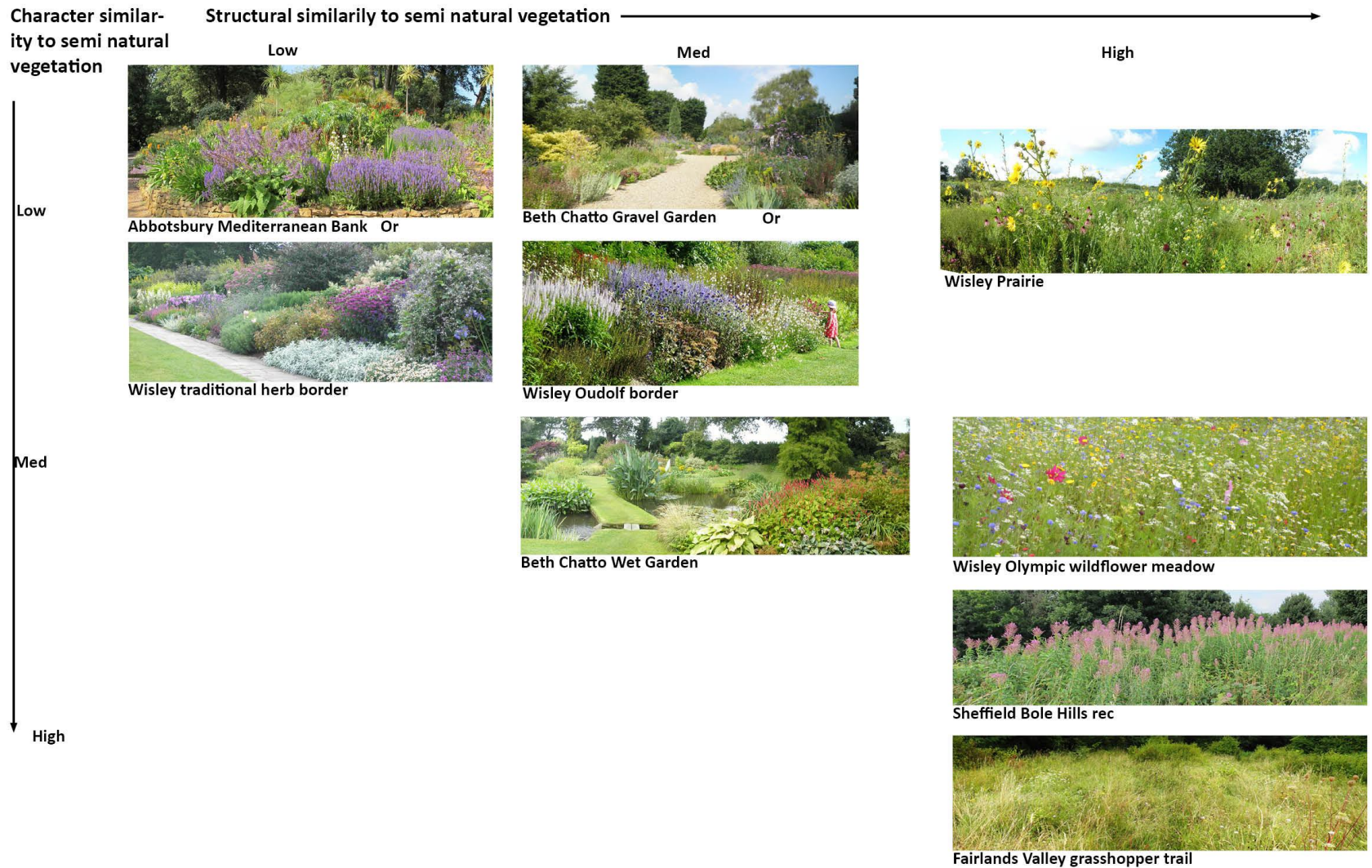
Introduction

Seventeen interviews were conducted with respondents who had originally walked through areas of herbaceous planting. The gender balance was uneven: 5 males, (29%), and 12 females, (71%). Interviewees were drawn from a range of age groups, although the older groups were better represented. Two interviewees (12 %) were aged 25 – 35, 2 (12 %) were 35 – 44, 2 (12%) were 45 – 54, 4 (23%) were 55 – 64, and 7 (41 %) were over 65. Fifteen interviewees (88%) described themselves as White British/Irish, 1 (6%) as Mixed White/Asian and 1 (6%) Asian/Indian. One interviewee (6%) recorded no educational qualifications, 3 (37.5 %) had GCSEs/O' levels /equivalent, 7 (41 %) had A' levels /equivalent, 4 (23 %) a first degree, 2 (12 %) a masters' degree, and 1 (6%) a doctorate. Three (18%) interviewees had past or present involvement in Landscape/Environmental professions.

After discussing their own walk experience and their remembered planting along the walk respondents were presented with eight images of herbaceous planting with varying character/structure in relation to semi – natural planting, as shown in Figure 1. The images were all A4 in size and were arranged in no particular order on a table/desk in front of the interviewee. Themes then discussed in relation to the eight images included overall attractiveness, relaxation, tidiness, and invertebrate biodiversity in relation to planting. In order to focus specifically on the role of planting structure and character, interviewees were then presented with a smaller selection of 3 images for each, from which they had to select their preferred walk, (Figures 2, 3 & 4). Interviewees were then presented with a panoramic photograph of an area of herbaceous planting at two different times of year, in order to discuss the impact of seasonal change on perception and preference, (Figure 16).

Other interviewees (those focusing on woodland and shrub planting) were shown photographs of two contrasting areas of herbaceous planting, as shown in Figure 5. They were asked if either area drew them in, or if they would like to walk through either of these areas.

Figure 1: Images used to discuss overall attractiveness, relaxation, tidiness and invertebrate biodiversity



Structural similarity to semi natural vegetation



Low

Med

High



Wisley traditional herb border



Wisley Oudolf border



Wisley Prairie

Figure 2: Structural Variability: Images used to discuss overall preference (herbaceous interviewees at Wisley, Sheffield and Stevenage sites)

Structural similarity to semi natural vegetation



Low

Med

High



Abbotsbury Mediterranean Bank



Beth Chatto Gravel Garden



Wisley Prairie

Figure 3: Structural Variability: Images used to discuss overall preference (interviewees at Abbotsbury and Beth Chatto's sites)

Character similarity to semi natural vegetation

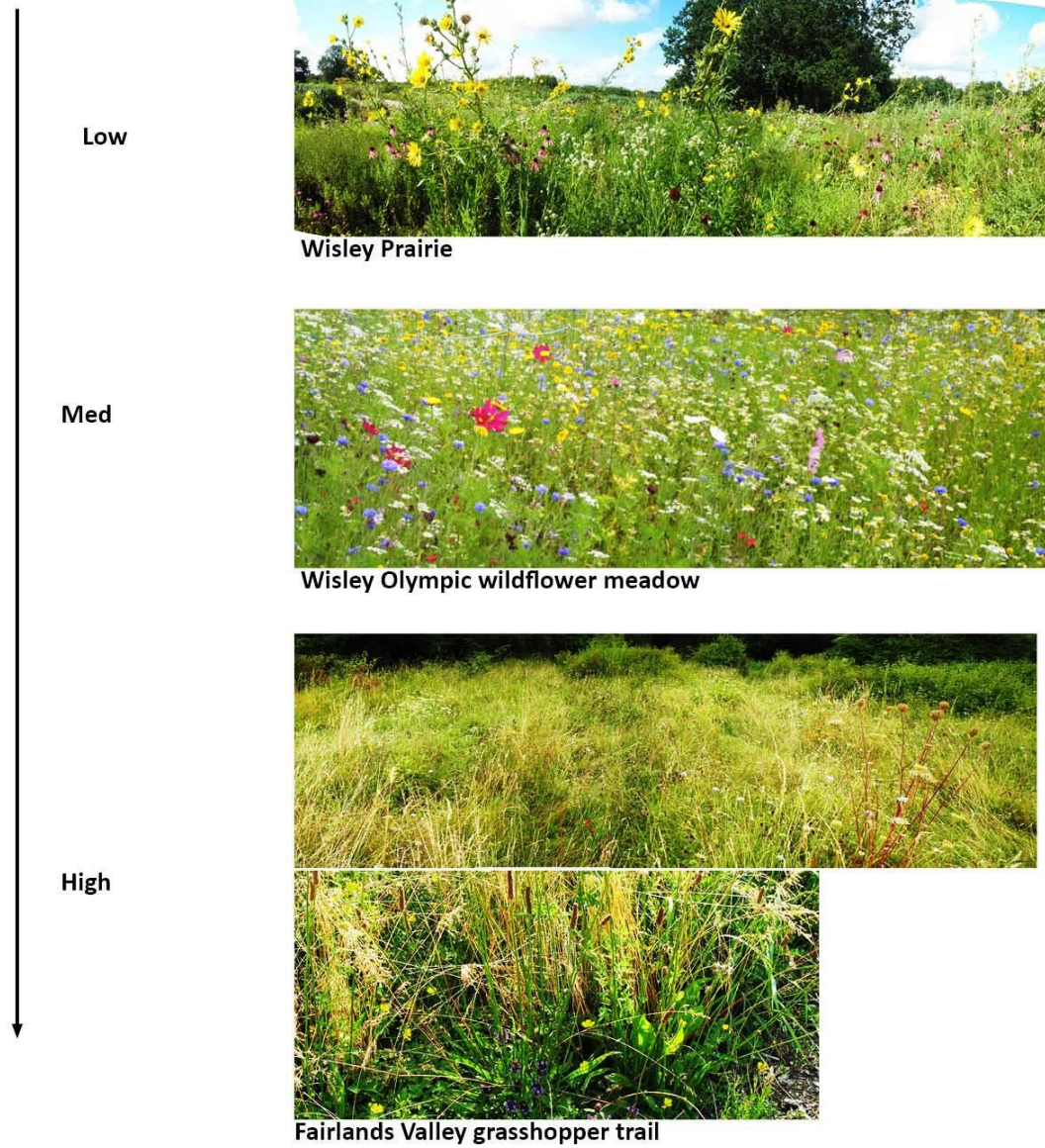


Figure 4: Character Variability: Images used to discuss overall preference



Wisley traditional herbaceous border

Figure 5: Images used to discuss herbaceous preference with woodland and shrub interviewees



Wisley Olympic wildflower meadow

3.1. The overall Attractiveness of Herbaceous Planting

Eight sub – themes emerged through discussion of the overall attractiveness of the areas shown in Figures 1, 2, 3 and 4 with the seventeen herbaceous interviewees and discussion of attractiveness relating to Figure 5 with woodland and shrub interviewees. These were; **planting structure, form and appearance in relation to species character, flowering and colour, water, sensory experience beyond the visual, perceived biodiversity and wildlife value, evocative planting, and scale and context.** The first five of these are discussed here, with **perceived biodiversity and wildlife value, evocative planting, and scale and context** featuring as, ‘emerging themes.’

3.1.1. Overall attractiveness of herbaceous planting: Planting structure in relation to semi – natural

In total, 23 of the 34 interviewees made comments on the attractiveness of herbaceous planting which were explicitly or implicitly related to its structure. These comments fell into four categories; appreciation of herbaceous planting with a most natural structure, (19/23, (83%),(8xM, 11xF)), appreciation of herbaceous planting with a least natural structure, (4/23, (17%), (3xM, 1xF), appreciation of structures with vertical height, (6/23, (26%), (6xF)), and enclosure versus openness, (1/23, (4%), 1xF).These categories were not mutually exclusive, in that a minority of interviewees, (7), showed appreciation for multiple categories.

i) Appreciation of semi – natural structure

In total, 19/23 interviewees , (8xM – M15, M1, M4, M12, M10, M3, M11, M13, 11xF – F13, F15, F11, F3, F14, F19, F23, F21, F9, F18, F22), showed a positive appreciation of herbaceous planting most natural in structure. They perceived planting of this type as more ‘natural’ and in many cases showed an explicit preference for things that were, ‘untidy’, ‘wild’, and

'unorganised'. When asked to choose the three areas of planting from Figure 1 through which they would find the most attractive to walk, three interviewees, (M15, F13 and F15) immediately chose all three of the sites most like semi – natural in structure; Stevenage Fairlands Valley grasshopper trail, Wisley Olympic wildflower meadow and Wisley Prairie, (visible in Figure 4; all most like semi natural in structure, but of varying character);

M15: I am going to put that as a first... (Fairlands grasshopper meadow), that as a second, (annual meadow) and that as a third...(Prairie)...and I can quantify (meant qualify) the reason on that as well.

HH: Okay, brilliant. That's the next thing. Can you try to explain to me why for you that one is the most attractive.

M15: Yes. I can give it to you from a negative point. The ones I like the least...'cos they're too organised...I am not a person that's into gardens, and gardening, and organised planting. I like to be out in the countryside. I go out in the countryside, a lot further from the centre of Stevenage, and I like to see land in its natural habitat, or as close to its natural habitat as you can get. I mean I would say that, I don't know, but that looks as if it's been artificially planted, (meadow), with a variety of plants. That looks a good deal more natural, (Prairie). Even though I have the opinion of it having been artificially planted it's got a nice variety of mixed plants in there, whether or not they're all English varieties or whether they're foreign ones that have been planted I don't know...

Interviewees repeatedly referred to the attractiveness of herbaceous planting where species and therefore colours were 'mixed' and saw this as more attractive than that where there were 'blocks' of one species and therefore blocks of colour in the planting.

The same Stevenage interviewee, (M15), expressed this very clearly when explaining his preference for Wisley Prairie over the Oudolf and traditional borders at Wisley;

HH: So, presented with the opportunity of walking through or alongside these ones, which do you think you would find the most enjoyable?

M15: Pretty definitely that one, (Prairie), and only because I can negatively reinforce that. They are too organised, (Oudolf and Trad borders). Erm, in my experience, plants do not occur in great blocks of mixed colours, all mix and match, they occur all over the place...erm, I know that in woodland you get like dogs' mercury and bluebells in particular parts, and you get patches, but they don't occur in blobs, regularly, they occur on a random pattern, and it's the random pattern that appeals to me more than the organised pattern.

The same point was made by a further interviewee, (M4), who used an artistic metaphor to justify his preference;

M4: That's easy (wildflower meadow – 1) I like the wild flowers..the meadow type thing. We are going on colour, not on formality or anything else but the colour?

HH: Okay, so what do you find so dominantly attractive about the meadow and the colour of that? That was a clear first choice..

M4: Mmm Mmm Jackson Pollock? That spattered effect..

HH: Whereas these are more 'blocks' (of colour)?

M4: Mm – Rothko!



Wisley Olympic wildflower meadow



Wisley traditional herbaceous border

Figure 6: Many interviewees thought the 'scattered', or 'spattered', effect of the meadow at Wisley was particularly attractive and preferable to the 'blocks' of colour visible in the traditional herbaceous border

The preference for naturalistic planting with a horizontal 'mix' of colours was referred to repeatedly when interviewees were justifying why they found the annual wildflower meadow at Wisley so attractive. Twelve interviewees, (5xM – M12, M10, M3, M11, M4; 7xF – F11, F3, F14, F19, F23, F21, F9), commented on the impact of the meadow as a 'whole', then the mix of colours and contribution of individual flowers to the 'whole'. In the case of many of these interviewees, reactions to the meadow were quite extreme; viewing the image appeared to unlock deep emotions and an effusive positive response;

F11: That's just stunning, (meadow) and as soon as you gave me the picture I thought, 'Wow, that is amazing!'..I just love it, I'd love to see it real and be there. It just really attracts me in so many ways, the colours, the textures, the naturalness, but it's obviously carefully created..and it, to me that looks like a real artist has made that..

HH: And is it the mixture of the colours you like?

F3: Yes, yes. It's because it's a mixture of the pinks, the purples the red, deep cerise, the blue and then just now and then the yellow..white. Varied colours, there's nothing too dominant, and yet, there's little bits that sort of zing out at you..even with this deep purple..I mean if it was all deep purple it would be really gloomy, but because it's just interspersed. You do need these little pin points of strong colour in amongst..I mean, it would be awful if it was all white, or all blue, but because it's a mix, it's really interesting, but on the other hand, it's not, it's not assaulting. It's just interesting..

Two further interviewees, (F19 & M11), made the same point about individual species and colours being attractive in their own right, but also contributing to the whole;

F19:..erm...the wildflowers and the sort of freedom and the way they all sort of blend in together, but then they are all individual. It's all sort of individual plants growing wild. It gives a lovely sort of movement..movement goes on as well. And quite delicate too, it's not too vibrant.

HH: So you said that you would have to go back to the meadow...what do you think it is about that in comparison with the others?

M11: Colour has a big impact on me. This particular one, I mentioned before (annual meadow), because although you are getting an overall impact of something rather beautiful, you can focus in on individual colours, especially the blues..which is a bit of a rarity in gardening, true blues anyway. Which one is it, the corn cockle?

Five interviewees, (2xM – M10, M13, 3xF – F11, F21, F22), thought the Oudolf borders were more attractive than the traditional herbaceous borders at Wisley. They were seen as less formal and organised;



Figure 7: The Oudolf borders at Wisley

HH: If you had these three, which do you think you would prefer to be walking through?

F11: That one (Oudolf), again because it's more interesting, it's got more going on, and it's not so structured and rigid.

ii) Appreciation of least natural structures

Four interviewees (3xM – M11, M10, M8, 1xF – F17) saw Wisley herbaceous border as particularly attractive. Some of them were gardeners themselves. In two cases, (M10, M11) this was not incompatible with the appreciation of less formal, naturalistic planting. One interviewee, (M11) had ranked the meadow first in terms of overall attractiveness, and Wisley herbaceous borders as number 2, nevertheless, one male interviewee,(M8) did express a strong antipathy to meadow planting.

M11: Erm..that was the second one (Wisley trad herb borders)..this grabs at the horticulturist in me erm because the reason I probably spend so much time in the Botanical Gardens is because I really like that manicured horticulture and I strive for it in my own garden..and fail miserably.

In contrast to the positive enthusiasm towards Wisley annual wildflower meadow displayed by the majority of interviewees, one, (M8), voiced an equally strong dislike of them, on the grounds that they were, 'untidy, and 'messy'. He preferred the traditional borders at Wisley and recounted his personal experience of an area of naturalistic meadow in Hampshire;

M8: I have never come to terms with this wildflower planting business. Erm, the last four, five years of my professional life I was sitting in an office looking at that lot.

HH: Whereabouts were you?

M8: That was on top of Portsdown Hill, at the research establishment up there, and there was a large area, which, er, for the first couple of years that I was there was religiously mowed, every five weeks ..And then they must have stopped, because we were growing some unique variety of wild orchid or something, you know, anyway, they were told that they must let it grow. And that was the result, which was great, and we thought, oh, that's great, and after we sat and looked at it for a couple of days we really quite enjoyed it. After we sat and looked at it for a couple of months, it was beginning to get through to be honest, and I was waiting for the day that came along with a lawn mower and cleaned it all up, because it got very messy. And it doesn't really attract me, to be honest...erm...that I would find attractive (herbaceous border) purely because of the interest of the different species.

iii) Appreciation of structures with vertical height

Six interviewees, all female, (F14, F16, F15, F22, F13, F19) expressed an appreciation of areas of herbaceous planting offering, 'height', or variations in height. Amongst these were; Wisley traditional herbaceous borders, the Mediterranean Bank, Wisley Prairie and Beth Chatto's gravel garden.

F15: That is lovely..like an old fashioned wide border (trad herb border)...and lots of colour. That looks like a conventional border but it's attractive because you've got so many different heights and colours..and you don't know what you're going to come up to next.

F22: This is beautifully planted with the height and the shrubs mixed in,(Trad border)

HH: Thanks, and then this one, (Beth C Gravel Garden)?

F14: That's another Mediterranean garden..erm it's just lovely! Erm..the heights and colours and shades of green, evergreens..yes.

iv) Structure: Enclosure vs openness

One interviewee, (F16), expressed a preference for structures which provided openness rather than enclosure;

HH: And why that one more so than the others?

F16: Erm...Because this (gravel garden) has got a wider view, but it's also got the distant views. And it's got the space...and I don't like being enclosed as you would be in this one (Med)

3.1.2. Overall attractiveness of herbaceous planting: Form and appearance in relation to species character

If the 17 herbaceous interviewees, nine commented on the attractiveness of the form and appearance of the planting in relation to its species character. The planting which elicited most comment was the Mediterranean Bank. Beth Chatto's wet garden and Wisley Prairie also featured. Views on the Mediterranean Bank were polarised, with three very positive interviewees, (M11, M15 and F18), and five negative, all female; (F12, F13, F15, F17, F22).



Figure 8: The form and appearance (species character) of planting on the Mediterranean Bank produced some polarised views

i) Positive reactions to planting least natural in form and appearance

Five (2xM – M11, M15, 3xF – F18, F21, F12), of the 17 herbaceous interviewees responded positively to planting least natural in species character. Three interviewees, (M11, M10, F18) reacted particularly positively to the Mediterranean Bank; one, (M11), was hoping to see more of that style of planting in the Botanical Garden in Sheffield;

M11: I keep an eye on what they are doing in the Botanical Gardens in fact I've worked in there myself from time to time and the Mediterranean terraces they've got, cos they've redone those as you probably know. There's a lot of spare space in those at the moment and I'm hoping they will be something like that.

For one interviewee, (F18), the image of the Mediterranean Bank evoked warmer climates;

HH: Thanks, and then what about this one, (Mediterranean Bank). Why do you like that particularly?

F18: Erm..probably because it's in contrast to that one (meadow)..sort of hot things going on. It makes you think more of warmer climates. It would be nice to be in a climate where it was permanently...lovely and warm!

One interviewee, (F21), appreciated the large fleshy leaves of planting in Beth Chatto's wet garden;

F21: You see I like, I love the form of these..I've got these growing..these look so much healthier than mine! And I love the big leaves and the big structural, sort of architectural bits of those leaves, (Beth C wet gdn).

ii) Negative reactions to planting least natural in form and appearance

The Mediterranean Bank provoked five negative responses, all from female interviewees, (F12, F13, F15, F17, F22), with some objecting to the 'spiky' form of the palms. One interviewee, (F12), who had reacted so positively to the Prairie, was particularly vocal in her negative reaction. As well as the palms, she objected to the red hot pokers, and spoke at length of her preference for the 'familiar';

F12: yeah it looks spikier somehow and harsher, not as inviting looking, (Med Bank). I can imagine that these...I don't know if they are ..erm there are those poisonous kind of ones if you ate them..though probably not being in the Botanical gardens, I'm thinking of is it devil's poker or something? They look like those..we used to have them in the garden I grew up in and we were always told 'DON'T GO NEAR THEM, TOUCH THEM!', and the sort of jaggedy

look of all those plants makes me think they might be a little bit toxic..and . it looks more rocky and spiky.

F12: No...I always look for the familiar..it's always kind of ..satisfying if you can name a tree or a bird or a plant, I think I've got that kind of dismissive feel, I kind of dismiss plants that I think are spiky and cactusy looking and aren't English and are there for display, and they won't thrive

Four further interviewees, all female, (F13, F15, F17, F22) reacted negatively to the Mediterranean Bank;

F13: It reminds me of those gardens you get near the beach..yes those gardens by the sea front and they're quite..it doesn't look formal but it just reminds me of those. I think it's those spiky trees actually. And those orange things. I don't like those orange things..

HH: Yes, red hot pokers.

3.1.3. Overall attractiveness of herbaceous planting: Flowering and colour

When herbaceous interviewees viewed the eight images in Figure 1, all these areas of planting demonstrated a significant amount of flower and colour, so instead of drawing a comparison between colour and lack of colour, interviewees tended to focus on the structure of the planting and the distribution of colour either in 'blocks' or more naturalistically 'mingled', as discussed above.

When focusing on preference for specific colours of planting, in the case of most flower colours there was no clear pattern to responses. Some interviewees liked pinks, some white/cream, some blues, reds or purples. Responses were also tied up with the form of the plant. The response to yellow flower colour was different. Interviewees tended to react much more strongly when viewing yellow flowers than in the case of any other. Responses were polarised; people either loved or hated yellow flowers. These responses arose particularly in relation to the yellow *Silphium laciniatum* of the prairie planting at Sheffield Botanical garden and at Wisley.



Figure 9: The yellows of Sheffield botanical garden prairie (top) and Wisley prairie (bottom) generated a polarised response amongst interviewees

In total, 13 interviewees, 9xF, 4xM expressed a positive appreciation of yellow flowers and yellow in general. Positive responses to yellow flowers focused on associations with the sun, and that it was a cheerful colour. One interviewee, (F4) associated it with being born in the spring when the 'daffies' were in flower;

HH: to M3: Alright, thank you. What is it about this? You said the yellows? What is it about yellow you like?

M3: I could say 'bright and cheerful', that's a bit of a cliché isn't it...

F4: I think what it is, is that because I was born in April, you know everything around my birthday as a kid, was always yellow daffies and things, so and little pansies and stuff, and so....

HH: Have you ever thought about why you like yellow, or not really?

M10: Must be the sun?

HH: And when you were there you said that you liked the yellow and that it was quite cheery, the yellow. Is that something that stands out? Do you particularly like yellow flowers?

F12: I think it is an uplifting colour isn't it? It's got a lot of associations, yellow, with various things. It's a sunny colour...I can't remember what time of year it was but it looks summery because of the abundance of flowers and the sunny yellow colours.

Five interviewees expressed a strong dislike of yellow planting. Two of these associated this with oil seed rape flowers, one (F11) saying the sight of these made her feel physically sick. Another associated yellow with danger and wasps.

HH: Do you feel that any particular colour in planting – blues or purples or yellows - is particularly attractive? Or have you never really thought about that?

F11: This one (Prairie – yellow) was easy because I don't like yellow, I don't like bright yellow, so that , it just..I strongly dislike that one. ..I can actually feel almost physically ill if I go past a rape field..that intensity of yellow makes me feel right queasy, yes..just the colour of it.

HH: And its nothing to do with the perfume of the rape field?

F11: Well it might be, subconsciously. I don't have a good sense of smell so I don't notice it. Maybe it is doing that.

M13:.. whereas the yellow (of Prairie) feels more alarming because it's a colour you'd potentially associate with maybe danger and wasps..

3.1.4. Overall attractiveness of herbaceous planting: Water

Only one of the eight areas in Figure 1 contained water. The presence of water seemed to provide an additional 'draw' for six herbaceous interviewees, (1xM – M12, 5xF – F14, F15, F17, F18, F19). It was seen as a source of calm, attractive 'sounds' and amphibious life;



Figure 10: Some interviewees commented on the attractiveness of the water at Beth Chatto's wet garden

F19: And yeah that (Beth C wet garden) is a bit more formal but it's got water in it, so..it's nice to have some water..the sound of water...

One interviewee, (F15) linked her love of water to her appreciation of 'newts and tadpoles and things';

F15: Well, without a doubt..first of all I love water, and I love ponds and I love paddling in ponds with newts and tadpoles and things, so that would take me straight away (Beth C wet garden).

3.1.5. Overall attractiveness of herbaceous planting: Sensory experience beyond the visual

When accounting for their selection of the most attractive areas of herbaceous planting, two interviewees, (F23, M15), referred to sensory experiences beyond the visual, referring to positive sounds of insects and being away from the negative sound of traffic, as well as the smells of the planting;

HH Okay, thanks...that was quite quick. You made your decisions quite quickly. Why do you think you find this one, (meadow) particularly attractive?

F23: That one's got so many different varieties of plants in it. It could also be very noisy, with crickets and bees and things like that...and there would probably be quite a nice smell coming from it as well. All your senses would come into play with that one..

3.2. Herbaceous planting and relaxation

The potential of the areas of herbaceous planting shown in Figures 1, 2, 3 & 4 to induce a state of relaxation was discussed with the seventeen herbaceous interviewees, and the potential of areas of planting in Figure 5 was discussed with woodland and shrub interviewees, resulting in the emergence of four sub - themes; **planting structure, water, temperature, and evocative planting**. The first three sub – themes are discussed here, with **evocative planting** addressed in 'emerging themes'.

3.2.1. Herbaceous planting and relaxation: Planting structure

Interviewees' comments on the relaxation potential of walking through various areas of herbaceous planting in relation to the structure of the planting fell into three categories, appreciation of most natural structures as relaxing, (five interviewees, 1xM, 4xF), most natural planting structure and lack of people, (4 interviewees, (1xM, 3xF), and enclosure versus openness, two interviewees, (1xM, 1xF).

i) Appreciation of most natural herbaceous planting structure as more relaxing

Five interviewees (1xM - M15, 4xF - F13, F19, F21, F11), expressed the view that herbaceous planting most like semi natural in structure would be the most relaxing of all the areas Figure 1 to walk through. They thought the 'wildness', lack of structure and formal organisation would be particularly relaxing.

Three of these interviewees, (M15, F13 and F19), had chosen the three areas most like semi natural as the most attractive (Stevenage Fairlands grasshopper trail, Wisley Olympic wildflower meadow and Wisley Prairie), and also chose these as potentially the most relaxing;

HH: If I was to ask you to walk through these eight areas, which three would you find the most relaxing to walk through, in order again, with 1 being the most relaxing?

M15: Erm....it's going to be the same three again. I'm afraid...it is going to be the same three.. Again, I can actually quantify (again means qualify) that. It's because of the lack of formal organisation that's in these, and these (others) are all formally organised...I'm not really personally into formally organised things.

F13: And for me it's very, it's very reassuring and nice, because it's all just come back, and no one has planted it, and I like the fact it's all just there anyway and hasn't been put there. For me it makes it a nicer experience, because that's what being outside I want to get away from all the constraints of being around work people or whatever..so for me that really helps, whereas if it's something that people have made and I'm 'sposed to like it..I find that less nice, yes, that's it.

One interviewee, (F18), thought Wisley Olympic wildflower meadow would be the most relaxing to walk through, but shied away from Stevenage Fairlands chalk meadow and Sheffield Bole Hills because they appeared too much of a physical challenge. She was very wary of thorns;

F18: I still think that one's number one..I think I'm going back to the same three you know...

1 – Meadow, 2 – Trad herb borders, 3 – Beth C Wet Garden

F18: I think it's mainly because for me those two..it's too much of a tangle to walk through (Grasshopper trail native chalk meadow Stevenage and Bole Hills)...and it's one's own experience..There probably aren't any thorns in there but I mark incredibly easily..I have what was such a light graze such that it didn't even draw blood..this was three years ago (shows scar)..

HH: Ooh gosh, yes..

F18: You see? So I tend to avoid anything...my instinctive reaction is that there might be stuff there...

The same interviewee later spoke about her preference for tidy planting and dislike of getting her hands dirty in a garden environment, linking this to her childhood background in India.

ii) Most natural herbaceous planting structure: lack of people and relaxation

For four interviewees, (2xM - M12, M13, 2xF - F13, F21), the perception that areas of planting most like semi – natural would be lacking in other people made them attractive. These areas offered the possibility of, ‘getting away from it all’, and ‘not meeting anyone else. Stevenage Fairlands grasshopper chalk meadow, Wisley Olympic wildflower meadow and the two areas of Prairie planting were all perceived in this way;

HH: Okay, yes, so this (Grasshopper trail, Stevenage) is a completely different environment to the things that you’ve been looking at before. Do you think you can put it into words..why you would think it was would be relaxing?

M12:..for me..I suppose to be relaxed I’m steering away from formal settings because with formal settings I’m identifying general upkeep, groundstaff, members of the public being there, so personally for me I like my quiet spaces..I like going down to Cornwall, I like going through woodlands..so that’s very much an environment..it doesn’t look like it will have many people around...no houses surrounding it...

HH: (to M13) And why is this one particularly relaxing for you, (Stevenage Fairlands chalk meadow)?

M13: Because its, by location its somewhere at a distance from people and traffic and its out in the countryside somewhere and its quiet...you could hear nature and not an army of people. Isolation, isolation really.



Figure 11: Stevenage grasshopper chalk meadow was considered relaxing because of its informality, spontaneity and the lack of other people perceived to be around. For one interviewee, (F13) it meant being away ‘from all the constraints of being around work people’; it offered escape.

iii) Herbaceous planting structure: enclosure v openness

One interviewee, (M11), thought that being enclosed within tall herbaceous planting such as that in the Prairie made him feel relaxed;

M11: Erm..but the idea of wandering on paths through these Prairie plantings and so on (Prairie Bot Gardens – ranked 2) it just makes me feel relaxed. Especially the one in the Botanical Gardens, with this very tall Sylphium there, because you sort of lose yourself in the

middle of it..whether that was the initial intention or not I don't know..but that's the way it feels.,

Another interviewee, (F12) felt the opposite;

F12: Yes but I think that that's quite tall (Prairie the botanical gardens) and it might not be so relaxing, because you'd walk into the middle and..so something lower down or more contained would be more relaxing...



Figure 12: The Prairie at Sheffield Botanical Garden. The enclosure made one interviewee feel relaxed, yet another felt the opposite

3.2.2. Herbaceous planting and relaxation: Water

Five interviewees, (2xM – M11, M13, 3xF – F13, F14, F15), thought the presence of water in Beth Chatto's wet garden would be relaxing. They all held the view that water was generally a relaxing feature. One, (M11), referred to the prospect of seeing dragonflies and another, (F15), implied that wildlife would be found in the ponds;

M11: I think probably this one (Beth C Wet Garden ranked 3) is down to the presence of water, which I've always found relaxing. You know, sitting on the edge watching dragonflies and things like that I've always found very relaxing. So I tend to associate water ...water gardening with relaxation.

3.2.3. Herbaceous planting and relaxation: Temperature

Two interviewees, both female, (F18 and F19) stated that they needed warm surroundings to feel relaxed;

HH: So which one would you find the most relaxing to walk through..is it the same?

F18: It's partly dependent on weather for me...because I feel the cold so much. I was sat at home this morning with this lot on..and I have two long sleeved thermal vests underneath, with a fleece and a hot water bottle and I was still cold. So it depends on the warmth. So I do come here and I have been here (Wisley) in the winter, it's never been relaxing, because my body's battling to stay warm.

3.3. The tidiness and order of herbaceous planting

Considering the eight images in Figure 1, all seventeen interviewees were asked to choose the three they thought looked the most tidy or designed, as opposed to being natural – looking. Once decisions had been made, interviewees were asked to justify them. Most interviewees selected both the traditional borders at Wisley and Wet Garden at Beth Chatto's Garden amongst the three most tidy, with justifications falling into two main categories; firstly, reference principally to the perceived level of care and maintenance of the planting, particularly the shortness of the grass, (11 interviewees, 4xM, 7xF), and secondly reference to the structure, layout, and role of paths through the planting, (12 interviewees, 2xM, 10xF).

3.3.1. The tidiness and order of herbaceous planting: Care and maintenance

When asked to justify their selection of the traditional borders at Wisley or Beth Chatto's Wet Garden as the tidiest, 11 interviewees, (4xM – M10, M13, M14, M11, 7xF – F11, F18, F21, F12, F13, F14, F23), referred to their perception of the level of care and maintenance required to produce the outcome, using words such as 'trimmed', 'tended', 'edges' and 'manicured' to explain their choices. The shortness of the grass was a key indicator;

HH: So, what was it that led you straight away to make the decision ..(about Wet Garden)?

M10: Well, the sharp edges. And the mown grass, and the same applies to that one (Trad borders). This is not quite so easy to say, It's much less clear, the joint third place, than 1 and 2, so erm..I think it's simply the fact that there's a bit of tended grass there (Oudolf), that doesn't look quite so clipped as this one (Trad borders).

F18: Simply because they are so manicured. This one (Oudolf) obviously less so, but then you have the sort of manicured effect of the lawn

Two interviewees, (M11 and M12) reflected on their own personal experience of maintaining planting in different contexts;

HH: That was a quick decision. What do you think provoked you to make that decision? Why do you think those ones are particularly tidy?

M12: Yes – part of my job is dealing with vegetation. That (Beth C Wet Garden) looks manicured – looks like it would take a lot of effort. Certainly looking at the grass there, how close mown it is. I suppose again what I thought with this one (Trad herb borders Wisley), again it's just the level of the grass, and the borders looking quite formal and presentable, and also the concrete path here as well, again it's just that level of surface presentation. And then, yes (Oudolf borders, Wisley), certainly again I think it's the grass..and coming from a parks perspective.



Figure 13: The traditional borders at Wisley (top) and Beth Chatto's wet garden (bottom); trimmed edges, tended grass, a regular (formal) layout and the clear pathways were all considered indicators of tidy planting

3.3.2. The tidiness and order of herbaceous planting: Structure, layout and paths

Still focusing on the traditional borders at Wisley and the Wet Garden at Beth Chatto's, other comments, (2xM – M13, M10; 10xF – F11, F12, F17, F18, F19, F14, F15, F16, F19, F13), were

directed towards the contrived structure and layout of the two areas, as well as the role of pathways. One interviewee, (F11) contrasts this formality with the 'effortless' design of the meadow;

HH: Again, those decisions were very quick...what is it in these images do you think, that is prompting you..

F11: Well, this one (Beth C Wet Gdn) is incredibly tidy. It looks designed, it doesn't look natural at all. It looks like everything has a place and has been thought about, put in. This one (meadow), I'm sure there is a lot of design in it, but it looks effortless...

F12: and deliberately planted in a certain order. .. There's certainly been more planning..because there's that path and the lawn it's as if you are 'sposed to stand away from it and it makes me think it's been done specifically. It's been designed...

HH: So what was it that made you make the decision so quickly about that one (Wet garden) then?

F17: Formal structure. That's what made the third decision as well. Because that one is a lovely bed...I mean I love that one but this, I think it's the structure..the pathways, the sort of tidy lawn edge, and even this, although it's spilling out onto the gravel, it's still quite structural..

Four interviewees, (M10, M13, F13 and F19) focused specifically on the role of a pathway in suggesting tidiness;

HH: Thank you, that was quite quick, wasn't it? What is it particularly about these that makes you think they are so tidy compared to the others?

F19: I 'spose cos they've got pathways, dedicated almost pathways...seems to be a sort of way you have to go to view the plants..you can't just sort of storm in.

3.3.3. The tidiness and order of herbaceous planting: Attitudes to tidy planting

Once interviewees had justified their decisions, discussion then moved to the interviewee's reactions or preference in relation to tidy planting, sometimes linking this to personal tidiness and a reflection on why the interviewee thought they had reacted in that way. Responses fell into three categories; firstly an appreciation of tidy planting and links to personal tidiness, (4 interviewees, 2xM, 2xF), secondly a rejection of tidy planting, (6 interviewees, 1xM, 5xF) and thirdly an appreciation of tidiness in context, (3 interviewees, 1xM, 2xF).

i) The tidiness and order of herbaceous planting: Positive appreciation of tidy planting and tidiness

When asked whether or not they liked tidy herbaceous planting 4 interviewees, (2xM – M10, M11, 2xF – F15, F18) showed a positive appreciation of it;

M10: I think, when you see a border that's been cared for, tended and the plants are in such good condition it really is very attractive...

M11: Erm..that was the second one (Wisley trad herb borders)..this grabs at the horticulturist in me erm because the reason I probably spend so much time in the

Botanical Gardens is because I really like that manicured horticulture and I strive for it in my own garden..and fail miserably.

One interviewee, (F18), referred to previously, attributed her preference for tidiness and order to her cultural background in India, where the words for 'tidy' and 'dirty' are the same. She later went on to say she didn't like getting her hands dirty in the garden;

HH: So if you think you want to relax then you would walk through the same sort of area that you find attractive?

F18: Yes, because otherwise..I'm the sort of anal idiot who gets crotchety if things aren't ..Poirot and I have a lot in common...that's why I liked Agatha Christie when I first came across her...we like our things symmetric..and I can get..I don't find it relaxing if things are messy..all over the place...Actually it would be an interesting cultural thing..because I've always maintained that ..I've been to many many poor Indian homes. I've only ever been to one that I would call untidy. In India we don't have separate words for untidy and dirty. It's the same thing....and my sisters think I am and I quote 'a slob', but most of my friends think I'm unbelievably tidy.

ii) The tidiness and order of herbaceous planting: Rejection of tidy planting

Six interviewees, (1xM – M13, 5xF – F13, F14, F16, F17, F22,), rejected tidy herbaceous planting in preference for something more informal and naturalistic;



Figure 14: Six interviewees rejected planting they perceived as 'tidy' in favour of 'wild' more naturalistic planting structures such as the Wisley annual meadow, (top), Stevenage grasshopper chalk meadow, (middle) and Wisley Prairie, (bottom).

HH: Okay, thank you. Could you try to explain what you find attractive about those? It might be difficult.

F13: Erm, I like the fact they look a bit wild. .. I like this wildness here...looks kind of..yes, not too manicured, you know? This one? (Mediterranean Bank) I'm not sure. It's something about the way it's planted up. With these things ...I don't like tidiness really. It looks quite constructed

HH: It's interesting. Do you like things that are tidy generally?

F16: for my own self I would prefer something a little bit more relaxed, where things do flop over the path a bit, things are a bit more naturalistic. You can have the two, erm, in a garden, but you tend to have them graduating one to the other.

iii) The tidiness and order of herbaceous planting: Tidiness in context

Three interviewees, (1xM – M10, 2xF – F16, F9), acknowledged a role for tidy planting, and that it, 'had its place';

HH: And would you say you liked things that are tidy in planting?

F16: To a certain extent. They have their place. They don't actually happen in my own garden, but they do have their place.

HH: So it depends on the context, where we are looking at? So where would you think you would like to see tidy planting and where would you like to see less tidy planting do you think?

F16: I think formal planting's okay for a formal garden. You're actually going to a country house or something and they've got sort of parterres and straight lines and the rest of it..

3.4. Herbaceous planting and invertebrate biodiversity

All 17 herbaceous interviewees were asked to choose the three areas of planting in Figure 1 they thought would be the most beneficial for native UK insects, including butterflies and bees, and then to explain their decisions. Justifications fell into two main categories; most responses focused on the presence of visible flowers and referred to pollinators, whereas fewer responses focused on habitat, species character and structure. Two interviewees, (1xM, 1xF), gave a comprehensive, holistic explanation, referring to the role of the planting in terms of both pollination and habitat. In addition, one interviewee, (F13), commented on the lack of human disturbance, whereas two, both female, referred to the presence of water as a factor.

3.4.1. Herbaceous planting and invertebrate biodiversity: Visible flowers and pollinators

In this the dominant category of response, comments ranged from straightforward ones about the presence of flowers and therefore benefits to pollinators, (5 interviewees, 1xM, 4xF) to more sophisticated comments referring to the shape of flowers and variety or species richness, (8 interviewees, 1xM, 7xF). Others referred to their own personal experience of herbaceous planting and the presence of specific insects, (2 interviewees, 1xM, 1xF), and some the length of flowering, (2 interviewees, 1xM, 1xF).

i) *Visible flowers and pollinators: Straightforward reference to visible flowers*

When selecting the three areas of planting most beneficial to UK insects, 5 interviewees (1xM – M15, 4xF – F13, F19, F21, F22) chose the sites with obvious flowers, as these would be good for pollinators. The Wisley annual wildflower meadow was a popular choice, yet other sites featured too; the Prairie at Wisley, Wisley Oudolf borders, Abbotsbury Mediterranean Bank, Sheffield Bole Hills and Stevenage grasshopper chalk meadow;

HH: Okay, now, you made quite a quick decision about this one (Shackledell grasshopper), why do you think that's particularly good for insects?

F13: Because it's..it's got a few flowers...And this one (meadow) just because it's got loads of flowers, I think, I just imagine bees would like that one, and butterflies..I don't know..I think they would.

ii) *Visible flowers and pollinators: Reference to flower shape and species richness*

More sophisticated responses , (8 interviewees, 1xM – M12, 7xF – F11, F12, F14, F17, F18, F19, F22), referred specifically to the shape of flower and pollinators' preference for single open flowers, as well as the variety of species which would attract a variety of insects. The Wisley wildflower meadow was mentioned repeatedly in this context, yet other areas of planting with a variety of planting also featured; Wisley Oudolf borders, traditional borders and prairie, as well as Abbotsbury Mediterranean Bank and Stevenage grasshopper chalk meadow. This was contrasted with Sheffield Bole Hills, which was considered to be perhaps less attractive to pollinators because it consisted of one dominant species, rose bay willow herb;

F11: Well, this one (Oudolf) has lots of different flower shapes..I think I remember reading they like these flat things to land on, other things like these tall things to put their, get their pollen out of..I don't know what they do..laughing..but there's lots of variety amongst the flowers and colours there. This is obviously more wildflowers which I assume they go for, and this one again has lots of different flowers and colours and types.

HH: Okay, so what made you choose those three and what made you choose this one as being the best, do you think?

F14: I think bees especially like the open flowers..and that one's got the Echinacea (Prairie)...

HH: Okay so what is it (about the meadow)?

F17: I suppose variety of planting. There's a lot of different types of flowers, therefore attracting a lot of different type of insects, not just bees..erm, a lot of them are single flowers as well, which attracts them more I think really. So I think it's the variety of planting really...which I think almost threads through the three..looking for something. I chose that (Shackledell) I don't know if it's a meadow..

Two interviewees, (F12 and F17) thought that the lack of variety of species at Sheffield Bole Hills would make it less beneficial for native invertebrates;

F12: I was inclined to think they'd go for variety, or that the variety would attract different insects. I thought that something with only one sort of plant (pointing at rose bay willow

herb, Bole Hills) **would only attract one sort...but I don't know a lot about bees and butterflies..**



Wisley annual wildflower meadow



Wisley Oudolf borders



Wisley traditional borders



Stevenage grasshopper chalk meadow



Abbotsbury Mediterranean Bank



Sheffield Bole Hills

Figure 15: The presence of open flowers and a variety of flowering plants (species richness) in the first five areas was seen as beneficial to a wide range of pollinators

The dominance of rose bay willow herb at Sheffield Bole Hills was thought to make it less advantageous to insects

iii) Visible flowers and pollinators: presence of pollinators linked to past observation/experience

Two interviewees, (M11 and F22), reflected on their own personal experience of certain types of planting or plant species in relation to pollinators. One, (M11), referred to different areas of Sheffield, one meadow and the other the Prairie in the botanical gardens;

M11: So we are focusing on pollinators here, yeah?

HH: Not just, so including pollinators but other insects and invertebrates as well

M11: Erm...well having seen an area like that (the annual meadow)...which again took me completely by surprise..it was outside the Washington pub I think, just below Devonshire Green, and it looked like.. I was walking down there and suddenly..oh...and it looked like guerrilla planting..it was great...just took the wind out of my sails really...and I spent ages just standing there, photographing, looking at it... at the same time noticing how many insects were in that area, where insects wouldn't normally be in that area. So I think if you had that in an area where it was more countrified you'd probably have more insects, but in that area there was enough to make me feel that way.

iv) Visible flowers and pollinators: length of flowering

One couple (M10 and F10) discussed the length of flowering as a factor important in assessing the relative benefits of different areas to pollinators. She (F10) was aware that the sequential flowering of the annual meadow offered benefits;

M10: Yes, It's just a question of how long the flowering period is..if it's going to last for a season..(in meadow)

F10 (Wife of M10): Presumably there's a succession of flowers?

HH: Yes, that's the idea, that certain ones come into bloom, and then...

F10 (Wife of M10): Whereas when you've got something like that, once it's finished..it's finished isn't it?

3.4.2. Herbaceous planting and invertebrate biodiversity: Habitat, species character and structure

The second main category of justification included reference to habitat, species character and structure, although fewer responses, (7 interviewees, 2xM, 5xF) fell into this category. Of these, two interviewees, (1xM, 1xF), referred to the role of species character; the possible difference between native and non – native plant species, whereas five, (1xM, 4xF), focused on the structure of the planting, with reference to habitat.

i) Habitat and species character: non - native vs native species

Two interviewees addressed the relationship between native/non – native plant species and native invertebrates. One, (M15) thought native plants would be more beneficial to native insects, whereas the other, (F22), expressed the opposite view;

M15: Insects..

HH:....UK insects and wildlife..When I say 'wildlife' I mean insects, invertebrates, not deer...

M15: I have to say on this one, I don't really know...I would make an assumption that the more wild areas, the more naturally wild areas are the ones, naturally occurring plants, ie British varieties will be better for British insects...erm, but I don't really know....

This second interviewee was better – informed and understood from personal experience in her own garden that non – native plants were of value to native insects;

F22: ... insects like non – native plants as well, not just the natives. People always think, 'You've got to plant native plants', but you don't, because they are also attracted to non – native plants, so no. There is an awful lot of misunderstanding. Yes, when I look at my own garden and I see the plants with butterflies and things on them, there not always natives! Well, I've got some, but no, a lot of them are non – native. I mean, wasn't buddleia introduced?

ii) Habitat and planting structure

Five interviewees, (1xM – M12, 4xF – F15, F18, F21, F22), referred to the habitat role of herbaceous planting and the benefit to invertebrates of a structure which provided varied habitat, i.e., different heights provided by the structure of the planting offered niches for different insects. One, (F18) did so explicitly;

F18: , erm, that (Oudolf) because of the variety and the wildness..so lots of shelter for creepy crawlies to go through things there..I believe our roundabouts are brilliant for wildlife..I've been told, in Milton Keynes..so and again for variety, because there are lots of different kinds of plants and if you'd call it habitat..

HH: Yes, yes.

F18: and then here, (Trad borders), again there's a variety and there's shelter and its different heights so I'm guessing and different creatures at different heights would like it..

3.4.3. Herbaceous planting and invertebrate biodiversity: Holistic view of pollinators and habitat

Two interviewees commented in a more holistic way on relative value of the different areas of herbaceous planting for both pollination and invertebrate habitat. The first interviewee, (M13) was definite that Stevenage grasshopper chalk meadow offered the most in every sense;

HH: So, you've explained a bit about this before, but do you want to say a bit more about why you chose these 3?

M13: This (Grasshopper trail Stevenage) is just a..it speaks for itself..it's that (Oudolf borders) but in a wild context..I mean it's that with all the things that have been eradicated that are actually good for animal life taken out. It's everything, because that's not just insect life. It's whatever's there..mice, whatever it might be..

HH: Yes, an ecosystem..a whole functioning ecosystem..

M13: Yes, it is, yes..that again (Oudolf borders) – I can't explain that wholly, but it's got a sort of wild quality to it, that links in with that. This, (Bole Hills rose bay willow herb) I just like, it adds something, it's good for bees, it's good for moths...it has that wildness, but it offers cover. That (Oudolf borders) doesn't offer cover to anything not really. That

(Grasshopper trail Stevenage) offers everything..or at least that's my imagination ..to all the invertebrates you might expect to find in an area like that.

3.4.4. Herbaceous planting and invertebrate biodiversity: Lack of human disturbance

One interviewee, (F13) considered Stevenage grasshopper chalk meadow and Sheffield Bole Hills would be the best two areas for native insects because she thought they looked relatively free from human disturbance;

HH: Okay, the last one here that I'm going to look at with you is how good you think these things are for native insects, including butterflies and bees, but not only butterflies and bees.

F13: The best for all insects really?

HH: Yes, all insects.

F13: ..but it's (Stevenage grasshopper chalk meadow) got some sort of shrubby bits behind that look as if they've been left alone..I've got a feeling that there's not much being done to that at the back, and this isn't being cut or anything...I think there'd be a load of stuff hiding in there...Again, there aren't many flowers, I mean there's those things..(rose bay willow herb)..can't remember what they're called..

3.4.5. Herbaceous planting and invertebrate biodiversity: Water

Two interviewees, (F12 and F15) thought Beth Chatto's garden would be beneficial for insects because of the presence of water;

F12: Tho I suppose that (Beth Chatto Wet Garden) would be good for insects with the water...I didn't really consider that..

3.5. Seasonality in relation to herbaceous planting



Abbotsbury Mediterranean Bank July 2013



Abbotsbury Mediterranean Bank September 2012

Figure 16:
Seasonal changes
in herbaceous
planting:
Abbotsbury
Mediterranean
Bank in full
flower (July
2013), and with
little flower
(September
2012).

In order to assess the impact of seasonal change on perception and preference, the seventeen herbaceous interviewees were presented with two panoramic photographs of the Mediterranean Bank at Abbotsbury, one in full flower, (July 2013) and another with little flower, (September 2012), (Figure 20). These images had been taken during earlier on - site walks with questionnaire respondents. Interviewees were then asked which of these they thought would be the most attractive to walk through, then which would be the most relaxing to walk through. Responses fell into four main categories; appreciation of both images and seasonal change, (3 interviewees, 1xM, 2xF), overall preference for planting in full flower, (5 interviewees, 1xM, 4xF), overall preference for planting with little flower, (3 interviewees, 2xM, 1xF) and those who saw the planting in full flower as the most attractive, but that with little flower as the most relaxing, (3 interviewees, all female). Four (female) interviewees commented specifically on the grasses visible in September, when there was little flower.

3.5.1. Seasonality in relation to herbaceous planting: Appreciation of both full and little flower and seasonal changes

Three interviewees, (1xM – M10, 2xF - F10, F12) showed a real appreciation of both images. The first one, (M10), preferred not to choose one over the other;

HH: I'm asking you now, if you were somehow a time traveller and you could go at one time in the year, then immediately the next time of year, which of these two would you consider the most attractive if you were walking through?

M10: Well, I don't really want to answer that one, only because, I think that we've mentioned going to Hilliers garden, and we really do like every season, and we find

whenever you go there's something to enjoy, and so if we go in September, October, or certainly November, January, we always enjoy it. And I think I wouldn't want to rank them really.

3.5.2. Seasonality in relation to herbaceous planting: Overall preference for full flower, (July)

Five further interviewees, (1xM – M12, 4xF – F11, F17, F18, F19), expressed a clear preference for the planting in full flower, in July, in terms of being both attractive and relaxing. Two of these, (F11 and M12) explain that they would barely notice the planting in September because of the lack of colour;

HH: If I was to invite you to walk through these areas, at which time of year would you find it most attractive?

F11: Indicates – full flower straight away.

HH: Definitely?

F11: Yes.

HH: And which area would you find most relaxing do you think?

F11: Oh, still this one..yes.

HH: And that's because..?

F11: Because this one (in flower) would make me stop and slow down and look at it, or I'd be happy to sit and ponder it. This one (little flower) I'd just walk past in search of ..well what's out now?..I wouldn't sort of notice it really.

3.5.3. Seasonality in relation to herbaceous planting: Overall preference for little flower (September)

Three interviewees, (Mx2 - M13, M15, Fx1 – F13), expressed the opposite view, that the planting with little flower, in September, was both the most attractive and relaxing. One of these, F13, appreciated the visible shapes and textures of the planting in September. Another, M13, was surprised at his own response;

HH: Which would you find the most attractive to walk through?

F13: That one (no flower), definitely...I just love..I love all those different shapes in there and different textures. It looks so different to the one here (in flower)..I love..to me all the different sort of spiky bits and the different things look a little less contrived than they do in this one. It's the same garden, but these don't matter so much to me when there are these other spiky bits at the front. I like it. I like the colour as well, it's not..it's just all that green, it's really nice.

HH: And then, if I asked you about relaxing, would you find this one the most relaxing as well?

F13: I would, yeah...

HH: So we've got one that you've already seen, (Med Bank – shows image). That was taken in July last year, and this is the same area (shows image) in September the year before.

M13: It's difficult...I probably would warm towards that one..you've probably guessed that, but I don't know why..yes, probably would (Sept, little flower)

HH: And which of the two would you find the most relaxing to walk through, or past. You can actually walk through..there are steps. You can just see somebody there (in image)

M13: I'll go with that..(September – little flower)

HH: And can you try and put it into words?

M13: Well..I..It's an odd contradiction isn't it really because there you've got obvious colour and err why should I reject that? Erm...Praps I've got that sort of image in my mind of and I gravitate towards something which is more erm..neutral on the eye I suppose..yes, if I saw the right butterflies on this, (July), you know I'd be there, but..it probably is that feeling that that is a little bit more natural, you know you've got these palms in the background which are not very natural, erm..and it is probably my preference for something that is more native and natural..

3.5.4. Seasonality in relation to herbaceous planting: Full flower (July) as most attractive, little flower (September) as most relaxing

Three interviewees, all female, (F14, F23, F22), thought the Mediterranean Bank in full flower, in July, was the most attractive, whereas the more subtle, muted colours and visible textures of the same area in September, would be more relaxing;

HH: The first thing I'd like you to say, I'd like you to tell me which of those two (July – in full flower, September v little flower) you find the most attractive

F14: Well..(pointing...decision - colour – in flower – July)....because of the colour I think. But that is..when you look into it, the colours of the greens and the browns, it's lovely, (in September)..they're both equally, in a different way. Obviously one is more colour, it's more erm attractive I spose..

HH: Now if I ask you which do you find the most relaxing? Which would you find the most relaxing to walk through?

F14:...Difficult! Probably, probably this one actually..the greens..

Relaxing – greens

HH: Because? For the reason you said earlier about colours?

F14: Yes, different greens, it's lovely.

3.5.5. Seasonality in relation to herbaceous planting: Comments on grasses

Four interviewees, all female, (F15, F16, F21 and F12) all commented on the grasses visible in the planting with little flower in September. Two, (F21, F12), were very positive about these, referring to their movement, and tactile qualities;

HH: If you were to walk through, which of the two would you find the most attractive?

F21: I would think this one (Sept, v little flower), it has grasses, and I know they will move...and I know they will give you that..it's the sound that grass makes, as it moves, it's

that kind of whispering sound. And for me that would be a more interesting walk, and at that time of year I wouldn't be expecting to see lots of butterflies and things, so I wouldn't need the flowers, but I would like the texture of these things rustling and moving and joining in with the environment more..erm, so for me..but partly because I like movement..

The other two, (F15, F16), were critical. One of these, (F16), wanted to 'weed' out the grasses;

F16: I sort of almost want to weed that because I don't like grasses! (September) My daughter had lots of grasses in her garden, not this one but the previous one, and I just thought, 'why did you put them there?'..

3.6. Herbaceous interviews; a summary

In the case of the herbaceous interviews, because most of the areas of planting were dominated by colourful flowers, flowering per se became less important than the structure of the planting when interviewees were making decisions about the relative attractiveness of the areas shown to them. The majority of interviewees found planting most natural in structure and moderately natural in species character the most attractive overall. This combination was found in the annual meadow at Wisley, where interviewees repeatedly commented on the attractiveness of individual flower species and colours, which then contributed to a breathtaking 'whole'. Interviewees also viewed planting with the most natural structure as offering the greatest potential for relaxation, yet in this case that with the most natural character was also selected. Many thought the semi – natural chalk meadow in Stevenage would be the most relaxing place to walk. For some of these interviewees, this semi – natural system seemed to suggest a type of place or context where they could walk alone and undisturbed, or very few other people would be present. This preference for more naturalistic planting was reinforced in the discussions of tidiness, when most interviewees, with one main exception, expressed a preference for untidy, naturalistic planting. These reactions may reflect the very selective nature of the sample of interviewees. Self – selecting from the original questionnaire respondents, most had a real interest in either horticulture, landscape or the environment. No – one suggested they might feel vulnerable or threatened to walk alone in the Stevenage meadow, maybe because of the openness and clear sight lines. It would be interesting to see if this view was held more widely.

Reactions to non – native planting least natural in character were again polarised, as in the case of the woodland interviews. Although most people were very accepting of non – native planting not dissimilar in form to native plants, (such of that in the traditional herbaceous border), many reacted strongly to the unfamiliar forms of the Mediterranean Bank. Some interviewees responded positively, yet five female interviewees objected to its 'spiky' forms, two picking out the red hot pokers for particular criticism. They saw this type of planting as out of keeping in the UK.

When considering the value of the planting to invertebrates, visible flower cover prompted most interviewees to comment on pollinators, with some showing an awareness of the relative merits of different flower shapes and of species diversity. One interviewee in particular showed a wider awareness of the habitat value of herbaceous planting to the different life cycle stages of insects. This man was not typical of the UK population in general as he had his own meadow and was a keen RSPB volunteer.

Section 4: Emerging Themes

Analysis of all 34 in – depth interviews with Woodland, Shrub and Herbaceous interviewees resulted in the emergence of four dominant themes; Evocative planting, the relationship between perceived attractiveness and relaxation, attractiveness and perceived biodiversity value, and the significance of context and scale.

4.1. Theme 1: Evocative Planting

In recent years researchers from a range of disciplines including Geography, Archaeology and Heritage Studies have become aware of the significance of the past in the contemporary construction of narratives, and the changing nature of the relationship between place, memory and identity, Moore & Whelan, (2012). This applies particularly to the role of landscape in cultivating narratives of identity, Claval, (2012). On many occasions, when asked to justify their preferences for particular areas of planting, interviewees evoked past experiences or memories of the area shown in the image, or of other similar areas of planting. Perhaps significantly this occurred in the cases of interviewees viewing woodland and herbaceous planting, but never in the case of those viewing shrub planting. In the case of herbaceous planting this occurred almost exceptionally in the case of two areas of planting, the annual meadow at Wisley, and Stevenage grasshopper chalk meadow, (Figure 1). The Wisley Olympic wildflower meadow was the area of planting which prompted more evocative responses than any other area.



Figure 1: Wisley Olympic Wildflower meadow (top) and Stevenage grasshopper chalk meadow (bottom) in 2012

Four sub – categories of evocative planting emerged; Familiarity, including shared experience, often with grandchildren, childhood memories and experience, more recent adult experience and in one case, nostalgic idealism, when the interviewee referred to an imagined landscape of the past.

4.1.1. Evocative planting; Familiarity including shared family experience with grandchildren

When accounting for the relative attractiveness or relaxation potential of particular areas of woodland or herbaceous planting, twelve interviewees, (8xF, 4xM), chose the areas of planting local to them as their preferred areas, or said that the area they viewed reminded them of a

familiar, local area. Some referred back to particularly positive experiences in these areas, sometimes with their grandchildren;

4.1.1. i) Woodland Planting

In the case of woodland interviewees, when asked to select the three areas of woodland (from Figure 1), which they would find the most attractive to walk through, five out of eight selected their 'home' site, where they originally did the woodland walk and questionnaire. One interviewee was reluctant to choose Abbotsbury, even though she perceived it as the most attractive, as she felt she was 'biased' in favour of it because she knew it;

F2: (Interrupting)...It's hard because sometimes the most attractive is the most familiar isn't it? Well, I thought I wouldn't go for Abbotsbury as my first choice, because...I was biased towards it...so I made myself go for something else...

A Stevenage resident thought Monks Wood in Stevenage to be attractive because she felt comfortable there;

F4: I mean obviously I like our own one because it is, comfortable..

Another Stevenage resident selected woodland with which he was familiar as the most attractive. This also looked the most, 'natural'.

HH: Which of these three do you particularly like?

M5: (Points at Monks wood semi complex)... Erm, I'd say it looks more natural...

Two female interviewees, (F1 and F23), chose home sites and being the most appealing because of memories of shared experiences there with grandchildren. A Torquay resident, (F1), selected Princess Gardens as the most attractive, and the other Torquay planting, Kings Gardens as the second most attractive. This was mainly because of memories she had of times spent there with her granddaughter;

F1: That one there, number 2 (Kings Gardens Palms), I chose that one because it's near enough the same as that one, but you've got a family, or you've got the ducks...'cos I used to take my, when my granddaughter used to stay with me. We used to go down there quite a bit to feed the ducks and you can sit on the seat.

Another Stevenage resident chose Monk's Wood in Stevenage over Wisley Wild Garden (Figure 6), because of times she spends there with her grandsons and the memories the image evoked;

F23: Definitely that one, (pointing Monk's wood bluebells). I just love woodland..I take the boys over there whenever we get the opportunity..my two grandsons, and I've been doing that since they were born virtually. They're now sixteen. We went for a walk this week actually, and every tree they've named them all, so they've got trees, and I've written stories about the trees when they were little. So, you know the woodland is...They said the other day that they don't see me a lot, but every time we see you there's an adventure..

Another Stevenage interviewee, (M9) described deep, spiritual experiences in Monk's Wood, in Fairlands Valley Park. He claimed to 'feel vibrations', when walking through the woodland,

which he never experienced in areas of immature woodland or in an area of herbaceous planting;

M9 : Right, I have to say that when I walk through woods, I feel the presence of the trees. Erm, It's probably just me, but I can feel....this may just sound completely rubbish to you, I feel the vibration of the trees, large trees. I see the aura around trees. I can walk through trees...sometimes I walk through the pine trees there, and that has a particular vibration. You go further on and you're walking through beech trees, it's also...I could be walking through a cathedral....Some people say that's rubbish...doesn't exist, but to me, err I study esoteric philosophy and I cover all the kingdoms of nature and to me plants are a living species, evolving the same as we are, the same as you've got the mineral, vegetable, the animal, human, angelic kingdoms. I just resonate with..an area like that and I can be totally at peace just walking through trees. It doesn't happen if I walk through this area (more open).



Wisley Wild Gdn

Figure 2: One interviewee, (F23) preferred Monk's Wood, Stevenage to Wisley wild garden, recalling the experiences there with her two grandsons



Stevenage Monk's Wood with bluebells

4.1.1. ii) Herbaceous Planting

In the case of herbaceous interviewees, two, (F15 and F16) recalled their own gardens when accounting for why they considered areas of herbaceous planting attractive;

F15: This is nice too with the yellow (Prairie). I like yellows and greens. I think I'm going to say that...(making decisions). That's almost a wild garden (Prairie)..like mine at home. Everything's grown so much more this year!... that (Prairie) almost takes me home..the mixture of untidy...

The meadow at Wisley reminded two interviewees, (F15 and F9) of attractive wildflower meadow planting near to where they lived;

HH: Okay, thank you. And then this one, (meadow)?

F15: Back to the field of..we have a field like that in a village not far from where I live. I don't know if it's there this year, but the people that own it planted it up, and it looked wonderful. I'd never seen so many wildflowers

Another (Swedish) interviewee, (F6), appreciated the meadow at Wisley because it reminded her of 'home';

F6: This (meadow) to me is home really..Swedish meadows, you know?

One interviewee, (M15), found his local, familiar area of planting, Stevenage Fairlands grasshopper meadow the most relaxing, explaining how he found it comfortable. He knew what to expect when walking there;

HH: Which three would you find the most relaxing to walk through, in order again, with 1 being the most relaxing?

M15: I'm very biased on that one (Fairlands Valley grasshopper), because I walk through that virtually every day, so I would find that the most relaxing, because I know where I'm going, I'm comfortable, I know what I'm going to find etcetera. Erm....

HH: Do you think that's part of it, being relaxed, knowing what you..?

M15: Oh yes. Knowing what's there and knowing what I'm going to find, so that is going to get a number one each time...

4.1.2. Evocative planting; Childhood experience and memories

4.1.2.i) Woodland Planting

In total, five interviewees drew on positive childhood memories of woodland when explaining why they were attracted to particular woodland images. One resident of Stevenage, (F4), actually recalled her childhood memories of playing in the area of woodland she later walked through to do the questionnaire with me almost 50 years later. Another interviewee, (F21), associated Monk's Wood, Stevenage, with childhood walks through bluebell woods with her mother.

HH: I asked you to walk through an area of woodland in Fairlands Valley Park. Can you recall that experience? What was it like? What was the woodland like?

F4: Lovely! I love it!

HH: You've lived in Stevenage quite a while have you.?

F4: Yeah. I can remember when I was a kid erm I mean in those days children were allowed to roam off..Knebworth and everything. We used to come over here, sort of six, seven, eight years old...it would have been early sixties..erm..and the wood was literally completely overgrown. It was like this (Monks wood most natural) the whole way through, erm, cos down that far end by the car park, I don't like it quite so much, because it is all open. The rest of the wood is....I remember all that lot. I remember them planting the Millenium Wood.



Figure 3: Fairlands Valley complex woodland Stevenage, where one interviewee early attract remembered playing as a child almost 50 years ago

F21: I like that (Stevenage monk's wood, bluebells), partly because that's a bluebell wood ..for me, bluebell woods is my mum, and when I was a kid, and the smell of bluebells is my mum...and so you will never get me picking anything else that I would like to do more than walk through a bluebell wood, because of lots of different things, but I also like walking through woods and it's that sense of being small in somewhere big...erm and this looks like a beech wood.

Another interviewee, (M12), referred to playing in woods as a child, and the sense of 'losing oneself in a wood';

HH: Do you think you can explain what is about woodlands that you like above herbaceous planting or maybe shrubs?

M12: I don't know..I don't know if it's a childhood thing..I was fortunate that we had woodlands round the corner where you could sort of play with your friends and that was only secondary woodland ..but yeah no, I suppose the variety of trees and the structures that trees give you. Maybe the fact that you can feel like you can lose yourself in a woodland its ..certainly on this picture here.. you can go off the beaten track on just informal routes and things like that. Yes you can lose yourself a lot more in woodland than in an open space..

4.1.2.ii) Herbaceous Planting

When accounting for why they thought the meadow at Wisley was an attractive area of planting, three interviewees, (F16, F17 and F21), recalled childhood experiences and memories associated with meadows. F16 recalled walks with her gran, whereas F21 remembered the height of the tall meadow grasses in relation to herself as a small child.

F16: that one (Meadow) because erm, it sort of reminds me of my childhood. There were lots of fields where I lived as a child. I lived with my gran from the age of 2. There were lots of open fields, and when she moved out this way she used to take me for very long walks...probably in an effort to wear me out! To Wharton..and we'd always go across the fields, and that sort of reminds me of that.

HH: So it's a kind of association..memories..

F16: It's an emotional response, personal memories..an emotional response..

F21: ..and for children, that (meadow) would be more fun for children..yes, this one..although the excitement of having that above your head..I remember walking into a

garden and the grass was above my head, I was three, and that was exciting and amazing! And you get the feeling that would be quite tall.

One Stevenage resident, (M15), felt particular attachment to the grasshopper meadow in Stevenage because he had known this area as a child;

HH: Yes, and I asked you to walk through a particular area of Fairlands Valley Park. Can you recall the experience at all?

M15: Well, I walk through there (Fairlands Valley Grasshopper trail) nearly every day. I've lived in this area for 59 years now, so I have memories of that going from when Tommy Young was a farmer in the field there, I knew the farmer.

4.1.3. Evocative planting; More recent past experience as an adult

Many interviewees were also reminded of positive adult experiences in other woodland or herbaceous settings.

4.1.3.i) Woodland Planting

When shown three images of varying planting structure, one interviewee recalled time spent living in Brussels and his experience of the Foret de Soignes when accounting for his preferred walk;

HH: Now of those three, which would you most prefer to walk through?

M2: Erm..I lived for three years in Brussels and to the east of Brussels is the Foret de Soignes and it's the most marvellous park like forest that I've ever come across near to a big city and it's very accessible and it's got some magnificent beech trees. It has a wonderful mixture of natural growth but clearly carefully planned and managed, and it was always a great pleasure to walk through. So I would chose that first..(Monks wood semi complex – beech trees) because it reminds me of that..

Another interviewee recalled walking through Hatfield Forest in accounting for her preference for Stevenage Monk's wood over Wisley Wild Garden, (Figure 2).

HH: Yes. And what is it about that one?

F17: It's just lovely walking through a forest, isn't it? And the sort of undergrowth and I envisage Hatfield Forest which isn't far away from where we are..and you know, sometimes you see deer and you walk through the trees. Again, for me it's a nice memory, and it's just lovely walking through the woods. It just would draw me. And I could do it time and time again.

4.1.3.ii) Herbaceous Planting

The annual meadow at Wisley prompted 5 herbaceous interviewees, all female, to think back to other positive meadow experiences in Ireland, (F14), France, (F20), Texas, (F21), near Val d'Iserre, (F18) and more locally at Hyde Hall in Essex, (F17);

F17: I think it's just being a wildflower meadow really...isn't it? They had one like this down at Hyde Hall one year, in fact I think they've done it twice, erm, and it's absolutely stunning. Looked just very much like that, perhaps a bit more blue, but we actually took photographs, and that was one of the best gardens I've ever seen. This brings memories of Hyde Hall to

me and we sat on a bench at the top and the wildflowers went down the valley like that and there was water in the distance and just trees and things. And just sitting there was very relaxing. Yes, that is a memory.

Another interviewee, (F19), responded positively to the semi – natural planting of Stevenage grasshopper chalk meadow;

HH: You focused in on this one (Stevenage grasshopper trail)...why do you think that would be relaxing?

F19: You're out in the countryside...where things have just sort of come up by themselves and not been tended or anything..

HH: And for you that means relaxation?

F19: Yes, nice walking..I like walking, so it's nice to be walking. I've just come back from Devon, and we've been walking around there. The hedgerows and everything are just full of wild flowers... It's so abundant it's amazing..so yes, it reminds me of that a bit.

In contrast, the image of Sheffield Bole Hills rose bay willow herb evoked negative, uncomfortable memories for the husband of one interviewee, (M14). Having worked as a volunteer clearing wild vegetation from around railways, he felt agitated by the thought of the wild seed spreading;

M14 (husband of F22): It's interesting that one...it stresses me in a way..(Bole Hills rose bay willow herb).. I can't get around the seed heads blowing and how it takes over. I do a volunteer job where we cut lineside railwayside, and if we see that, it's a mixture between..the colour's nice, but as soon as it gets that seed, it blows everywhere..it'll spread like bilio yes!



Figure 4: Sheffield Bole Hills rose bay willow herb was a source of agitation for the husband of one interviewee

4.1.4. Evocative planting: Nostalgic idealism

In one case, the meadow at Wisley evoked a type of nostalgic idealism, a harking back to an imagined past landscape, rather than something actually experienced;

HH: Okay, thank you. Now can you put those decisions into words? Why do you think that one is the most attractive, and then this one, and then this one?

M11: Okay..its not just visual. I think that one (annual meadow) sort of harkens back to what we used to have and we haven't got much of anymore....so I'm looking at what farmers' fields would have looked like at one time when they were cutting at different times and

agriculture wasn't so intensive. Erm and as I say, to be able to see that in the context of a city centre as well..is just fantastic.

4.2. Theme 2: The relationship between perceived attractiveness and relaxation

As described earlier, all interviewees were asked to state which three areas of planting from the initial selection of eight or nine images would be the most attractive to walk through, then which three areas would be the most relaxing to walk through. Later in the interview interviewees were asked the same question with respect to areas of planting shown at different times of year and therefore displaying a varying amount of flower and colour. These questions elicited some consistent responses.

4.2.1: The relationship between perceived attractiveness and relaxation: the 'common' view

The majority of interviewees chose areas of planting with more vibrant visible displays of flower and colour as being the most attractive. These were often less like semi natural in character, although often semi natural in structure, (such as the Wisley annual wildflower meadow). According to interviewees, 'attractive' planting was often more vibrant and colourful, had more detail, and demanded attention. When choosing areas of planting they thought would be more relaxing to walk through, most interviewees chose planting with more subtle colours, often dominantly green. The planting was usually most like semi natural in structure and often in character, (such as Stevenage grasshopper chalk meadow, or Stevenage Fairlands Valley complex woodland). Interviewees saw this as less detailed, providing the 'background' for other thoughts or conversations. It demanded no response or reaction. These responses are articulated clearly by the interviewees below;

HH: Do you think there's something definitely different for you in terms of what you would find attractive and what you would find relaxing?

F14: Yes, I think there is..sort of more vibrant colours you would find attractive, whereas the more subtle colours could be more relaxing, and the wildness really..

F16: Well the attractive is buzz, buzz, buzz, ooh what's round there?...the relaxing is like a stroll isn't it? It's going out on a walk..

HH: And do you think ..you've touched on some explanations I think, but for you what is the difference between an area that would be attractive to you, and an area that is relaxing to you?

M3: Yep, ermm I suppose that 'attractive' there's got to be something of interest..Relaxed doesn't so much require input from the scenery, interesting (attractive) does. I mean I have at times gone for walks over open heathland and that I think I usually find very relaxing...if not necessarily hugely interesting.

Two interviewees, (F11 and F21) explained why some of the more formal, designed areas of herbaceous planting at Beth Chatto's Garden and at RHS Wisley (the Wet garden, Traditional herbaceous borders) might be attractive, but not relaxing, because they 'have got so much going on'. In contrast, more naturalistic areas such as the annual meadow at Wisley and Stevenage grasshopper chalk meadow offer more potential for relaxation;

F11: Because this one (Beth C Wet Garden), it's got so much going on, so many areas to explore, and so much perfection in it, the way it's kept, that I probably wouldn't find that so relaxing, because I'd think, 'Oh I must look at this bit..and how do their lawns look so beautiful..?' Whereas these ones (Meadow, Oudolf, Borders), you can just walk along them and they'd be almost background, so I could talk with whoever I was with, or think my own thoughts, and they'd be a really pleasing background, without it going into my head and taking over thoughts..whereas this one (Wet Garden, Beth C) I'd want to explore and think.. 'oh what's that plant?'

The impact of flowering and colour on perceptions of attractiveness and relaxation is exemplified time and again with reference to the Punchbowl at the Valley Gardens. All interviewees saw the Punchbowl in full flower, in May, and then with no flower in August. Nine interviewees, (3xM, 6xF), 35% of the 26 interviewees who expressed a clear view, responded in the same way, thinking the area would be more attractive to walk through in May, in full flower, but more relaxing to walk through in August;



Figure 5: The Punchbowl in May (top, in full flower), was considered more attractive by many interviewees, yet the same walk in August (bottom, greens) was thought to offer more relaxation potential

HH: Which of these would you find the most attractive to walk through?

F16: The brightly coloured one..cos I'd just go, 'Wow!', (laughing..)..I'm very drawn to bright colours.

HH: So now we go to the second question, which for you would be the most relaxing to walk through?

F16: Well I think it's got to be the green one, because the..erm..the reddy pink one is sort of like really stimulating, so that's the opposite to relaxing isn't it, you know? I'd be quite hyped up looking at that..I'd be going, 'ooh, ooh! Look at that!..oh look there's something else there!' I'd be on a mission..whereas with this I'd stroll through the green...

HH: Which would you find the most attractive to walk through, at which time of year, do you think?

M8: Ahhh well, I think that's a no brainer. That one ..with the colour.

HH: And which of those two do you think would be the most relaxing to walk through?

M8: That one, (greens). It's a question of interest or relaxation again. If I just want to walk somewhere and forget something dreadful, or think of something good, or just think of nothing, that's the place you go, (greens). Because this, this is going to excite the brain, (in flower). That sounds a ridiculous thing...!

HH: No, I totally understand.

M8: That sets you thinking, whereas this is like mowing the grass this, (greens)

HH: Yes, there is a difference with some things. With the woodland areas you found some of the same areas to be attractive, and relaxing, didn't you, but when there's so much colour...

F3: I think then, it can be, it can be too stimulating, so then it's not that relaxing, really. I don't think it's a very relaxing place to walk through, because, to be honest, when they're really all there it's an assault on the senses..it's so bright. I don't think...I think you go there for the 'Wow factor', but you don't go there to relax. Here, I think here if you wanted to have a relax and just wanted to sit, maybe listen to the birds or just generally stare into space, this is probably more relaxing, (greens – August). This is almost unreal, as though someone's painted it but used the wrong colours..

4.2.2. The relationship between perceived attractiveness and relaxation; active relaxation, the 'minority' view

Four of the 34 interviewees, (1xM, 3xF) seemed to see the same areas of vibrant, detailed planting as attractive and relaxing, arguing they needed to be stimulated by or interested in something to be relaxed;

M1: When you talk about relaxing, my relaxing is walking around but looking for vegetation. I mean, I'm forever looking when I go out early in the year. I'm looking for the first violets I can see, the first snowdrops, you know, so that to me is relaxing. My relaxation comes from looking rather than just relaxing in the normal sense of the word.

HH: And would it be the same if I asked you which would be the most relaxing for you, would it also be the spring?

M1: It would. I mean there's a difference in people's terms of relaxation. I relax by not relaxing.

The view that bright, colourful planting could be both attractive and relaxing is illustrated by the responses below. Four female interviewees, (F1, F5, F9 and F17), expressed real enthusiasm for the vibrant colours of the Punchbowl, linking their appreciation to a general preference for bright colours.

This interviewee, (F5), who did her original walk and questionnaire at the Punchbowl thought the Punchbowl in flower would be both the most attractive and relaxing for her to walk through;

HH: What I'd like you to think about is which of these is the most attractive, which would you find the most attractive to walk through, and then which do you think would be the most relaxing to walk through?

F5: Okay, well, I prefer the coloured one, which is why I've never been in the summer. I don't think I've ever been here in the summer, I've never seen it looking like this, (in August). It's nice though because there's such a variety of greens, and there are no people. Erm, to be honest I know green's typically a more relaxing colour than that lot (all the pinks)..but I probably would find...relaxing...I'd find them both a relaxing place..but you get more stimulation from the colours I guess..when it's in full bloom..I would be looking for the colour, so for me I would find it more relaxing to be there with the colours even though typically green relaxes you more

4.2.3. The relationship between perceived attractiveness and relaxation an alternative view

In contrast to the interviewees above, (4.2.1), eleven interviewees, (4xM, Fx7) reacted negatively to vibrant colourful planting rejecting the vivid pinks of the Punchbowl and Spring Wood in full flower. Several referred to these as, 'an assault'. These interviewees often chose planting more like semi natural in both species character and structure as the most attractive. The greens of the Punchbowl in August were preferred, in terms of both attractiveness and potential for relaxation

HH: Which of these two, if I invited you to walk through would you find the most attractive do you think? Which of the two?

M6: It's probably going to be the one that's taken later in the year, because it's..I love flowers, but I like green, and there are so many types of green in there..and I think, I just think it's much more calming.

HH: So which one do you find the most attractive?

F11: This one – pointing (no flower).

HH: Can you explain that?

F11: That's over the top to me (in flower). I find those colours clashing, too big and garish, and sort of overwhelming, whereas this on (no flower), is calm, and peaceful and there's still quite a lot to look at because there are different greens, and different shapes and so on..

HH: So in terms of attractiveness, and being relaxing, it's this one?

F11: Yes, definitely.

4.3. Theme 3: Attractiveness and perceived biodiversity value

When justifying why they perceived certain areas of planting as attractive, thirteen interviewees, 5xM, 8xF, referred to the biodiversity wildlife value of the planting. Although the word, 'biodiversity', was not used directly, interviewees referred to habitat value and species variety. This occurred in the case of both woodland and herbaceous planting, but maybe significantly, never in the case of shrub planting.

4.3.1. Attractiveness and perceived biodiversity value: Woodland planting

Four of the nine woodland interviewees referred to the perceived biodiversity or wildlife value of a specific woodland area when explaining its attractiveness and appeal. The first

interviewee referred to what he perceived as habitat value of both the Wisley Eucalypts and Beth Chatto woodlands;

HH: Yes, it is, it is, and you've explained this one (Eucalypts)

M1: The reason I like this one partly is also, you can imagine this having a lot of broken down trees, habitats etcetera, you know what I mean, and so it's err reinventing itself all the time as well, you know, it's open as well.

HH: And then you like this one (Beth C woodland) because you like..

M1: (Interrupting) Yeah, I think it's got a lot of lower fauna (means flora) but it's got tall trees as well, so you're not enclosed like say this one is, for instance. There's an openness about it, but it's got trees where there's plenty of chance for the fauna and that to make its own life as well..

Another interviewee focused on the plant species diversity of the same woodland;

F2: I think actually I chose that one first (Beth C)....there's a great variety of flora here. I like what I see there because there's all these different plants here ..(excited voice)..



Figure 6: Beth Chatto's woodland was perceived as attractive because of plant species diversity and habitat potential

Several interviewees also saw the wildlife benefits of Stevenage Monk's wood and Wisley Wild Garden, (Figure 5), for example;

F3:...and this one is nice (Stevenage monk's wood) because I think this is more of a woodland, so I would like to walk through that, because it's a deciduous woodland, and it looks as if you are going to be able to see a little bit through. You might see a deer or a rabbit...

M15: I would have a pleasure in walking in a woodland. Again, because of the variety ...different animals, insects, er birds of course that are there. I'm no expert on them, but I love to see the variety. You know, I like watching weasels..erm, when you see one pop up, watch it...those sort of places...you'll see them...

One, (F21), commented on the potential to see different trees and birds, as well as the psychological benefits of woodland;

F21: It's hard being grumpy near a tree..or to maintain a state of agitation and that..so.. so..this I've got the promise of trees and possibly birds.

4.3.2. Attractiveness and perceived biodiversity value: Herbaceous planting

Many interviewees chose the herbaceous planting they perceived to be the most biodiverse, or beneficial to wildlife as the most attractive, or amongst the three most attractive areas of planting in Figure 1. As well as referring to invertebrate biodiversity, interviewees widened

their response to refer to the possibility of seeing mammals, reptiles and birds within the areas. The planting was seen as attractive because it was valuable for wildlife. The five areas of herbaceous planting interviewees identified as attractive because of their wildlife value were Stevenage grasshopper chalk meadow, Wisley annual meadow, Sheffield Bole Hills, the Prairie at Wisley and the Mediterranean Bank. Most comments were focused on the first two of these areas.

Six interviewees saw Stevenage grasshopper trail chalk meadow, one of the two areas most like semi natural in structure and character as particularly attractive because of its wildlife value. They identified the habitat potential of this 'wild' area for birds and invertebrates.

M11: And this (Stevenage semi natural chalk meadow) just looks like some Set Aside in a farmer's field which I love, I really love that, cos I'm an ultra - keen birdwatcher so I tend to focus on areas like this erm..when they are there and when they aren't totally taken up with crops or being grazed by cattle, so I do like that..sort of wild nature..

F15: Oh, right. Lovely isn't it, it's very wild looking..

HH: Yes, it's a chalk area. A small area surrounded by woodland, but it's been opened out.

F15: Mmm it wouldn't attract me...well it would because I like the things inside..insects and things inside, spiders and things..

HH: So which is to you the most attractive?

F21: You see I know, I know that I would probably find bees and butterflies around here (Fairlands Valley grasshopper trail) and so part of me would enjoy that area, because, hey, there's nothing like the surprise of spotting a butterfly you've never seen before, um, possibly not here, you wouldn't get very different ones, but you never know..this one again would be great to..actually that's really pretty isn't it? The more you look at it, the more you see.....erm...



Figure 7:
Stevenage
grasshopper chalk
meadow;
particularly
attractive to
interviewees
because of its
perceived value to
wildlife

One interviewee, M13, appreciated this area of meadow because it offered real benefits to wildlife and not just people. Whilst working as a volunteer at a RSPB reserve he had noticed

that so much was done for people rather than wildlife. He also remarked on the invertebrate value of the spontaneous chalk meadow over Wisley annual meadow, which he perceived as, 'false', because it lacked grasses and other plants such as nettles, valuable to certain invertebrate life – cycle stages;

M13: This (Stevenage grasshopper) would just be a walk in the country and probably in its own way, the best experience, truly, because it offers so much more..(to wildlife)

HH: And this is for the reasons you've said before?

M13: Yes..so many of these things are designed for people..I go on an RSPB reserve doing things as a volunteer, and you'd think that everything they did was geared to looking after the birdlife, but it doesn't seem to be like that at all. They seem to be more reacting to what people want....I'm more attracted to something that is aimed more at wildlife than people, and that's why I wouldn't put that one first (meadow), because that is aimed at pleasing people and wildlife is secondary to that....

HH: What was your impression of it? Did you enjoy looking at it? (Wisley annual meadow)

M13: Yes, yes, but as I said at the time, my impression was of something that was to me a little bit false..I understand it but as we've already said, I'm more geared towards creating something that's a bit more 'natural'... which goes back to my thoughts on grasses and the focus with the meadow was on, really on bees, which is wonderful..I happen to like both bees and butterflies..and butterflies, some butterflies benefit greatly from meadows and grasses because their larvae feed on that sort of thing..even dock, which is not a grass, but...it's frowned upon, but I've learnt to love it because it's a food plant for small coppers so its...it..I tried not to voice my concerns about it. I've seen the Sarah Raven sort of thing and reacted in the same way, although I understood it was a progression to something better when it comes to park gardens. Much better to have something that offers some goodness to the wildlife; the bees, the lower insects that are around.

The same interviewee, (M13), and his wife, (F20), also appreciated Sheffield Bole Hills, the other area most like semi – natural in structure and character, for its invertebrate value;

F20 (wife of M13): If you're walking along and you see an absolute swathe of willow herb, it is quite stunning isn't it?

M13: You know, that in itself is not particularly attractive, because it's one colour, I just know that willow herb is a useful thing when it comes to hawkmoths...I'd be going through there looking..



Figure 8:
Sheffield Bole
Hills: One
interviewee
referred to its
value to the
hawk moth

Four further interviewees, (M12, F2, M3, F4) all appreciated Wisley annual wildflower meadow for its perceived wildlife value;

HH: So what made you decide? What do you like about the meadow?

M12: I like it (meadow) because it looks like it would be good for wildlife...I don't know if that's Sheffield..I know certain areas where we have demolished housing in the manor area that's what they've done, just thrown down wildflowers to attract wildlife..which I think's a very good idea..to bring insects in and things like that..rather than just leaving it grassed over or whatever.

F2: And just on my way to my local Sainsbury's that roundabout was covered in wildflowers, and it just looks glorious! And I just think..you see the bees and you think ..you get a 'feel good' sort of emotion about it...and I mean these wild flowers..I mean lots of councils now are doing this on roundabouts and things like that aren't they? And they look lovely and of course, excellent for bees, and insects, and flies and wasps etc.

One interviewee, (F21), a keen wildlife photographer considered two additional areas of herbaceous planting attractive for their potential wildlife value. The Prairie looked to be the sort of place she would find birds, as well as a range of insects, and the Mediterranean Bank evoked a habitat for lizards;

F21:...but that (Prairie) would be an interesting place to walk and you'd kind of know there'd be birds around here as well..cos they'd go for the seed heads, and there would be butterflies and bugs and I might if I'm really lucky get damsels or dragons..

F21: I like brick walls (Med Garden), I like the fact that, cos you can get lizards in there, I have wall lizards at home, I have European wall lizards. There's a small colony on Shoreham beach, erm, that apparently arrived a while ago, and I'm really lucky I get wall lizards, so I know that lizards erm, would probably quite like that wall, but this one (Med Bank), because it does have the promise of lizards and..you never know..(Whispered)...and they are so cool lizards...

4.4. Theme 4: The significance of context

The significance of context recurred throughout discussions of the relative attractiveness and potential for relaxation of the different woodland, shrub and herbaceous areas. Some interviewees had a highly developed sense of the appropriateness of certain types of planting in specific contexts at different scales; globally, nationally, then more locally, focussing on town centres, residential areas versus areas on the edge of urban areas. In the case of

herbaceous planting the relative tidiness of the planting was a factor dictating the most appropriate context.

4.4.1 *The significance of context; Woodland planting and species character*

As discussed earlier, three of the eight woodland interviewees, all male, (M2, M3, M5) rejected woodland areas such as the Torquay *Cordyline australis* planting and ‘subtropical’ Jungle ride at Abbotsbury because their appearance and form were so dissimilar to what they perceived as semi – natural, or indeed, ‘natural’ in a particular part of the UK. These interviewees appreciated woodlands that were semi – natural in appearance and form. In many cases they stated either implicitly or explicitly that to see more exotic woodland character in the UK was or would be out of context;

HH: Okay, so they were fairly quick decisions. Could you explain what made you make those decisions?

M2: Yes, I’ve travelled around the world and lived also in a number of different countries, and one of the things that I’ve always enjoyed about coming home to England is the English countryside..and one of the things I’ve noticed is how much planting now includes non – native species and I’ve built up as I’ve got older a don’t know..dislike is perhaps too strong a word, but I don’t like palms and pampas grass and those things that I regard as so artificial as to be unattractive in our native environment.

M3: The feeling I get about ..that one (palm), okay, if I’d gone to Hawaii, fine...



Figure 9: Three interviewees rejected less familiar forms such as the Torquay cordylines (top) and Abbotsbury Jungle Ride (second) as artificial and unnatural

They preferred Wisley Wild Garden (third here) and Stevenage Fairlands Valley complex woodland (bottom), seeing these as more ‘natural’



HH: I see, so you think a lot of this is context – based, where you like to see these things depends where you are and a particular situation?

M3: Yeah.

M3: Yes. I don't say it would be my preference, necessarily, but I don't particularly object to tidy of this type (Torquay cordylines) I mean if I was in Bournemouth and there was a garden just off the sea front like that, that's fine, quite pleasant to stroll through. Somewhere like this, is probably nicer if you are going for a long walk in the countryside because that looks more natural (Monks wood) And on the whole I prefer natural, but not when it's created natural.

4.4.2. The significance of context; Shrub planting and heathers in context

Although some interviewees responded positively to the colours of Wisley heathers, (see Overall attractiveness of shrub planting: Flowering and colour), many interviewees reacted negatively to the appearance of heather planting, particularly that at Wisley, which was perceived as flat and uninteresting. Interestingly, all negative reactions to heathers came from female interviewees. When explaining their negative reaction to heather planting at Wisley and Hilliers, two female interviewees, (F17, F19), referred particularly to their preference for seeing heathers in their 'natural' context rather than in a designed urban setting.



Figure 10: Wisley heather planting provoked some very negative reactions

F17: Well, you see heather should be on moorland.....so it's in the wrong setting! I think that's what that is, because heather's beautiful on moorland, so that's probably my least favourite, (Wisley heathers)

HH: Yes, that's here in the heathers...

F19: I don't particularly like heathers...

HH: Why do you think you don't like heathers?

F19: I don't know..just do nothing for me! I spose if you were in like a Scottish..when they are completely covered... I suppose it could be nice..but..

4.4.3. The significance of context; Herbaceous planting – tidiness, context and scale

In the case of herbaceous planting, the perceived tidiness of the planting was a key factor guiding people's sense of the appropriate context for a specific type of planting. Most interviewees subconsciously responded to traditional cultural norms, which suggest that planting in urban areas or town and city centres should be more tidy than that on the edge of a town in a more rural setting. The images which prompted these discussions were; the Wisley Olympic wildflower meadow, Wisley Prairie, Oudolf borders at Wisley and Stevenage grasshopper meadow. Within these discussions, some interviewees addressed the issue of the scale at which they thought a particular area of planting would be appropriate.

Meadow – style plantings featured most prominently in the discussions of herbaceous planting in context, firstly, in discussion of the **annual meadow at Wisley**. When discussing appropriate contexts for annual wildflower meadows, two interviewees, (M11 and M4) both suggested a type of 'guerilla gardening' approach to meadows, with the idea of seeds simply been thrown out onto patches of 'wasteground' or urban built – up space where planting isn't expected;

HH: Can you explain the sorts of places in relation to a town or city that you could see these (meadow) as being effective?

M11: Yeah, I mean this one would work anywhere (annual meadow), erm, but it is contextual as you quite rightly say, its..if you find a patch of that somewhere where you weren't expecting any planting at all or some very manicured grass or something... to see that in a sort of guerrilla gardening context... I think that would have far more impact than anywhere else...I mean it would be nice in the Botanical Gardens, but it wouldn't have as much value as being in a built up area.

M4: But certainly, I like the idea of there being bits of wasteland, railway embankments and things where people chuck seeds out and things come up. That's rather lovely – reclaiming bits of wasteground and so forth...

Three further interviewees, (M10, F22 and M14), suggested any public areas, but particularly those along road verges and on roundabouts would be an appropriate location for meadows;

M10: I think wherever it was possible to create an area like this I think it would be appropriate, certainly in any public areas, and if you could envisage it, you know along the side of a road or anything of that kind. I think that would be excellent. Erm..I mean we are, we live in a little town, a large village, whatever it is, and they've reduced the mowing of the grass borders. It seems to me there's really quite a good case for reducing the mowing a lot, if it would allow the plants to grow, and praps some flowering to happen.

This view was supported by a further interviewee, (F22), who gave a personal example of where she had seen meadows sown to create an attractive effect along road verges leading into Brighton. Her husband, (M14) suggested roundabouts were another possible location;

HH: And if we think about context now, because we haven't really talked about context before, and where you would see these things being appropriate, where do you think this sort of planting would be appropriate?

F22: I'll tell you where it has been appropriate, on the way into Brighton last year, all the verges in the middle they did with this very similar sort of thing, I don't know if you know it,

but it was absolutely beautiful as you drove into the city. Unfortunately I'm driving along at 40 miles an hour and I can't look too hard...erm, but that does look nice like that..

M14 (husband of F22): Roundabouts..

When discussing the attractiveness and context of meadows, four interviewees, (F12, F14, F11, F23) made reference to scale. Three of these, (F12, F14, F11), suggested that an area of meadow would be more dramatic and impactful at a large scale;

F12: Yes, because there's a path there..also thinking about the scale too...I think that (annual wildflower meadow) would look nice on a large scale but I think in a small scale it might not look as good..and if it was a large scale you maybe wouldn't mind walking through it because you would think you aren't going to cause much damage..if it was small and everyone was trampling through it you'd think it would cause damage..it looks quite easily trampling.

HH: And do you think that these would work in different sorts of area in relation to a town? (meadow)

F14: No, I don't think they're at home. No, I mean they are nice if you've got a large area, but I'd have thought in a town you can't really plant them there..

One interviewee, (F23) thought that meadows were appropriate anywhere and at any scale, even , 'in a flower pot';

HH: And do you think meadows are appropriate in gardens? I just wondered whether you thought the scale was a thing, because I think that some people think meadows need to be very large areas.

F23: I think they're appropriate anywhere. They could be in a flower pot.

Stevenage grasshopper chalk meadow, (Figure 7), was also discussed. This was one of the two areas of planting (other was Bole Hills) which was most natural in both structure and character. Four interviewees, (F14, F15, M11 and M13), all saw it as being more appropriate in an out – of – town context, 'by the river', or in the countryside.

HH: Do you think that has its place?

F14: It has for me, but I don't know if it would be in a town...

HH: So maybe on the edge?

F14: Yes..yes, by the river or something like that..

F15: I suppose maybe it's when farmers have a wild corner...

M11: And that (Stevenage semi natural chalk meadow) as I say is just a sort of natural, more natural statement of an area that I would seek out when I'm enjoying the countryside.

In the case of the **Prairie at Wisley**, one interviewee, (M10) suggested that this style of herbaceous planting might be appropriate within an urban environment, although another

interviewee held a different view. She personally appreciated the Prairie, but thought some members of the public might not accept it on the grounds that it was untidy;

M10: Erm....pause...one of these two...(Prairie/Oudolf)..and again I find it kind of difficult to detach from context and..if I was coming across that in an urban environment that would be my number one (Prairie).

F22: I think if they saw something like this (Prairie) in an urban planting they would just think, 'why doesn't the council do something about that?' Do you think? Cos it looks a bit...I don't mind it but I think some people would say, 'that's not brilliant'. Yes, it sort of depends where it was..you know, if it was in an appropriate place, but if it is say an area in an urban park or something, I'm not sure that everyone would appreciate it..I think in a town centre or something, I'm not quite sure. There may 30%, 40% people who thought, 'oh yes it's lovely', but the rest might be thinking, 'it's a bit of a mess', you know...because there might be people with incredibly tidy gardens, and things and they would not be in tune with that style..but we have a garden near us in Henfield, the Prairie Gardens and it is beautiful, absolutely lovely..absolutely beautiful.

Two interviewees, (F14 and M11) commented that a significant amount of space would be needed to plant a prairie effectively. One, (F14), suggested this would be difficult within an urban area.

HH: And these other things, whereabouts do you think you would seem to fit or work? Would it be inside a formal garden or in a wild..

F14: Yes, on the edges of a formal garden or an estate or something like that (Prairie)...but er it would be very difficult in a town I think when you've only got a small area haven't you?



Figure 11: The appropriateness of Wisley Prairie for an urban context was discussed

4.5. Emerging Themes; a summary

'Evocative planting' revealed many interviewees' strong sense of place attachment for particular areas of woodland or meadow planting. In sharing their experiences and feelings about these special places, interviewees drew on rich memories, sometimes of their own childhood or of times spent with grandchildren. Conversations about the relative attractiveness of certain areas of planting and their potential for relaxation supported interview evidence suggesting that in general vibrant flowering planting was perceived as the more attractive, whereas more muted greens were considered more relaxing. Interviews also revealed both a real appreciation of the wider wildlife and invertebrate value of the areas of planting discussed, as well as a well – developed sense of context or the appropriateness of certain types of planting in particular areas. These four themes will be readdressed in the discussion.

Section 5: Thoughts, Beliefs and Values

The final part of the interview with all 34 interviewees focused on the interviewee's thoughts, beliefs and values in relation to climate change, the inclusion of non – native species in UK parks and gardens, as well as broader environmental concerns.

5.1. Climate Change

The 'thoughts, beliefs and values' part of the interview opened with interviewees being asked if they thought climate change was happening, and if so, should 'we', collectively, as a human race, be concerned about it. All interviewees were of the opinion that it was happening. Many, 16/34, (47%), focused on the cause, with half of these, (8 interviewees, 4xM, 4xF) acknowledging the role of human activity in creating or enhancing climate change. Six interviewees, (3xM, 3xF) emphasised 'natural' climatic aspects of change, with some of these seeing the earth as a self – regulating system. One interviewee, (M13), thought the underlying reasons for climate change were not significant, whereas another, (F1), thought it was in the hands of, 'the man up there'.

5.1.1. Climate change; the role of human influences

Eight interviewees, (4xF – M2, M3, M7, M9, 4xF – F5, F6, F9, F19), expressed a belief that global climate change was of human origin, or that human activity had a role in accelerating it;

M3: Yes, I have no doubt whatsoever that it's happening. I also have no doubt whatsoever that it's influenced by us, in fact, caused by us. I realise there could be other causes, but this time around I think it's largely us. Erm, should we be doing anything about it? I suppose I have to say, Yes we should, I'm afraid my personal view is that it's too late..we should be trying, but I don't think we're going to succeed in combatting the problems that it's going to bring, so yeah, to be more positive, yes, we should be doing something about it. I don't think we'll succeed.

5.1.2. Climate change; natural causes and the earth as self – regulating

Six interviewees, (3xM – M11, M6, M1, 3xF – F2, F23, F17), were of the view that climate change was a natural cyclical process, some of these thinking that the earth would continue to regulate itself to some sort of equilibrium;

F23: .I've had stages thinking yes it's definitely changing...it certainly is warmer now, but then erm I don't know, I mean climate is always changing isn't it? It's not just now, it's always changed...presumably always will, so, you know, I don't know if you can say this is anything unusual, when you consider we had an ice age in 900, you know ...erm, and things happening all over the world that change the weather, so climate change specifically, I don't know..It's always changing...

5.1.3. Climate change; the cause is of no importance

One interviewee, (M13), expressed the view that the case of climate change wasn't important. He thought that reducing greenhouse emissions was a good idea anyway;

M13: You can do..ermm you know to an extent when it comes to greenhouse gases I don't think it matters why we've got climate change, we seem to have that. Cutting out greenhouse gases seems to me to make sense anyway, irrespective...so as far as I'm concerned the argument is a bit irrelevant, erm it's about the one area where I think the EU

does some good probably, by policing the whole of the so called continent..sorry that's getting off what you're asking..

5.1.4 Climate change; God is in charge

Another interviewee, (F15), thought climate change was beyond human control;

HH: So, do you think we should be concerned about climate change or worried..or not really?

F15: No, I think whatever is to be will be. We save and do things that help, conservation and stuff like that, but I can't see that we can change anything..we are in the hands of the man up there..

When addressing the issue of climate change, interviewees responses varied from those which demonstrated little understanding of the underlying causes or likely consequences, (2 interviewees - 2xF – F1, F4), to carefully articulated responses which showed real understanding of the complexities, as well as the lack of scientific and political consensus, (6 interviewees - 4xM – M9, M8, M10, M13, 2xF – F7, F9). These extremes are demonstrated here, (F1 and M9)

F1: Yeah, yeah, 'cos it is changing. The weather seems to be a bit on the funny side at the moment, where...like couple of months ago, a few months ago when we..well we didn't but some places had, like floods and everything, and it rained non – stop and erm..looking at that where you had all those people had all their houses flooded and things like that...and it rained and it rained..and it rained...we thought, 'When does it ever stop?'. Here we were lucky, we were lucky, but some other places didn't, so I think, yeah, looking at that, yeah.

HH: So you think we should be really concerned about it?

F1: Yeah, yeah...'cos it is, like on the news a few months ago where..not Iceland, erm...Atlantic where they've got a flow and everything? It's starting to melt a bit.

M9: It is happening, we have great need to be concerned about it. A large percentage of the climate change is use to human intervention and my understanding, from what I've read is that the burning of fossil fuels has contributed greatly to the increase in carbon dioxide, and general overwarming of the earth. It can be reversed, but there is a very limited timescale for us to actually work on it. Now the reversal process, would involve a switching from, I think, burning carbon based fuels in cars, transport, moving to an alternative...the problem if we use nuclear power is that produces radiation, of a level which is not currently detectable by the scientific community. The future for us as a race will depend on how we address climate change, global warming, and we are going to see increasing shortages of fresh water, food and energy.

Interviewees generally focused on the potential and actual consequences of climate change such as warmer atmospheric temperatures, the melting of the polar icecaps, flooding of coastal areas and increasing freak weather. Two, (F16 and M13) referred to personal experiences of changing flowering phenology in their own gardens;

F16: It's definitely happening..erm...I think in the dry parts of Essex we do grow slightly different things to erm roses and perennials, we used to do when I was a child... we grow more Mediterranean stuff and it survives and it's happy and it's flourishing. In fact I've got a

rosemary bush that I'm just about to take out because its doing too well, erm..taken over the whole flower bed. So things have changed in that way.

One interviewee, (M13), also acknowledged the possibility of positive ecological outcomes;

M13: Some, some birds, I'm not sure if other animals ..are actually benefitting from climate change. They are increasing their range northwards. The Dartford Warbler is experiencing that, so it's not all a bad thing.

In justifying their limited concern about climate change, three interviewees, (1xM – M1, 2xF – F3, F22) stated that they thought it was occurring, but at a much slower rate than was being reported in the media;

M1: I think it's happening, but not as, err, rapidly as maybe one or two people try to tell us it is...

F3: I know there are climate change skeptics but I think it is changing, but I don't think it's changing as much as some of the doommakers amongst us. I don't think it's changing as much as that.

Other interviewees (F18, M1), saw their own position as powerless in the face of governments of developing countries or the mass view which was, according to one interviewee, (M1), apathetic;

M1: ...we should be concerned, but, if I said we ought to be tackling it, there's not that many people are helping to do it...know what I mean? It's so low on the agenda of a lot of people, and countries..you know? I mean it's alright saying us and having our climate change policies and things, but then when you've got places like China and Russia that are burning it as if it was no tomorrow sort of thing, it, you are never going to get word climate...

5.2. The role of non – native plant species in UK parks and gardens

The second idea discussed in relation to interviewees' thoughts, beliefs and values was the role of 'non – native' plant species in UK parks and gardens. 'Non – native' was deliberately not defined, but interviewees, were reminded that they had been asked their thoughts about this in the questionnaire, when they had been shown an area of Mediterranean planting and asked whether they would be prepared to see this type of planting in UK parks and gardens. Once again, in the interview, interviewees were shown the photograph of the Mediterranean Bank, as in Figure 1, and asked if they would be prepared to see this sort of planting in UK parks and gardens.

Responses and justifications fell into two main categories. Of the 34 interviewees commenting on the issue, 25/34, (74%), 10xM, 15xF said they would be prepared to accept this type of Mediterranean planting in UK parks and gardens, for a variety of reasons. In contrast, 4/34 interviewees, (12 %), 1xM, 3xF, objected strongly to their introduction of this type of planting in the UK. The five remaining interviewees who expressed a view, 5/34, (15 %), together with other interviewees who had expressed a positive view on the introduction of this type of planting, also expressed clear reservations about its' introduction. Concerns focused mainly on the perceived invasiveness of 'non – native' plants.



Figure 1: Interviewees were shown the image of the Mediterranean Bank at Abbotsbury and asked if they would be prepared to see this type of planting introduced in UK parks and gardens.

5.2.1 The role of non – native plant species in UK parks and gardens: Acceptance

Interviewees’ justifications for accepting non – native, Mediterranean – type planting in UK parks and gardens fell into two main categories; ‘aesthetic reasons’, and ‘ecological reasons’. A few also referred to historic factors and inevitability. Some interviewees also referred to the appropriateness of context and scale. Several interviewees made comments in multiple categories.

5.2.1. i) Acceptance of non – native plant species: Aesthetic reasons

Of the 25 interviewees demonstrating a positive attitude to the introduction of Mediterranean planting, 8, (4xM – M12, M1, M8, M6; 4xF – F1, F3, F11, F5) expressed the opinion that they found this type of planting attractive. Interestingly, two of these, (M1 and F1), were residents of Torquay, where this type of planting already features prominently in urban landscapes. In addition, interviewee F11 had moved to Poole several years ago, where this type of planting is more common than Nottingham, where she had lived previously. She thought that increasing exposure to more ‘unfamiliar’ or ‘exotic’ species had probably contributed to her now positive view regarding its use in public spaces;

HH: In the questionnaire there was some planting that looked quite a lot like that, (shows photo Med Bank), and you were asked if you would be prepared to see that, or happy to see that in UK parks and gardens. So would you be prepared to see that?

M12:.. Yeah, no that would be appropriate. Again, its good variety. I like the fact that there’s trees in the background there and yes a good variety of colours on display ; whites, purples, reds oranges and its kind of naturalish,I like it.

M1: Yes, yes.

HH: Do you have any worries about using non - native species in parks and gardens in Britain?

M1: No.. I mean those along there we looked at, (princess palms and bedding) that are regimented, they look nice...if they said they were going to do something like this (Med bank) in the beds, I’d be happy, you know, even though it’s non – regimented there’s colour in there, and it’s got diversity in the planting.

F1: I don’t think there’d be any problems. ‘cos there’s a lot of people, alright, like living in a town centre, or where, and they would like to see a bit of colourful, like them ones you just showed me, (Med bank)...

F11: And I think I've changed a bit over the last two years because I used to not like palm trees in the UK but now I quite do..you know, I might plant one myself..so I've definitely changed.

HH: That's interesting. Do you think that's because, you told me earlier that you live in Poole, and your friend was saying that in that area there are palm trees. Have you moved to that area?

F11: Yes, yes.. I grew up in the Midlands, and you don't see palm trees in the Midlands, and it probably would look odd in the Midlands, but when you are by the sea it seems to fit in..when I was little you only really saw them in Torquay, that area. Now you do see them all along the south coast, and I think it's becoming more normal to see them, in the south at least.

5.2.1ii) Acceptance of non – native plant species: Ecological reasons

When justifying why they thought it would be a good idea to introduce Mediterranean planting in UK parks and gardens, 15 of the 25 positive interviewees, (7xM – M3, M11, M12, M6, M8, M9, M13, 8xF – F2, F11, F14, F18, F17, F7, F19, F22) referred to ecological reasons, with the majority, (13/15) of these making reference to the need to respond to a changing climate, increasing aridity and the need to produce more sustainable urban planting that didn't require constant watering and maintenance. One interviewee, (M9) referred to the use of these plants which are adapted to a drier climate as, 'evolution in action'.

F11: I think I'm more concerned that our parks and gardens are more sustainable, so we grow plants that grow happily and look after themselves, rather than having lots of bedding or stuff that needs loads of resources. So if that's what was going to work, you know, fine.

HH: You were asked whether you would be prepared to see something like that in UK parks and gardens...

F14: Yes, definitely..we might have to mightn't we? We have to change our ideas... plant what would tolerate dryness.

M9: I think it's essential that we erm, adjust our planting so that we don't have to use fresh water to sustain green areas. Now, things like the lavender, yellow..They are drought tolerant. They'll come back year after year.

HH: So you would be happy to see these things?

M9: Yes, definitely. If you are looking at planting a new area, you've got to look at what will survive with minimal maintenance, because the richest budget you've got available in terms of financial needs and manpower to actually do the work and you can't afford to put water on the soil other than initial planting. So yes, I'd accept variation in planting because its evolution in action.

Two of the 15 interviewees, (M13 and F22) referred to the value of non – native plant species to native invertebrates;

F22: Insects like non – native plants as well, not just the natives. People always think, 'You've got to plant native plants', but you don't, because they are also attracted to non –

native plants, so no. There is an awful lot of misunderstanding. Yes, when I look at my own garden and I see the plants with butterflies and things on them, there not always natives! Well, I've got some, but no, a lot of them are non – native. I mean, wasn't buddleia introduced?

5.2.1.iii) Acceptance of non – native plant species: History and inevitability

Six interviewees expressing a positive view about the wider introduction of Mediterranean planting in the UK, (2xM – M9, M7, 4xF – F2, F15, F19, F18), referred to the fact that so called 'non – native' plants had been introduced in the UK for centuries, and that much of what we now viewed as native was in fact brought into the country at some point in the past. Of these, two, (M7 and F18), also saw it as inevitable that species would migrate into the UK in the future;

HH: As we said earlier, these are referred to as 'Mediterranean' species, because that's their native environment now, so they are non – native to the UK. Do you have reservations about introducing non – native species to UK parks and gardens?

M9: No, it's been happening for hundreds of years. Victorian botanists went out and they collected everything they could find...and they brought it back and tried it. And some of what we term as our 'British' species are in fact imports from abroad. If you look back throughout hundreds and thousands of years, the plants have migrated with the environment.

M7: No, no, I like plants for what they are..where they come from I don't think really matters. Especially in this day and age when things just get spread around everywhere. ..We've got loads of parakeets round our way now. It's just the way the world goes, with transport nowadays, everything can get round the world, and the same with seeds and plants, and course everyone brings them in.

5.2.1.iv) Acceptance of non – native plant species: The significance of context and scale

Of the 25 interviewees expressing a positive view on the introduction of non – native species to the UK, 8, (3xM – M3, M7, M15, 5xF – F2, F5, F6, F11, F16) referred to the need to consider the context and scale of the planting and carefully. In terms of context, some saw this style of Mediterranean planting more suited to particular parts of the UK than others. One interviewee, (F16), expressed the view that the warmer SW would be more appropriate than, for example, Sheffield. Another, (M6), thought that it would be acceptable in a new area of planting, but not if introduced in the middle of an area of native plants;

F16: I think we already see that in places like Cornwall. We do see that, which to me is fine in places like Cornwall and Tresco in the Isles of Scilly, but it's not home to me. It's not what I was brought up with, so I'd be a bit resistant to it in my own county. Yeah..I think in Sheffield it'd sort of be a bit of a step too far at the moment.

M6: Yes, well for instance, say ..I'm just trying to think...It's basically going to be somewhere where you've got an area of new planting. If it comes in as part of an initial design maybe it will look fine, but if it's just, sort of attached to the side of an existing garden which is full of native species, and if it would become the dominant thing, then it shouldn't be planted, or it should be carefully managed if you like..but that's (Med Bank – which is at Abbotsbury)

obviously a garden with loads of non – native, pretty much all non – native species, and it looks fine, because it's done on its own, but you know if you, somebody stuck that in the middle of Hyde Park for instance, it might look a bit out of place. Yes, it's all about context for me, and about how it's done.

Some interviewees, including M7, expressed the view that introduction of Mediterranean planting should be done in a restricted way, that the scale should be limited, whereas another, (F2), said that non – native trees such as Eucalypts would be acceptable within a large space such as the garden at Wisley but not in the confined space of her own garden;

M7: Erm..long pause...I don't have a problem with it, provided it's not done on too large a scale...I don't think you should overpower the natural British plants...but a bit here and there even in public spaces I don't have an issue with, no ..as long as there's not too much. I like what I would call the native plants..the herbaceous plants that you get..foxgloves, delphiniums, and irises..this sort of thing. It's what we have in our garden, it's what we like...but I don't have a problem going round and looking at them in a situation like this (Mediterranean Bank), no. I think they've got their place..

F2: Umm..I'm not terribly fond of eucalyptus trees, but in this environment, in a huge place like Wisley I think they are absolutely fine...certainly it wouldn't be something I'd plant in my own..garden..but in context..in a huge place like Wisley I thought they looked, yes.

5.2.2. The role of non – native plant species in UK parks and gardens: Rejection

The 4 interviewees, (1xM – M2, 3xF – F4, F12, F13) who reacted extremely negatively to the introduction of non – native plant species within UK parks and gardens did so on ideological, (M2), or aesthetic, (M2, F12, F13, F4) grounds. Interviewee M2 seemed to have developed a dislike of non – native plant species such as those of the Mediterranean Bank, purely because they were by definition not native to the UK and therefore did not fit what he believed was appropriate in the UK;

M2: Yes, twenty years ago I developed this dislike of what I call 'unnatural' foreign species, but I've kind of refined that, developed that and the whole azalea, rhododendron thing, which seems to have gathered momentum in a number of places, in France as well, I find slightly incongruous, particularly where they spring up... I don't know the real name of these, the spiky..palms.. I just find that incongruous..and they just stand out

Three female interviewees, (F4, F13 and F12) reacted negatively to the appearance of the Mediterranean planting;

HH: and in the questionnaire, there was a photo, quite a lot like that (Med Bank), and it asked if you would be happy to see planting like that in UK parks and gardens..

F4: I like, I prefer to see the native stuff. I don't know what there is in there..I like to see the native stuff. I mean these..I mean they're probably alright, but...they don't do a lot for me...

F13: I don't like it much, but then, but then it's okay and it's better than a car park or something...I'd rather have that than nothing...but it's not my..It's not what I would like, no. There is something not..there's something about it which jars with me and I think it is..It does feel..I can't think of the right word...not decorative exactly...It feels a bit fake to me..that's what I don't like...it sort of disturbs me a bit, yeah..yeah..

5.2.3. The role of non – native plant species in UK parks and gardens: Reservations

Seventeen of the 34 interviewees (50%, 7xM – M4, M5, M10, M11, M12, M14, M15, 7xF – F3, F4, F9, F11, F15, F16, F23, F6, F8, F18) expressing a view on the introduction of non – native species to UK parks and gardens qualified their responses by voicing reservations about this introduction. This included many interviewees who were generally very positive. Their concerns were almost entirely based on perceptions on the invasiveness of non – native species, and/ the likelihood that they would out compete and oust native plants. Several interviewees made references to past experience with Himalayan balsam, rhododendrons, Japanese knot weed, and the grey squirrel.

F3: I mean obviously there's been a problem with some things like Himalayan Balsam, there's one or two things that have become too invasive, but I think now we probably know which ones they are, so as long as we have got that knowledge of what we can plant that is not going to take over or invade and come up through the pavements, we'll be alright.

M4: Erm..not as long as they are..they are not going to a grey squirrel on us and take over from the indigenous...but, there are so few, as I understand it..natural, native plants to this country, that the vast majority have been imported from elsewhere anyway...now's not the time to start saying, no, close the door..but with the reservation that it doesn't turn into Japanese knotweed or whatever.

F16: As long as they're not invasive. Erm..and they're not going to sort of mix up and change what we've got, you know they're not..well one of the classics was the Victorians introduced Japanese knotweed because they thought it was lovely. You've got to think about these things before you plant them.

Three interviewees, all female, (F6, F8, F18) referred to what they perceived as the negative impact of non – native plant species on native wildlife;

F6: I don't know, I mean it depends on whether they introduce..how that relates to butterflies, bugs everything..what happens with that..

F8: I think one should perhaps, if it..if one needs a non – native, then yes, put a non – native in, but I think one should try and use native plants as much as possible, because that's what, what our climate, what the wildlife has been brought up on...he he...(laughing)..if you know what I mean..erm, because again, it changes it for them, doesn't it? So, I mean I would go native as far as possible, and bring in something else that might enhance or help...I'm not against that no.

HH: Yes, so perhaps think carefully about how invasive things are before you plant them..

F18: Yes..and obviously it does have an impact on native wildlife..because I don't know what feeds on Echinacea..that may make it difficult for other things that live in the undergrowth..if it's not part of the normal food chain..

5.3. Thoughts, beliefs and values; a summary

Discussion with interviewees revealed that all believed climate change was happening, but that there was considerable variation in both the understanding of the process and level of concern about the implications. Many interviewees appreciated a link between climate change and the introduction of non – native Mediterranean – type planting to the UK. Some liked this

on aesthetic grounds, yet more people saw its ecological, climatic merit, i.e., as a sustainable alternative to high maintenance native planting which would require irrigation. Reservations about the introduction of non – native planting were centred on concerns about its invasiveness. Many interviewees who were relatively well – informed about climate change and the climatic advantages of non – native planting, still held misconceptions in this area, perceiving Mediterranean – style planting as a dangerous potential usurper of native biodiversity.

Part 4

Discussion

The discussion focuses on outcomes of analysis of both questionnaire and interview data in the light of existing literature. It is structured according to the research questions, facilitating a clear focus on the key issues driving the research.

1. Research Question 1

Are designed plant communities that look similar to semi – natural plant communities of that region more preferred than vegetation which looks dissimilar to semi – natural plant communities?

This question addresses how people responded to areas of woodland, shrub and herbaceous planting of varying structure and species character in relation to semi – natural plant communities. It was posed in reaction to an increasing presumption amongst both lay people and professionals in landscape architecture/planning that sustainable urban landscapes of the twenty first century should be composed of ‘natural’ or native planting, (Hitchmough, 2011), i.e., that which is both most ‘natural’ in structure, and with an absence of exotic, alien species. The question focuses particularly on how people reacted to unfamiliar non – native planting which might be better adapted to a climate change scenario than more familiar native planting. These exotic, non – native species are increasingly and inaccurately, (Thomas & Palmer, 2015), being portrayed as aggressive invaders. It also assesses the extent to which human reactions were influenced by the characteristics of the planting itself, people’s background factors, (age, gender, ethnicity, educational qualifications), and whether they were a member of the landscape profession.

1.1. How is public perception and preference related to the structure of the planting?

As described in the initial research questions, **Structure** refers to the way in which the individual plants are arranged within the context of the ‘whole’ area of planting experienced by people walking through it. Structure is an extremely important factor from a landscape architectural perspective as, in addition to being a property of all naturally occurring vegetation types, it is also a key device employed in planting design, and hence can be readily manipulated initially by design and in the longer term by management.

In the case of woodlands this relates to the vertical structure or layering, with a semi – natural system demonstrating more complex layers and a higher overall density of planting, which might obscure people’s sight lines through the planting. At the other end of the spectrum, a highly designed arboretum – style woodland consists of a single layer of trees, which would seem more ‘open’ to the person walking through, and as a result in some cases might be seen as less threatening, (Jorgensen et al., 2002, Jorgensen et al., 2007). In this research, as described earlier, three levels of structural complexity were considered in relation to woodlands, the two described above, (most and least natural respectively), and an

intermediate one, with a limited understorey of shrubs, (moderately natural). In the case of shrub planting, just two levels of structural complexity were considered, the most natural, which incorporated shrubs of different heights, and least natural, where shrubs were generally the same height as each other in a single area of planting, creating a flatter profile. In the case of herbaceous planting, variations in structure occur through the horizontal mixing of individual species throughout the whole. A semi – natural system consists of mixed or mingled planting, with individual species distributed relatively evenly, if randomly, through the ‘whole’, such as a meadow. A highly designed system consists of discrete ‘blocks’ of an individual plant species, as in a traditional herbaceous border. Three levels of structure were also considered in relation to herbaceous planting. Research participants (questionnaire respondents and interviewees) were not told that they were walking through or observing areas with particular structural qualities as described above, yet the structure of the planting was clearly being perceived by them, and had a bearing on their reactions, with many interviewees referring to structure explicitly or implicitly, as they discussed ‘layout’, ‘openness’ or ‘mingling’ of species, which were related to the structure.

1.1.1. The bigger picture: The role of structure; all vegetation communities

Findings from the questionnaire indicate that people reacted most positively to planting with a moderately natural structure which demonstrated to the participant, probably subconsciously, that some degree of human intervention had taken place. In other words this looked a lot like nature, but had been sanitised for human consumption. This supports observations that people like to see, ‘cues to care’, (Nassauer, 1988; 1995), preferring neat, tidy landscapes in the vicinity of their homes, (Jorgensen et al., 2007). This was considered the neatest planting by our respondents, the most unfamiliar, and interestingly, the most complex. This planting was related to higher levels of personal well – being, with people feeling most relaxed, comfortable and the greatest sense of escape from mundane routines and work when they walked through it (compared to planting with any other structure). In terms of the questionnaire data, planting structure had no effect on how attractive people perceived the planting to be.

To date, research has focused on people’s perception of different planting structures both explicitly, (Jorgensen et al., 2002; Jorgensen et al., 2007; Lindemann – Matthies & Bose, 2007), and implicitly, with reference to the ‘style’ of planting which is related to the structure, (Martens et al., 2011, Van den Berg et al., 2014), yet the majority of this research has focused on specific vegetation communities such as woodland edge, (Jorgensen et al., 2002), or herbaceous planting, (Lindemann – Matthies & Bose, 2007), with the majority addressing public perception and preference in relation to woodland structure, (Burgess, 1988; Parsons, 1995; Summit and Sommer, 1999; Jorgensen, 2007; Martens et al., 2011; Van den Berg et al., 2014). Aside from highlighting the dearth of literature relating to preference in relation to shrub and herbaceous structure, this also illustrates the point that it is challenging to generalise across the three vegetation communities in terms of human experience of structure, and that generalising across ‘all communities’ masks important differences in human response specific to the individual vegetation community. This is probably because there are significant experiential differences in walking through each of these different communities, directly arising from the scale of the planting in relation to the human being. Woodland areas, even more open arboretum – style ones, are beyond the human scale, and individuals walk within them and beneath the canopy. Shrubs vary in height in relation to humans, but

generally cannot be walked underneath, presenting more of a series of edge experiences. Most herbaceous planting, with exceptions, is lower still, and people look at it whilst walking through it, often on a made path, again with perspectives from the edge, rather than walking within it, as in the case of woodland. If patterns of perception and preference in relation to structure are to be discussed meaningfully, it needs to be at the level of the individual vegetation community.

1.1.2. The role of structure; woodland communities

Woodlands moderately natural in structure were seen as the most attractive, suggesting, as stated above, that people find some degree of human modification of nature desirable. It is likely that these relatively open woodlands provided more detail than the least natural arboretum style planting, providing soft or quiet fascination affording 'effortless attention', (Herzog et al., 2003), and clearer sight lines through the planting than the more complex most natural woodlands. These findings can be related to work carried out in the USA by Summit and Sommer, (1999). Focusing on preference for tree forms in different contexts, using prospect/refuge theory as a conceptual basis, this showed that larger canopies appeared to offer more shelter, but that smaller canopies provided greater prospect. Jorgensen et al., (2002), discovered that a multi – layered woodland edge was the least preferred style of planting. Later work by Jorgensen et al.,(2007), indicated that preference for multi – layered woodland or woodland edge might be related specifically to view distance and visual penetration, i.e., if people can see through the vegetation and feel safe it is perceived more positively.

Evolutionary environmental psychology literature of the past 40 years, (e.g., Appleton, 1975; Parsons, 1995) has emphasised a preference for 'savannah' woodland, formed of copses of trees with open spaces, a landscape form mirrored to a substantial degree in the parks of the English landscape movement. In contrast, questionnaire findings indicated that people perceived least natural arboretum – style planting such as the gardens of *Cordyline australis* in Torquay and arboreta at Wisley and at Fairlands Valley Park as the least attractive. Interview evidence supports this, with several interviewees rejecting the arboretum - style woodlands as too formal, planned, and in one case, 'a bit boring'. These findings are consistent with those of Burgess et al., (1988), which indicated that people preferred wilder looking urban spaces containing woodland and multiple layers of vegetation to more manicured, conventional landscapes of mown grass and isolated trees. Interviewees also identified these arboretum style plantings as the neatest, with the majority choosing sites from the three or four areas of arboretum – style woodland as the neatest of the eight or nine areas viewed. The structure of the planting was the main cue with many referring explicitly to aspects of structure and layout. They accurately perceived this planting as, 'unnatural', and referred to straight lines and even spacing as evidence these areas had been, 'put' or designed. In terms of preference or otherwise for neat woodland planting, just two interviewees expressed positive appreciation of the level of maintenance and council intervention in the seafront gardens in Torquay, where the grass appeared cut and the path swept. This positive appreciation of neatness supports Zheng's (2011) observation that people in general prefer a neat environment, and Nassauer's earlier (1988) claim that neatness is one of the most important factors in an attractive landscape. This very neat type of planting was however perceived as the least biodiverse.

In contrast, complex, multilayered woodlands most natural in structure were viewed as the least neat, yet they were also viewed as providing the highest levels of native plant and

invertebrate biodiversity. When discussing woodland planting and invertebrate biodiversity in the interviews, four of the interviewees made reference to the structure of the planting as an important factor in relation to habitat and the need for variety of planting to support a variety of invertebrates. One of these interviewees thought that a multi – layered system would offer more ground cover and more mature trees than a simpler system, providing good invertebrate habitat. He was referring to Monk’s wood in Stevenage, which he knew personally.

Reaction to woodland areas of varying structures can also be related to gender, context and place attachment. Research already cited by Jorgensen et al., (2002), Jorgensen et al., (2007), found that women expressed a greater fear of possible attack in multi – layered woodland areas than men. This PhD research revealed a similar pattern. When interviewees were asked which area of woodland they would find the most relaxing to walk through, four made a definite decision that they would find a multilayered structure most relaxing. Two male interviewees thought this enclosure would feel like they were being ‘embraced’ by the woodland. Other (female) interviewees expressed a contrasting position, and thought they would find more open woodland with better visibility more relaxing, perhaps because they would have better sight lines and would be less likely to worry about attack from a potential assailant, as described above. One interviewee expressed this explicitly, saying that she would wonder what was lurking in the Wild Garden at Wisley. Considering context, in a study of residents’ perceptions of naturalistic woodland planting in Birchwood, Warrington, Jorgensen et al., (2007) concluded that people might prefer neater, more manicured landscapes immediately next to their homes, but might also seek out wilder woodlands in their local area. In this PhD research, questionnaire respondents were asked to rate the woodland they were walking through in terms of its attractiveness. They were not asked if they would be prepared to see this type of woodland immediately adjacent to their own homes. There is also considerable evidence, (Jorgensen et al., 2007; Ward Thompson et al., 2008) that place attachment, or, ‘the positive bond that develops between groups or individuals and their environment’, (Altman & Low, 1992; Williams et al., 1992), can have a major impact on individual perceptions and behaviour in relation to naturalistic woodland areas. In this research, three Stevenage interviewees showed particular appreciation of the complex multi layered woodland of Monk’s Wood in Fairlands Valley Park. They talked about its’, ‘naturalness’, and relied on daily walks there for their restorative qualities. One female interviewee referred to ‘our woods’ when speaking about the woods. Even though she whisperingly admitted to seeing a ghost in the woods, she showed no fear whatsoever about visiting on a twice – daily basis, and spoke nostalgically about playing in the woods as a child. These findings are consistent with those of a large study conducted in Central Scotland, (Ward Thompson et al., 2008) , which revealed that individuals visiting woods as children were more likely to visit similar places as adults, and that an adult’s awareness of the physical and emotional benefits of the woodland environment reflects childhood experience.

1.1.3. The role of structure; shrub communities

In the case of shrub planting, as stated above, two levels of structural complexity were considered, most natural, with a varying height profile, essentially composed of 2 or even three canopy layers, and least natural, where the shrubs appeared ‘flatter’, essentially a mono-layer. Questionnaire results indicated that there was no significant statistical relationship between the structure of shrub planting and people’s perceptions of its attractiveness, yet both questionnaire and interview evidence indicate that higher levels of psychological and

physical well – being were associated with most natural shrub planting such as Hilliers heathers, Fairlands Valley woodland edge as well as the Punchbowl and Savill Garden Spring Wood than in the case of shrub areas least natural in structure. When asked to say whether they would prefer to walk through the lower flatter heathers at Wisley, (least natural) or those at Hilliers (most natural), almost all interviewees said they would prefer to walk through the heathers at Hilliers, for visual, aesthetic reasons; the heathers at Hilliers were more interesting with a variety of height and profile whereas they found the flatter heathers at Wisley ‘boring’ and static. The low – growing flat heathers at Wisley were the least preferred area of planting overall. Preference or otherwise for the heathers of different structures was also related to culturally defined non – visual factors. Some interviewees associated the flatter heathers with a lack of need for maintenance, and thought of them as something you would see in an old person’s garden.

1.1.4. The role of structure; herbaceous communities

In the case of herbaceous communities, three levels of structural complexity were considered; most natural, where individual species were randomly mixed throughout the planting, (Sheffield Botanic Garden Prairie, Sheffield Bole Hills, Wisley Prairie, Wisley Olympic wildflower meadow and Stevenage Grasshopper trail), least natural, consisting of ‘blocks’ of a single species, (Wisley Traditional herbaceous borders) and an intermediate state referred to as ‘moderately natural’, (Oudolf borders at Wisley, Beth Chatto’s Wet Garden and Beth Chatto’s Gravel Garden).

As in the case of woodland planting, questionnaire evidence suggested that people preferred herbaceous planting with a moderately natural structure, as this was perceived as the neatest, most attractive, interesting, colourful and complex. It was also perceived as being associated with the highest levels of native biodiversity. Planting that was most natural in structure was seen as the least neat, least attractive, least interesting, least colourful and least complex. This suggests as stated earlier that some degree of human intervention is required to optimise human aesthetic experience of an area of planting. Early studies by Nassauer, (1988), indicated that neatness in urban planting was a prerequisite for attractiveness, whereas later work has indicated that cultural norms in residential areas may affect people’s perceptions, as residents aim to ‘keep up’ with their neighbours, (2009). Other research confirms this appreciation of neatness. A study of front gardens in Guelph, Ontario showed that most were dominated by amenity mown grass or turf, with only 2% using any alternative planting, (Henderson et al, 1998) and a study of Japanese street trees and the preferred under storey vegetation, (grass, hedge, or flowers), revealed a preference for low, ordered arrangements of bright flowers, (Todorova et al., 2004).

Evidence from the interviews contradicted this, however, with the majority of interviewees (19/23) expressing a clear preference for herbaceous planting most natural in structure, including the Sheffield Botanic Garden Prairie, Sheffield Bole Hills, Wisley Prairie, Wisley Olympic wildflower meadow and Stevenage Grasshopper trail. This was perceived as more ‘natural’, and many of these interviewees expressed an explicit preference for things that were, ‘wild’, and disorganised. Interviewees repeatedly singled out the Wisley Olympic Wildflower meadow as the most attractive of the eight herbaceous areas they were shown, referring to the attractiveness of planting where species and therefore colours were mixed, seeing this as more attractive than where there were distinctive ‘blocks’ of colour, as in the case of the traditional border at Wisley. There is considerable existing evidence supporting this

appreciation of herbaceous planting with this degree of structural diversity. An older study by Strumse, (1996), used photographs of different agrarian landscapes in Western Norway and produced high preference scores for areas of species rich wildflower meadows. Akbar et al., (2003) focused on herbaceous plant preferences along roadsides and found that forb – rich grass swards were the preferred choice for the re – vegetation of road verges perceived as ‘unpleasant and drab’. More recently a two – stage study was conducted in Switzerland where some participants assembled their own meadow patch. Others created ‘imaginary’ idealised meadows. These participants either assembled or imagined meadow areas with a high degree of horizontal structural diversity and variety in plant height. Although large or colourful flowers were selected within the mixes, these were set within an extensive green matrix with grasses frequently included, (Lindemann – Matthies & Bose, 2007), indicating a preference for structural diversity over ‘blocks’ of colourful planting.

Differences in findings between the questionnaire and interview phases of this research are likely to be related to the different socio – demographic composition of two samples. The larger questionnaire sample, (1410), although not fully representative of the UK population, is more likely to represent the wider views of users of the areas of green space and gardens. Just 34 of these original respondents took part in the interviews. These self – selecting interviewees were individuals who were often involved in landscape and environmental professions or had a heightened interest in landscape, environmental or horticultural issues. Previous work, (Ozguner et al., 2007; Zheng et al., 2011) has indicated that these groups are more likely to be positive than the general public about more naturalistic landscapes which diverge from the conventional horticultural norm. This was also the case in the Swiss study cited, (Lindemann – Matthies & Bose, 2007). Here participants were all visitors to a botanical garden, so were self – selecting in that they already had an interest in planting. It is also likely that since the 2012 London Olympic Games more UK residents have a positive view of meadow – style planting than previously. The meadow plantings at the Olympics gained significant media attention and were very popular with the games’ spectators. In addition television programmes such as that presented by Sarah Raven have explained the biodiversity benefits of meadows, (e.g. http://www.sarahraven.com/articles/how_to_create_a_mini_wild_flower_meadow.html; accessed 23rd June 2015) The initial questionnaire work was done in 2012 and 2013, as this momentum was building. The interviews were carried out in 2014 and by then many participants were very much aware of the aesthetic and ecological value of urban meadows.

1.1.5. The role of structure; a summary

Although it is difficult to generalise across all three vegetation communities, findings indicate that where three levels of structural complexity were considered, as in the case of woodland and herbaceous planting, people responded most positively to planting with a moderately natural structure, demonstrating that some degree of human modification of nature was appealing to respondents. In the case of herbaceous planting interviewees’ views diverged from those of questionnaire respondents and a stronger preference was expressed for herbaceous meadow planting with a most natural structure. In the case of shrub planting, where two levels of structural complexity were considered, people preferred the most natural, with variety in height and profile. The low – growing mounded mono – layer shrubs at Wisley, a dominant form of planting design in landscape practice, were the least preferred area of planting.

1.2. How do the public react to non – native species with very unfamiliar appearances? Would they be accepting of these in UK public spaces?

Public reaction to non – native planting with unfamiliar appearances was gauged by asking questionnaire respondents and interviewees to comment on three levels of species character as they either walked through the actual planting , (questionnaires), or viewed images of different areas of planting ,(interviews). As stated in the introduction **Species Character** is derived from the appearance of the species present. The underlying assumption in the research is that native UK species are likely to appear more familiar to UK citizens, and more exotic non – natives less so. The three levels of species character were ‘most natural’, where most species within the planting were native to the UK and the planting was likely to look familiar to the UK population, ‘least natural’ dominated by ‘non – native’ species with perhaps ‘unfamiliar’ forms and ‘moderately natural’ consisting of a mixture of native and non – native plants. These assumptions probably worked reasonably well in the questionnaire survey and more so in the interviews as many of the interviewees had a relatively well – developed understanding of plants and planting. In the context of the general public however, it seems highly likely that only plants with dramatically different appearances, for example arborescent monocots such as palms would be capable of being perceived as non – natives. It seems unlikely that most people can actually distinguish between natives and non – natives where conceptual cues, such as being in the countryside as a seemingly natural part of the landscape, or alternatively in a garden, are absent.

1.2.1. The bigger picture: the role of species character; all communities

Findings from both questionnaires and interviews indicated that in general people reacted very positively to non – native species with a ‘least natural’ species character, appreciating the aesthetic value of plantings on the basis of, for example, the novel and interesting form of branches (*Eucalyptus* trees) or bright flowers (*Rhododendron*). This supports findings from research conducted in 60 domestic gardens in Sheffield, (Smith et al., 2003) which indicated that 33% of garden plants were natives and 67% aliens, mainly from Europe and Asia, suggesting an acceptance of and perhaps preference for the use of non – native plant species amongst the UK population, yet reactions within each vegetation community were very species specific, as discussed below. The interviews provided most insight into people’s views. A minority of interviewees were very negative about non – native plants and areas of planting, some objecting to it on aesthetic grounds, because it simply didn’t look ‘natural’ or because it looked out of context. Several interviewees rejected non – native species simply because they were not native to the UK, expressing concerns about the invasiveness of these species, or the fact they might not support native wildlife, as discussed later. This supports observations by Hitchmough, (2011), who refers to a media representation of exotic plants as aggressive invaders that destroy native biodiversity, whilst native plants nurture biodiversity (Peretti, 1998).

1.2.2. The role of species character; woodland communities

Questionnaire evidence indicated that woodlands least natural in species character such as the Wisley *Eucalyptus*, Abbotsbury Jungle Ride and *Cordyline australis* planting at Princess and Kings Gardens in Torquay were perceived as the most complex, interesting, and attractive , as well as the neatest and most colourful of all three categories of species character. The interviews revealed real species – specific differences in reactions, with positive responses to the *Eucalyptus* and subtropical Jungle Ride, and more negative views on the *Cordyline australis*

planting in Torquay. The Eucalypts at Wisley were appreciated particularly for their interesting bark patterns and the bending shapes of their branches, and the dense subtropical Jungle Ride was praised for its large leaves and lush green appearance. In contrast, 5/9 interviewees rejected the palms (*Cordyline australis*) on the Torquay seafront, many seeing these as out of context, 'more appropriate in Hawaii', and unnatural.

This appreciation of the lush, larger fleshier leaves of the subtropical woodland and rejection of the narrow leaves of the *Cordyline australis* is consistent with findings from work in Australia, (Williams & Cary, 2002), and can be explained with reference to habitat – oriented theories of preference, (Heerwagen & Orians, 1995), i.e., people might have preferred the larger leaves because they are indicative of a resource – rich environment where water is plentiful, whereas the narrow leaves of the *Cordyline* are adapted to xeric conditions and therefore indicative of droughty, resource deficient environments, although of course in its habitat in New Zealand, *Cordyline* is actually a species found in more moist or even wetland habitats. An alternative explanation is that a greater familiarity with one tree species and form over another leads to heightened preference, (Dearden, 1984). This explanation is supported further by the fact that some of the interviewees rejecting the palms saw woodlands moderately or 'most natural', (the Wild Garden at Wisley, Stevenage Monk's Wood respectively), as the most attractive, as these were, 'in keeping with our current countryside and climate', and therefore more familiar to interviewees. This may simply be because the non – native species in the Wisley example did not look dramatically different enough to their notions of native species to elicit a response. In the case of the Torquay palms, although many interviewees were negative about these, the two local residents interviewed in Torquay were both extremely positive, particularly in terms of the attractiveness of the seafront planting. This might also suggest that people are more likely to accept planting with a species character dissimilar to the local character with increasing exposure to it. They were familiar with these forms because they saw them on a daily basis, and had contextualized their strangeness, whereas the other woodland interviewees were not able to do this.

1.2.3. The role of species character; shrub communities

In the case of shrubs, people reacted very positively to non – native planting least natural in species character such as the Savill hydrangeas, Hilliers mounding arboretum – style shrubs, the Punchbowl (azaleas) and Savill Spring Wood, (rhododendrons). In general, the azaleas and rhododendrons were appreciated particularly for their bright pink and red flowers. Seven out of the eight shrub interviewees selected planting least natural in species character as the most attractive of all eight areas they were shown. The other interviewee selected areas which were most natural in character as more attractive, including Stevenage Fairlands Valley native woodland edge. He was a landscape professional and expressed a preference for more 'natural' green shrub planting. As stated earlier, it has been shown that the views of such professionals often diverge from those of the general public, (Ozguner et al., 2007; Zheng et al., 2011). These views are however also likely to change with contextual clues, for example, urban designer landscape as opposed to rural edges. Indeed this interviewee stated that he liked to see planting that was either extremely neat or extremely naturalistic, supporting this suggestion.

1.2.4. The role of species character; herbaceous communities

As in the case of woodland and shrub communities, people generally perceived non – native herbaceous planting as the neatest, most attractive, interesting, colourful and complex of all

three categories. Planting least natural in character included Sheffield Botanic Garden Prairie, Oudolf herbaceous borders, Wisley traditional herbaceous borders, Wisley Prairie, Beth Chatto Gravel Garden and Abbotsbury Mediterranean Bank. Research by Kendal et al., (2012) considering plant traits and preference, distinguishes between visual, aesthetic plant traits such as flower size, leaf width, and foliage colour and non – visual traits such as nativeness and drought tolerance. In this research, interviewees commented on positive visual traits such as how robust the tall prairie plants looked in the Sheffield botanical garden. Interviewees’ reactions to the Mediterranean Bank at Abbotsbury were polarised; some were very positive about this, with one saying that it evoked past memories of holidays in hotter climates. Negative responses to the Mediterranean Bank at Abbotsbury focused mainly on visual traits. Two (female) interviewees reacted negatively to the spiky narrow leaves of the Mediterranean planting, one referring to these as ‘a little bit toxic’, consistent with further habitat – related findings that people dislike narrow foliage as this is an indicator of low resource availability, (Williams and Cary, 2002). The same interviewees voiced strong non – visual reasons for her dislike of this planting, referring to her rejection of the Mediterranean Bank simply because it was not native. Findings from a Sheffield study cited earlier, (Smith et al., 2003) indicated that domestic gardens in the UK are dominated by alien non – native species. The perception that things that are native are intrinsically better than those that are not is a recent one, (Hitchmough, 2011), arising from the media representation also cited earlier, (Peretti, 1998), where exotic plants are presented as aggressive invaders that destroy native biodiversity. This is supported by ill – informed government policy, (DEFRA 2008), also favouring native over non – native biodiversity, regardless of ecological fit.

1.2.5. The role of species character; a summary

In terms of perceptions of the attractiveness of the planting, the majority of people reacted positively to exotic, unfamiliar planting with ‘least natural’ species character, appreciating it for its interesting aesthetic qualities, although reactions were often species – specific, as discussed. The *Cordyline australis* planting in Torquay and Mediterranean Bank at Abbotsbury provoked mixed reactions, with people sometimes seeing these types of planting as appropriate only in certain contexts. Objections to these plantings were sometimes made on aesthetic grounds, or because plants were perceived as potentially invasive and of limited value to UK wildlife.

1.3. Are public perception and preference related to any further qualities of the planting?

1.3.1. The role of flowering

People’s reactions to flowering were gauged by giving each area of planting a flowering % score, based on the percentage flower cover at the time of the onsite walk and questionnaire. Scores for all walks are all shown in the questionnaire results and analysis section. Flowering was also discussed in the interviews, particularly in relation to the Punchbowl at the Valley Gardens. All interviewees were asked to consider two photographs of the Punchbowl, one taken during the May 2013 questionnaires, showing it in full bloom, and the other taken in August 2013, also at the time of the questionnaires. At this time there were no visible flowers, but different shades of green were clear.

i) The bigger picture: the role of flowering; all communities

The research indicated that most people found bright colourful flowering plants attractive, interesting and stimulating, yet that greener less colourful planting was usually perceived as more relaxing and associated with the highest levels of personal psychological and physical well – being. Bright flowers were also associated with the presence of pollinating insects, which was generally seen as positive.

ii) The role of flowering; woodland communities

In the case of the woodland areas there was very little visible flower cover at the time of most onsite walks and questionnaires, with the exception of two sites; one in Torquay, (Princess gardens), where non – native *Cordyline australis* trees were underplanted with brightly flowering *Pelargonium* plants, and the other in Stevenage, (Monk's Wood), where in May the bluebells were in flower. The two Torquay residents who were interviewed showed particular appreciation for the colourful bedding plants beneath the Cordylines, one praising the high level of council maintenance, and the other saying how they lifted his spirits when he walked through the gardens. Many other interviewees reacted extremely positively to the more naturalistic swathes of bluebells in Monk's wood. These findings are consistent with that of earlier research, (Todorova et al., 2004) which focused on public attitudes to different treatments used under street trees in Sapporo, Japan, ranging from soil, to grass, shrubs and flowers. This indicated a preference for neat, brightly coloured low – growing flowers. Taller flowers were considered less appropriate in the context of an urban streetscape. Although there was no preference for any particular colour, brightly coloured flowers were preferred to delicate ones. The flowers contributed to people's enjoyment of the appearance of the street as well as their mental well – being. This work was conducted in Japan, using simulated images rather than on – site walks, yet the context was similar to that in Torquay, in that street trees were being considered.

iii) The role of flowering; shrub communities

In the case of the shrub planting, there was considerable variation in the amount of flower cover at different sites, and some sites such as the Punchbowl and Spring Wood were deliberately sampled at in two different seasons, to gauge the impact of seasonality and flowering. Generally people perceived shrubs in full flower such as the azaleas at the Punchbowl in and rhododendrons in the Spring Wood as colourful, interesting and attractive. As stated in relation to species character, seven out of the eight interviewees chose this shrub planting in flower as the most attractive of the eight shrub images they were shown, with the one exception, a landscape professional selecting greener, more naturalistic planting in preference. Focusing on the questionnaire evidence for shrub planting, perceived attractiveness peaked at a high level of flowering (27 – 45% cover), after which it declined. This is significant for designers in that it may mean that there is a threshold level above which people perceive increasing flower cover unattractive. The Punchbowl in full flower, (46%+ flower cover), was described as 'an assault to the eyeballs' by several interviewees. The need for some green background is supported by earlier work with herbaceous species, (Lindemann – Matthies & Bose, 2007). When research participants were asked to assemble their own small meadows from a range of possible species, on average, only one in three plants chosen were flowering, even though it would have been possible to choose all flowering plants. One of the characteristics of shrubs such as *Rhododendron* is that flowering is so profuse for the 10 – 14 day long bloom periods as to totally obscure the foliage. This is dramatic but also creates a

sense of the artificial, the plastic flower syndrome. This is probably what underpins the negative responses of increasing percentage flowering cover in shrubs, but not in other plant types.

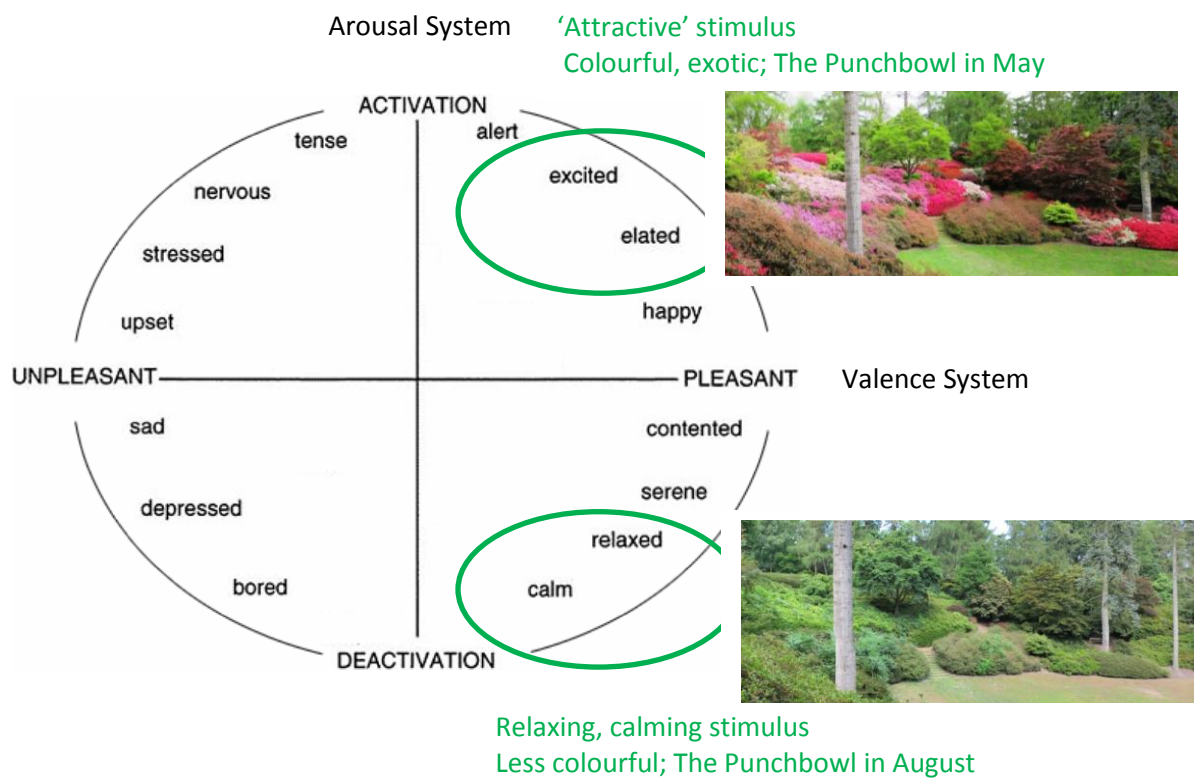


Figure 1 Graphical representation of circumplex model of effect (Posner et al., 2005), adapted to show the impact of flowering

Although most people found brightly coloured shrubs the most attractive and stimulating, in general people thought more subtle greens were conducive to calm relaxation. This applied particularly in the case of the Punchbowl at the Valley Gardens. These reactions can be placed within the context of the circumplex model of affect, (Russell 1980), a two dimensional model recently applied in neuroscience and psychiatric research, (Posner et al., 2005) This proposes that all human reactions or affective states arise from two overlapping systems; firstly, one related to valence, a pleasure – displeasure continuum, and secondly one related to a degree of arousal or alertness, ie., ‘activation to deactivation’, (Russell, 1980). Each emotion is then understood as a linear combination of the two dimensions, valence and alertness, (see Figure 1). The shrub planting generally perceived as attractive at the Punchbowl in May was bright and stimulating, resulting in an excited, elated affective response, (see Figure 1). This could also be compared with the ‘hard fascination’, (Herzog et al., 2003), of Attention Restoration Theory, (Kaplan and Kaplan, 1989). Hard fascination demands attention and opposes restoration and ‘quiet fascination’. In contrast, most people found the Punchbowl in August more relaxing. This calm, relaxed affective response was a reaction to the subtler greens of the planting at this time of year, which induced ‘soft fascination’, or ‘effortless attention’, (also see Figure 1). This is illustrated here through one male interviewee’s responses to the Punchbowl firstly in May and then in August;

HH: Which would you find the most attractive to walk through, at which time of year, do you think?

M8: Ahhh well, I think that's a no brainer. That one ..with the colour.

HH: And which of those two do you think would be the most relaxing to walk through?

M8: That one, (greens). It's a question of interest or relaxation again. If I just want to walk somewhere and forget something dreadful, or think of something good, or just think of nothing, that's the place you go, (greens). Because this, this is going to excite the brain, (in flower). That sounds a ridiculous thing...!

Interestingly, although this response definitely represents the majority view, not all interviewees reacted in this way. A large minority found the subtler varied greens both attractive and relaxing, and a smaller minority actually thought the Punchbowl in full flower was both attractive and relaxing.

iv) The role of flowering; herbaceous communities

Consistent with findings relating to shrub planting, people found herbaceous planting with large amounts of flower cover the most attractive. Herbaceous planting with the highest percentage flower cover, (46%+) was considered the most attractive (as well as being perceived as the neatest, most colourful and complex), indicating that in this case there was no threshold level above which perceived attractiveness declined. Interviewees commented on their preference for specific flower colours. In the case of most colours there was no clear pattern to responses, with some interviewees preferring pinks, some whites, creams and some reds, blues and purples. This is consistent with earlier findings, (Todorova et al., 2004; Lindemann – Matthies & Bose, 2007). In the first of these studies, results showed no significant difference among preferences for arrangements of different colours, (purple, red, white, yellow and mixed), yet bright colours were preferred to more delicate ones. In the second study, participants assembling their own small meadow areas frequently included plants with large colourful flowers, then listed plant colour as a criterion used in their selection. Appreciation of bright colourful flowers has been explained by evolutionary theories, (Heerwagen & Orians, 1995), as bright flowers are considered an indicator of a resource – rich environment. The response to yellow flowers was different, with interviewees' expressing polarised reactions. People who were extremely appreciative of yellow flowers referred to positive associations with spring, the sun and childhood memories of daffodils, whereas those expressing negative reactions associated yellow with danger, wasps and the smell and sight of oil seed rape used as an industrial crop in the countryside.

v) The role of flowering; a summary

Findings indicate that most people responded very positively to extremely colourful flowering planting, seeing this as attractive and stimulating, and good for pollinating insects. In the case of shrub planting, results suggested a threshold level of flowering above which attractiveness declined, yet this was not apparent in the case of herbaceous planting, where the highest percentage of flower cover was associated with the highest levels of perceived attractiveness. In terms of peoples psychological and physical well – being, interview findings in relation to shrub planting indicated that more muted naturalistic green planting was more conducive to a heightened sense of calm and relaxation. This has important implications for the landscape architect aiming to design real urban planting for ordinary people. Evidence suggests that

whilst most people seek colourful flowering planting for stimulation, they also need subtler greens for their restorative qualities. It is however, also important not to see these qualities as in any way mutually exclusive; flowering periods in most species are less than 3 weeks long, after which plants become entirely green, hence there is always green irrespective of how dramatic flowering display is at a point in time.

1.3.2. Additional factors

As well as planting structure, species character and flowering, people's perceptions and preferences were related to three additional aspects of the planting; firstly the percentage of bare ground or soil exposed in the planting, and secondly whether the planting was in a private garden such as RHS Wisley or a public greenspace such as Fairlands Valley Park in Stevenage. The three vegetation communities also provoked different responses.

i) The role of bare ground

During the analysis of questionnaire results it became apparent that the amount of exposed bare soil seemed to have an effect on people's reactions to the planting. Using the panoramic photographs of the sites on the days of questionnaires and walks, the percentage of the ground surface which was not covered in vegetation was calculated. Path surfaces or bare soil were interpreted as 'bare ground'. This was then related to people's questionnaire responses. Both questionnaire and interview evidence indicated a general dislike of large areas of exposed bare soil and a preference for 'fuller' planting.

In the case of questionnaire findings, in woodland and herbaceous areas the role of bare ground did not affect people's perceptions of the attractiveness of the planting, probably because few of these areas had exposed bare ground, with the exception of a path running through the planting. In contrast, in shrub areas there were considerable differences in the amount of bare soil exposed at different sites. The planting with (2 – 12 %) bare soil exposed, was perceived as the most colourful and attractive, with the highest invertebrate presence, indicating that people prefer to see denser, fuller planting, but that they still prefer some bare ground over none, maybe in the form of an access route through the planting. People rated the areas of planting with the highest bare ground values (56% +), as the least colourful and attractive with the lowest invertebrate presence. As stated in the results, this planting was composed of a very immature area of hydrangea planting. This planting was not well received by many respondents, who failed to understand why they were being asked to walk through what they considered to be very unattractive. These findings were supported by comments from some interviewees. When viewing this area of shrubs with bare soil between, one interviewee commented on the fact he didn't like to see bare soil, and went on to reflect negatively on the times in Torquay when the soil is left bare whilst bedding plants are in the process of being replaced. Several other interviewees expressed a preference for, 'fuller planting', or 'the cottage garden look'. Only one interviewee admitted to appreciating spacing plants out, saying that her husband planted things too densely for her own liking. These notions are probably related to the balance between control and disorder. Historically control has been a dominant idea in public planting in parks, for example in 'bedding out', with bare (but weed free) soil being seen as a horticultural exemplar. In recent years new values have appeared involving a fused canopy of foliage. A review of the changing fashions of planting at the Chelsea flower show provides an interesting test bed for these ideas; with recent shows almost entirely dominated by fused canopies; (<https://www.rhs.org.uk/shows-events/rhs-chelsea-flower-show/chelsea-photo-galleries>; accessed 23rd June 2015).

ii) The role of ownership and access; the difference between 'gardens' and public greenspaces

People perceived that public greenspaces such as Fairlands Valley Park in Stevenage and Bole Hills in Sheffield were significantly richer in native plant and invertebrate diversity than gardens such as RHS Wisley and Abbotsbury Subtropical Gardens, although this did not apply to shrub planting. In the case of woodland planting it is likely that respondents perceived familiar local greenspaces as being dominated by recognisable plant species such as beech, ash, field maple and oak, as well as grass dominated ground cover which they perceived as representing native plant biodiversity and supporting native invertebrates. Many of the woodland areas in private gardens, such as the Eucalypts at Wisley and Jungle Ride at Abbotsbury subtropical gardens were identified by respondents as 'non – native'. The 'palms', i.e., *Cordyline australis* planted in Torquay provide the exception, because these were clearly 'non – native', yet were in public spaces. The same would apply in the case of herbaceous planting in Bole Hills in Sheffield and the Grasshopper semi – natural chalk meadow in Fairlands Valley Park, Stevenage. It is likely that respondents perceived these familiar local greenspaces as being dominated by familiar recognisable herbaceous plant species such as rose bay willow herb which they perceived as representing native plant biodiversity and supporting native invertebrates.

In the case of herbaceous communities, planting in gardens such as RHS Wisley, Abbotsbury and Beth Chatto's were perceived as significantly neater, more attractive, unfamiliar and complex than that in public green spaces such as Bole Hills and Fairlands Valley Park. This result was expected because curators of gardens such RHS Wisley, Beth Chatto's garden and Abbotsbury gardens work hard to produce deliberate colourful, long flowering aesthetically stimulating displays to please the paying public. These gardens are managed intensively and experience a higher input of labour to maintain them than do public open spaces.

iii) The role of vegetation community

Focusing on questionnaire findings, herbaceous planting emerged as the most preferred of the three vegetation communities. It was perceived as the most colourful and attractive, with the greatest invertebrate presence on the days of walks and questionnaires. It was generally associated with the richest native plant and invertebrate diversity. Shrub planting was perceived as the least attractive and colourful, with the lowest invertebrate presence. Woodland planting was viewed as the neatest of the three communities, yet the least rich in native plant and invertebrate diversity.

Many of these findings may be related to the amount of visible flower cover at the different sites on the days of walks and questionnaires. Nearly all the herbaceous sites were in flower, many with a high percentage of cover, which has been shown to be associated with perceived attractiveness. When people walked through the herbaceous planting they were also aware of visible pollinators visiting flowers, and Interviews confirmed that most people based their judgement of the general value of plants to insects on the pollinator abundance on the day of their walk. Herbaceous planting is also very much in vogue at present, because of its capacity to provide dramatic flowering events over a long period of time. In the case of woodland planting there was very little visible flower cover at most sites. At shrub sites walks and questionnaires were deliberately done at different seasons to gauge reactions to flowering. On some occasions, for example, in the case of the hydrangea planting referred to above, there was almost no flower or foliage cover and people perceived it as very unattractive.

It is difficult to explain why the woodland planting appeared significantly neater than herbaceous planting. A range of structures from most to least natural was represented in each community. It is possible that in the case of woodland the general lack of flowering plants and dominance of arboretum style planting at several sites made the planting appear neater overall. An important factor is likely to be scale of the planting grain in relation to human body scale, with woodland based on large plants, (trees), at wide spacings, whereas herbaceous planting consists of relatively small plants very close together. This may have made the planting appear less neat than in the woodland sites, although these did incorporate very neat areas of planting such as the traditional herbaceous border at Wisley, as well as wilder areas such as the grasshopper semi – natural chalk meadow in Fairlands Valley Park, Stevenage.

The negative reactions to shrub planting were reinforced by interview findings. People expressed joyful emotions and enthusiasm for some areas of herbaceous planting in bloom, such as the annual meadow. Others voiced a quieter appreciation of the well – being benefits of woodlands, yet there was an overall lack of enthusiasm for shrubs. In general, they were valued only in the form of flowering exotics, such as azaleas (Punchbowl) and rhododendrons (Spring Wood). The flatter heathers at Wisley were frequently rejected as ‘static’, ‘flat’, and ‘boring’. As stated in the results, it does appear that shrubs seem to be a potentially challenging vegetation type in designed landscapes. These negative reactions may simply be a response to the fact that in contrast to herbaceous planting, ideas on shrub planting have not really evolved very much; the use of shrub planting is often crude in terms of how different species and spatial arrangements are used.

Until recently most research focusing on public perception to natural environments has focused on contrasts between human reactions to natural and built environments, (Ulrich, (1986); Van den Berg et al., 2003). More recent work has focused on human responses to different categories of natural environment, including different garden styles, (Van den Berg & Winsum – Westra, 2010), ‘wild’ and ‘tended’ forests, (Martens et al., 2011), and the relative restorativeness of different types of woodland setting, (Van den Berg et al., 2014). To date there appears to a lack of published research comparing public reaction to different types of designed vegetation communities, i.e., woodland, shrub and herbaceous planting. It would appear there is further scope for work in this field.

1.4. Is public perception and preference related to participants’ background factors such as age, gender and ethnicity?

Questionnaire findings indicated that gender, ethnicity and educational qualifications, but not age, had a bearing on people’s perceptions and preferences.

1.4.1. The role of gender

Questionnaire evidence indicated that gender had a bearing on people’s perceptions of the native plant and invertebrate biodiversity present at sites, and on their personal psychological and physical well – being, yet this was specific to particular vegetation communities.

In the case of woodland planting, women perceived higher levels of native plant and invertebrate biodiversity during onsite walks than did men. These findings are compatible with those from earlier research, (Strumse, 1996, Lindemann – Matthies 2002a), and can be explained with reference to other work conducted in the 1990s, (Silverman & Eals, 1992) indicating that women have a more developed ability to perceive and memorise the location

of a complex assemblage of vegetation. This work proposed an evolutionary hypothesis to explain gender differences in spatial abilities rooted in the gender division of labour during the Plio – Pleistocene. It suggested that women have an enhanced ability to remember the location of objects as a result of their early human role as foragers or gatherers, whilst ancestral males were primarily engaged in hunting and did not require these skills. A more recent and extensive critical analysis of this theory, (Ecuyer – Dab & Robert, 2007) reveals a body of evidence favouring this evolutionary scheme.

In the case of herbaceous planting, women experienced higher levels of psychological and physical well – being, ie., a higher level of relaxation, feeling comfortable and greater sense of escape from mundane routines and work than men whilst walking through areas of herbaceous planting. This is also compatible with earlier research, which suggested that women took a more positive stance toward nature than men, Strumse, (1996), although in this case the study focused on preference rather than well – being. In a study focusing on preferences for Norwegian agrarian landscapes, women gave a significantly higher preference score than men for images in the ‘flowers’ category. Similarly, in the study of preferences for and attitudes towards street flowers in Sapporo, Todorova et al., (2004) found that women had different attitudes to street flowers than did men, in that they agreed more than men did to statements referring to the psychological and aesthetic benefits of street flowers.

The observation that women take a more positive stance towards nature than men might be linked to the evolutionary theory outlined above, (Silverman & Eals, 1992), or alternatively research on environmental concern which has consistently found that women have stronger pro – environmental values, beliefs and values than do men, (Xiao & McCright, 2015). Rather than relying on evolutionary theory, differences can be explained with reference to gender socialisation theory, (Chodorow, 1978; Gilligan, 1982), which explains how boys and girls are socialised to adopt certain roles and behaviours from early childhood. Simplistically, boys might be socialised to be more competitive, independent and unemotional, whereas girls are encouraged to be more empathetic and cooperative. These childhood differences in socialisation might then be a source of differences in attitudes to the environment, (Xiao & McCright, 2015). Consensus is now emerging, however, that both evolutionary and cultural factors underlie human preferences, (Daniel, 2001; Tveit et al., 2007).

The interviews also revealed some gender differences in response. As discussed earlier in relation to woodland structure, women expressed more feelings of apprehension at the prospect of walking through dense woodlands than did men. More women than men referred to childhood place attachment, (see later) when justifying preferences the area of meadow planting, yet this may also reflect the gender imbalance in the herbaceous interviews, where 12 women, but only 5 men were interviewed. The fact that more women volunteered to take part in the interviews than men may support the observation cited earlier that women take a more positive stance towards nature than men, (Strumse, 1996), as a result of evolutionary factors, (Silverman & Eals, 1992), or socialisation, (Chodorow, 1978, Gilligan, 1982). It is also likely that it reflects the gender imbalance in the original herbaceous questionnaire sample from which interview participants were recruited, which consisted of 178 (37.4%) men and 298 (62.6%) women.

1.4.2. The role of ethnicity

Questionnaire analysis revealed that ethnicity had a bearing on people's perceptions of the neatness of the planting, specifically the neatness and attractiveness of herbaceous planting. Results appeared to indicate that a small group of Asian Indians perceived herbaceous planting as neater and more attractive than any other group. Unfortunately, because of the low number of people from non – white ethnic groups who took part in the questionnaire survey and due to the great discrepancy in the sizes of ethnic groups, it was impossible to interpret the results in a meaningful way. The high ratings for neatness, attractiveness, interest, colour and complexity recorded by Asian Indians were a reflection of one Asian Indian family's viewing of the Oudolf borders at Wisley, and included the influences of the planting characteristics too. This is explained in the questionnaire results and analysis section. Of the 460 herbaceous interviewees who completed the Ethnicity question in the questionnaire, 405 (87.9%) were White British/Irish, 35 (7.6%) White (other), with only 20 individuals (4.5%) from any other ethnic group. The overall ethnic profile of questionnaire respondents was similar, with 89% White British/Irish, 7.3% White (other) and only 3.7% respondents from any other ethnic group.

As the herbaceous interviewees were drawn from questionnaire respondents, the demographic composition was similarly skewed towards White British, (15/17, 88%), with 1 Mixed White/ Asian and 1 Asian Indian interviewee. Interestingly, the Asian Indian herbaceous interviewee suggested that her ethnic background and culture had influenced her attitude to tidiness and order in planting and more widely. She explained that in her culture the word for 'dirty' was the same as that for 'untidy', so untidiness was viewed exceptionally negatively. She preferred to see neatness and order and to look at plants rather than immerse herself in them or do garden work. She disliked mud and feared thorns and other hazards in wilder areas of herbaceous planting. These attitudes and behaviours might be explained with reference to a Dutch study, (Schouten, 2005), which discussed the links between religion and ethnic/cultural images of nature and landscape preference. In Islam, nature is presented as well managed and without disorder, with the Arabic ideal of a paradisiacal garden resembling a cultivated oasis shielding from the wilderness of the desert, (Schouten, 2005). A later Dutch study, (Buijs et al., 2009) supported this, indicating that immigrant groups did not share the white 'native' wilderness view of nature, but had a dominantly functional view, seeing 'natural', rural areas as agriculturally productive areas.

The dominance of White British/Irish questionnaire respondents and therefore interview participants partially reflects the overall demographic composition of the UK population, in that the 2011 census revealed that the largest ethnic groups were White British (80.5%), followed by Any Other White, (4.4%), and Indian, (2.5%), (Office for National Statistics 2011 Census, Key Statistics for Local Authorities in England and Wales Release, website accessed 29th April 2015). The 8.5% discrepancy between the percentage White British in the UK population (80.5%) and overall questionnaire sample (89%) indicated that white British people were over represented somewhat and other groups under represented. If 'White' groups are combined, the over representation becomes more extreme; 84.9% the UK population is White, yet 96.3% questionnaire respondents identified themselves as White. It is likely that the ethnic composition of the questionnaire sample more accurately represented the ethnic composition of the users of the public green spaces and gardens sampled. There is significant variation in ethnicity across the UK by local authority. None of the sites except the two in Sheffield were in

large urban areas where the percentage non – white groups is higher. In addition many of the sites were in gardens such as RHS Wisley or Beth Chatto’s Garden, where visitors might have been members of the garden or the RHS or would have paid to enter, specifically to view plants. The appreciation of horticulture and the aesthetic value of plants and flowers can be linked to highly distinctive and intensively felt British gardening traditions. People from non – British groups are less likely to share this tradition and to visit ornamental gardens.

1.4.3. The role of Educational qualifications

Analysis of questionnaire data revealed that educational qualifications were related to people’s psychological and physical well – being whilst they walked through the planting. They also had a bearing on perceptions of native plant and invertebrate biodiversity. This applied particularly in the case of woodland planting. In the case of woodland areas, people with the highest level of qualifications i.e., masters’ degree or doctorate, reported the lowest levels of well – being, whereas those with a first degree reported the highest. The most qualified groups also perceived the lowest levels of native biodiversity associated with the planting. People with no qualifications at all perceived the highest levels of biodiversity.

Interpreting differences in psychological and physical well – being between groups is challenging, yet complexities might be unravelled by focusing on the individual variables contributing to the psychological and physical well – being rating. These were, ‘comfort, (feeling comfortable), ‘escape’, (being allowed to escape from more mundane routines and work), and ‘relaxed’, (feeling relaxed). Although there was no significant relationship between economic status and Psychological and physical well – being, it is possible that the respondents with a first degree might have been employed in types of work they needed to ‘escape’ from to a greater extent than those more highly qualified, who perhaps had roles that satisfied them. If in an academic role, respondents with doctorates might feel passionate about their work and not feel the need to get away from it, although there is no real evidence for this. Interviews did not provide any further evidence in that interviewees represented a smaller sub – set of self - selecting individuals who were all particularly interested in the research. Of the total 34 interviewees, 13, (38%) had a first degree, 3 had a masters’ degree and one a doctorate. Some were working in full – time posts, some part – time, others in volunteer roles, and others retired, yet all showed great enthusiasm for planting or spending time in green spaces.

Secondly, considering differences in perceived native biodiversity levels, respondents with the highest levels of educational attainment are likely to have had more knowledge and a greater ability to distinguish between native and non – native plants, to have been more aware of the origin of the plant species viewed and confident in their assessment of species as native/non – native. Research has shown that the general public has a limited ability to identify plant and animal species diversity, and that as identification skills increase, so does the ability to accurately gauge biodiversity, (Dallimer et al., 2012)

1.5. How do people’s preferences vary with different levels of professional involvement with both nature conservation-biodiversity and landscape design? Being a landscape professional

Questionnaire findings indicated that being a landscape professional also had a bearing on people’s psychological and physical well – being whilst they walked through the planting, but

this only applied in the case of shrub planting. Landscape professionals reported significantly lower levels of well – being than any other respondents whilst walking through shrub areas.

There are several possible explanations for the relationship identified; firstly, many landscape professionals in the UK have worked in urban contexts where shrub planting has become the norm. The landscaping of car parks, university campuses and areas around residential properties is often done using low maintenance shrubs. Landscape professionals may be overfamiliar with this style of planting, or might view it as lacking in creativity. Linked to this, landscape professionals might view being in a shrub environment as something similar to being in a working environment, so they would not score the walk highly in terms of ‘escape’, or ‘being allowed to escape from more mundane routines and work’. It is also interesting to observe that the relationship between landscape professional/otherwise and psychological physical well – being emerged only in the case of shrub planting, and did not occur with woodland and herbaceous planting, with which landscape professionals may be less familiar in a working context.

Considering evidence from interview data, one of the nine shrub interviewees was a landscape professional, working in private practice, whereas the other eight were not landscape professionals. The landscape professional’s views on the images of the eight different areas of shrub planting used in the interviews were different to those of the other eight interviewees. When discussing the overall attractiveness of the areas viewed, the eight non – landscape professionals all responded very positively to non – native shrubs, including bright, colourful *Rhododendron* planting. In contrast, the landscape professional stated that he preferred shrub planting that looked more, 'natural', describing the bright pink azaleas of the Punchbowl as 'quite an assault to the senses'. He chose an area of native woodland edge in Fairlands Valley Park in Stevenage as the most attractive of the eight sites. This could of course be a professionally constructed inverted snobbery, to see the more austere, ascetic planting as more beautiful than the more colourful vegetation preferred by the public.

As yet there has been no research published focusing on specifically on attitudes of landscape professionals to shrub planting, although in a study eliciting responses from over 250 landscape professionals, Ozguner et al., (2007) demonstrated that a more naturalistic style of urban planting was popular with those working for conservation trusts, but less so with local authority works surveyed. Landscape professionals in private practice appreciated both formal and more naturalistic styles, thinking these should co – exist in an urban environment. A later study, (Zheng et al., 2011), focused on student groups rather than professionals, yet showed that wildlife science students preferred a more naturalistic landscape than students in social sciences, agricultural economics, and horticulture, who preferred a neater more obviously maintained environment around their homes.

1.6. Are preferences based on factors such as the physical context of the planting or personal place attachment?

Two key themes emerging from the analysis of interview data were ‘evocative planting and place attachment’ and ‘the significance of context’.

1.6.1. Evocative planting and place attachment

When asked to justify their preferences for particular areas of planting, many interviewees evoked past experiences or memories of the area shown in an image, or of another similar

area of planting. This process of evoking past landscape experiences can be linked to 'place attachment, or 'a positive bond that develops between groups or individuals and their environment', (Altman & Low, 1992, Williams et al., 1992). Place attachment studies emphasise, 'that places are more than geographic settings with definitive physical and textual characteristics; they are fluid, changeable, dynamic contexts of social intersection and memory, (Stokowski, 2002). Although the process of evoking past landscapes applied to many interviewees, it was more prevalent in the case of women. This is consistent with findings of an earlier study of place attachment in Santa Cruz, Tenerife, where women respondents showed a greater place attachment than men, Hidalgo & Hernandez, (2001).

Perhaps significantly this occurred when interviewees viewed woodland and herbaceous planting, but never shrub planting. In the case of herbaceous planting this occurred almost exceptionally in relation to two areas of planting; the annual meadow at Wisley, and Stevenage grasshopper chalk meadow. The Wisley Olympic wildflower meadow was the area of planting which prompted more evocative responses than any other area.

Two dominant sub – categories of evocative planting and place attachment emerged; familiarity including shared family experience with grandchildren, and personal childhood experience and memories.

i) Evocative planting; Familiarity including shared family experiences with grandchildren

When accounting for the relative attractiveness or relaxation potential of particular areas of woodland or herbaceous planting, twelve interviewees chose the areas of planting local to them as their preferred areas, or said that the area they viewed reminded them of a familiar, local area. Some referred back to particularly positive experiences in these areas, sometimes with their grandchildren. This gives further weight to the argument that familiarity with general landscape types has a positive correlation with landscape preferences, (Dearden, 1984). When speaking about their relationship with Monk's Wood in Fairlands Valley Park some Stevenage residents demonstrated deep feelings of place attachment which had grown over years through shared or individual experience. Elements such as specific trees had meaning, and sometimes names, and seasonal change itself was a key element. One woman spoke with enthusiasm about regular visits to Monk's wood in Fairlands Valley Park with her two teenage grandsons. Together they had created a fantasy world within the woodland, where trees had taken on names, (the 'sentinel'), and personalities, and she had written stories for the boys about these characters. She was surprised that teenage boys could remain so mesmerised by what she perceived as such a simple activity; walking in the woods. Another Stevenage interviewee described deep, spiritual experiences in the same wood. He claimed to 'feel vibrations', when walking through the woodland, which he never experienced in an area of more open herbaceous planting. This same woodland was referred to as, 'our wood', by another Stevenage resident who walked there with her dog on a twice daily basis. She talked about watching the trees and shrubs for new growth in spring, and suddenly being aware of a full canopy of leaves. These findings are consistent with those of Jorgensen et al., (2007) in a study focusing on 'place identity' in Warrington New Town. Birchwood (Warrington) residents, identified green spaces in the local area as their favourite places, and, 'invested these places and the surrounding landscape with rich meanings, to do with the conservation of nature and

wildlife and human coexistence with nature; awareness of natural cycles and seasonal change; the potential to engender existential experiences'. In the case of interviewees discussing herbaceous sites, two recalled their own gardens when accounting for why they considered areas of herbaceous planting attractive, whereas another interviewee appreciated the meadow at Wisley because it reminded her of 'home', or, 'Swedish meadows'. Manzo, (2005), explains how the literal or metaphorical interpretation of 'home' has been the central focus for many researchers of place attachment, and cites the observation that 'home' is often used as a spatial metaphor representing a range of places, as well as representing a way of being in the world, (Moore 2000).

ii) Evocative planting; Childhood experience and memories

Places have been described as 'bridges to the past', (Manzo, 2005), which provide continuity in people's lives. In total, five interviewees drew on their own positive childhood memories of woodland when explaining why they were attracted to particular woodland images. One resident of Stevenage recalled her childhood memories of playing in the area of woodland she later walked through to do the questionnaire almost 50 years later. Another interviewee associated the photograph of Monk's Wood, Stevenage, with childhood walks through bluebell woods with her mother. When accounting for why they thought the meadow at Wisley was an attractive area of planting, three female interviewees recalled childhood experiences and memories associated with meadows. One recalled walks with her grandmother, whereas another remembered the height of the tall meadow grasses in relation to herself as a small child. These findings are consistent with those from a study of the importance of childhood place attachment to woodland and greenspace settings in central Scotland and the East Midlands of England, (Ward – Thompson et al., 2008). Findings showed that individuals who visited these places as children were more likely to use them alone as adults, and that adult awareness of their physical and emotional benefits reflected childhood experiences.

The interviews revealed place attachment in relation to woodland and meadow planting, yet not in the case of arboretum – style planting, shrub planting, or more formal herbaceous planting. More needs to be done to understand these relationships. There is also further scope for the awareness that negative or ambivalent 'place attachment', exists, (Manzo, 2005), as revealed by Jorgensen et al., (2007) in the study of residents' perceptions of ecological woodland planting in the context of residential development in Birchwood, Warrington.

1.6.2. The significance of context

Once interviewees' perceptions of the relative attractiveness or well – being potential of particular areas of planting had been explored, discussions moved to context. In many cases interviewees expressed strong views about the physical context within which they considered particular structures and characters of woodland, shrub and herbaceous appropriate. Most discussions focused on context in relation to non – native species (eucalyptus trees, the *Cordyline australis* planting in Torquay, azaleas and rhododendrons and the Mediterranean Bank at Abbotsbury), or in relation to informal meadow – style planting. In the case of the latter, for some interviewees the relative tidiness of the planting and level of maintenance they thought it would require were factors related to context.

i) Context in relation to non – native planting

Some interviewees rejected particular areas of non – native planting such as the sub – tropical Jungle Ride, and Mediterranean Bank at Abbotsbury or *Cordyline australis* planting in Torquay because they looked, ‘out of context’ in the UK, and more appropriate to somewhere such as Hawaii or the south of France. They thought the appearance and form of these species were so dissimilar to what they perceived as semi – natural, or indeed, ‘natural’ in a particular part of the UK. Others thought that although Mediterranean planting might be appropriate in southern coastal areas of the UK, such as the ‘English Riviera’, including Torquay, it was not appropriate in other particularly northerly parts of Britain, such as Sheffield. These reactions were often related to people’s beliefs and values in relation to native species which are discussed in more depth later.

ii) Context in relation to informal meadow – style planting

Focusing on context in relation to informal herbaceous planting, although some interviewees advocated a guerilla gardening approach to urban meadows, where seed would be thrown liberally around any available area of wasteland and allowed to germinate, many people had a highly developed sense of the appropriate context for meadows, often referring to road verges and roundabouts as the best locations. One interviewee gave a personal example of where she had seen meadows sown to create an attractive effect along road verges leading into Brighton. This view is consistent with findings from yet unpublished work focusing on public reaction to a series of introduced urban meadows in different residential contexts in Bedford and Luton, (<http://bess-urban.group.shef.ac.uk/podcasting-from-the-meadows/> accessed 25th June 2015). In this research, local residents and focus group participants also expressed the view that roundabouts and road verges would be an appropriate context for introduced urban meadows. Several residents objected to replacement of selected areas of amenity mown grass on ‘greens’ very close to and in view of their houses with a range of different meadow treatments of different heights and species diversity. One resident referred to this as, ‘a wanton act of vandalism’. This gives further weight to earlier observations, (Nassauer, 1988; Jorgensen, et al., 2007; Nassauer, 2009), that people prefer to see a ‘tidier’ more orderly and well – maintained version of nature immediately adjacent to their homes, whereas people have a need for, or at least tolerance of, wilder green spaces further afield but still close by their local area, (Jorgensen et al., 2007). Comments on the ‘appropriate’ context for planting such as Stevenage grasshopper chalk meadow, confirm this. On seeing the photograph of this semi – natural meadow, four interviewees described this as being more appropriate in an out – of – town context, ‘by the river’, or ‘in the countryside’.

2. Research Question 2

How are preferences related to people’s underlying beliefs and values in relation to the value of greenspace and biodiversity, global climate change and the value of non – native species?

There is now evidence to show that individual and group beliefs and values have a bearing on attitudes, perception and preference, (Ives & Kendal 2014). The relationship between these is explained in the literature review with reference to the cognitive hierarchy. People’s beliefs concerning the potentially restorative qualities of outdoor greenspaces and the value they assigned to habitat biodiversity were assessed through the ‘thoughts’ section of the questionnaire. Their underlying values concerning issues such as climate change and the use of

non – native plant species in UK parks and gardens were also considered. Climate change and the role of non – native planting were discussed with the 34 interviewees.

2.1. Do people who already value urban greenspace and its biodiversity react differently to designed urban planting than others?

Findings from the analysis of questionnaire data indicated that people who reported a stronger general appreciation of the psychologically restorative benefits of outdoor greenspaces and valued habitat biodiversity more highly via their ‘thoughts’ perceived the areas they walked through on the day of their questionnaires more positively than did others. These people perceived areas as more attractive, neater and more biodiverse than did others. They also reported higher levels of personal psychological and physical well – being whilst walking through the planting. This is important because it means that people who were already predisposed to feeling positive about the planting and the restorative nature of green spaces, ie., those with more biospheric (nature – centred) value systems, had a more positive experience both aesthetically and in terms of their personal well – being than others. These findings support the observations by Van den Berg et al., (2014), that, ‘restoration in urban public spaces depends on individual perceptions and needs as well as physical characteristics of the setting’.

These findings also have important implications in terms of education, policy and practice. If people with more biospheric underlying values had a more positive experience on their walk through the planting, environmental education might be used as a vehicle to influencing people’s values, beliefs then attitudes and behaviours; equipped with increasingly biospheric underlying values, people might benefit more both aesthetically and in terms of their well – being, from planting and greenspaces.

2.2. Does designed planting involving non – native species with very unfamiliar appearances become more accepted when it is viewed as part of a response to a radically changing climate?

Questionnaire evidence indicated that people with stronger climate change beliefs recognised higher levels of native plant and invertebrate biodiversity on their walks through areas of planting than did others. These people were informed about climate change and might have been more highly educated or might have possessed particular environment – related knowledge. They would be more likely to distinguish between native and non – native biodiversity. As stated previously, research has shown that the general public has a limited ability to identify plant and animal species, and that as identification skills increase, so does the ability to accurately gauge biodiversity, (Dallimer et al., 2012).

Climate change beliefs and the acceptance of non – native species with unfamiliar appearances were explored fully in the interviews. All 34 interviewees were of the opinion that climate change was actually happening, although there was real variability in the understanding of the process, its consequences and thoughts concerning the extent to which human activities were responsible. Eight interviewees expressed a clear belief that it was of human origin, or that human activity had a role in its acceleration, whereas six saw climate change as a self - regulating, natural, cyclical process. One interviewee expressed an awareness of the

polewards migration of bird species in response to global warming, (Parmesan & Yohe, 2003, Parmesan, 2006, Hickling et al., 2006), viewing this as a positive change. Interviewees were all shown a photograph of the Mediterranean Bank at Abbotsbury, (Figure 2), and asked if they would be happy to see this type of planting in public parks and gardens in the UK. Of the 34 interviewees commenting on the issue, 25/34, (74%) said they would be prepared to accept this type of Mediterranean planting with an unfamiliar appearance in UK parks and gardens.



Figure 2: Interviewees were shown the image of the Mediterranean Bank at Abbotsbury and asked if they would be prepared to see this type of planting introduced in UK parks and gardens.

Some interviewees were prepared to accept non – native species with very unfamiliar appearances purely on aesthetic grounds. When shown this photograph of the Mediterranean Bank (Figure 2), 8 interviewees expressed the opinion that they found this type of planting attractive, supporting the observation that many UK residents choose exotic species over natives because they find certain exotic species particularly attractive (Hitchmough, 2011). Interestingly, two of these, were residents of Torquay, where this type of planting already features prominently in urban landscapes. A further interviewee had moved to Poole several years ago, where this type of planting is more common than in Nottingham, where she had lived previously. She thought that increasing exposure to more ‘unfamiliar’ or ‘exotic’ species had probably contributed to her now positive view regarding its use in public spaces. This evidence supports the earlier observation that familiarity has a positive correlation with landscape preference, (Dearden, 1984). Many interviewees gave climatic or ecological reasons for their acceptance of this style of planting indicating that non – native planting is seen as more acceptable in the context of a changing climate. Some interviewees expressed a preference for it over native UK species, because it would be more suited to an increasingly arid climate. 15 of the 25 positive interviewees referred to ecological reasons, showing an awareness that many species currently used in UK urban planting design are becoming less climatically fit for their current locations, (Hitchmough, 2011), and that, ‘a philosophy of ...restoring biological communities to some specified (or imagined) historical state, sits uneasily with the reality of climatic and environmental change’, (Thomas, 2015). The majority of these (13/15) made reference to the need to respond increasing aridity and the need to produce more sustainable urban planting that didn’t require constant watering and maintenance. One interviewee, referred to the use of non – native plants which are adapted to a drier climate as, ‘evolution in action’.

In contrast, there was a minority of 4/34 interviewees, (12 %), who objected strongly to the introduction of non – native planting in the UK. Concerns focused mainly on the perceived invasiveness of ‘non – native’ plants. In fact, 17 of the 34 interviewees expressing a view on the introduction of non – native species to UK parks and gardens qualified their responses by voicing reservations about this introduction. This included many interviewees who were

generally very positive on aesthetic or climatic grounds. These positive and negative attitudes are interesting, because they suggest a lack of awareness that most gardens and public landscapes in cities are already dominated by non – native species, (Smith et al., 2003), and have been for the past two centuries. This suggests that either this is not recognized by them or that in the moment of the interviews they over – rode their own understanding of this.

The negative concerns were almost entirely based on perceptions on the invasiveness of non – native species, and/ the likelihood that they would out compete and oust native plants. Several interviewees made references to past experience with Himalayan balsam, rhododendrons, Japanese knot weed, and the grey squirrel. Earlier work (Thompson et al., 1995) made it clear that ‘invasiveness is not a particular property of exotic plants but a combination of biological traits that some exotic and native plants possess’, (Hitchmough 2011). Recent work, (Thomas & Palmer, 2015) has confirmed this. Three interviewees, all female, referred to what they perceived as the negative impact of non – native plant species on native wildlife. In reality it has been known for some time that non – native plants do support a wide range of native invertebrates, (Owen, 1991; Smith et al., 2006a). More needs to be done to raise general public awareness of the scientific reality of relationships between native and non – native plants and non – native plants and native invertebrates.

3. Research Question 3

Is there overlap between designed planting that is most preferred by people and planting that they perceive as the most biodiverse?

This question was addressed via both the questionnaire and in discussion with interviewees. Focusing on the questionnaire, four indicators were used to assess how biodiverse people perceived the planting to be; perceptions of plant species diversity, the number of native UK plant species perceived to be present, the perceived value of the planting for butterflies, bees and other insects and the number of native insect species perceived to be present. Perceptions of both plant and invertebrate diversity were therefore considered. Native diversity was incorporated to explore its specific relationship with preference.

In order to assess the relationship between people’s preference for particular planting and perceived biodiversity, relationships between perceived attractiveness and perceived biodiversity and between people’s psychological and physical well – being and perceived biodiversity were considered, as well as focusing on the relationship between perceived attractiveness and well – being. This is because there is already considerable support for the argument that scenic beauty judgements differ from scenic preferences, (Arthur, 1977). In addition, some work has indicated a strong correlation between attractiveness and well – being, (Laumann et al., 2001; Van den Berg et al., 2003), yet other work (Martens et al., 2011) questioned the assumption that well – being arises from the positive evaluation of environments, indicating that the relationship between attractiveness and restoration is more complex than assumed so far. Recent work has focused on the relationship between well – being and biodiversity, (Fuller et al., 2007; Dallimer et al., 2012), yet this neglected the role of perceived attractiveness. This research sought to clarify these relationships.

3.1. How are perceived attractiveness and perceived biodiversity related for people walking through areas of woodland, shrub and herbaceous planting?

Both questionnaire and interview evidence indicated a clear overlap between the areas of planting people considered aesthetically attractive and those they considered biodiverse.

Firstly, analysis of questionnaire data indicated for woodland, shrub and herbaceous areas (all communities), there were significant positive correlations between how attractive people perceived the planting to be and three out of the four indicators of perceived biodiversity. Attractiveness was related to perceptions of plant species diversity, the perceived value of the planting for butterflies and bees and other insects, and to the number of native insects people perceived to be present within the planting at the time of their walk. Interestingly, there was no relationship between people's perceptions of attractiveness and the number of native UK plants they perceived to be present.

The strongest relationship identified here was that between perceived attractiveness and the perceived value of the planting for butterflies bees and other insects. Planting viewed as particularly good for butterflies, bees and other insects was considered the most attractive. These findings may be related to flowering, and the amount of visible flower present at different sites during the walks and questionnaires. The earlier discussion of the role of flowering, indicated that particularly in the case of shrub and herbaceous planting, that with a high percentage flower cover was considered the most attractive, and that people had associated flowering with the presence of pollinating insects. Many questionnaire respondents appeared to base their assessment of the value of the planting for insects on visual evidence in the form of the number of pollinating insects they could actually see on the day they did their walk and questionnaire. This agrees with interview evidence. When asked to choose the three areas of planting they thought would be the best for native butterflies, bees and other insects, most interviewees were immediately drawn towards flowering plants, with a small minority referring to the structure of the planting and it's possible habitat value, as well as referring to the different life cycle stages of insects.

Perceived attractiveness was also related to the number of UK insects people perceived to be present in the plantings. Plantings viewed as good for UK insects also were also perceived as attractive, although in this case the relationship was weaker. This might have been because respondents did not associate the most attractive, perhaps brightly flowering plants with native insects, or because they were unable to discriminate between native and non – native insects. Dallimer et al., (2012), a previously cited study, indicates that 'people generally have poor biodiversity – identification skills'.

Results also indicated that people found planting they perceived as richer in plant species diversity to be more attractive. This confirms evidence from the interviews, particularly in relation to herbaceous meadow planting, where many interviewees expressed real appreciation of the great variety of species of different colours in the annual meadow. Each was attractive in its own right, yet it contributed to a dramatic overall effect. This is consistent with findings from earlier work, (Lindemann – Matties et al., 2010), where respondents' aesthetic appreciation of meadow grassland increased with increasing species diversity.

Considering interview evidence, when justifying why they perceived certain areas of planting as attractive, thirteen interviewees referred to the biodiversity or wildlife value of the planting

as a factor influencing their decisions. Although the word, 'biodiversity', was not used directly, interviewees referred to habitat value and plant, insect, bird and animal species variety. This occurred in the case of both woodland and herbaceous planting, but maybe significantly, never in the case of shrub planting. In the case of woodland planting discussion focused more on the invertebrate habitat value of the woodland, whereas pollinators were a major focus in the case of herbaceous planting, supporting the observation regarding the relationship between perceived attractiveness, flowering and pollinators made above. In the case of both woodland and herbaceous planting, as well as referring to invertebrate biodiversity, interviewees widened their response to refer to the possibility of seeing mammals, reptiles and birds within the areas. The planting was seen as attractive because it was perceived to be valuable for wildlife.

The lack of any relationship between perceived attractiveness and the number of UK plant species people perceived to be present in the area they walked through means they did not differentiate between native and non – native plants in terms of attractiveness, i.e., it indicates that the public gauged the attractiveness of the planting in terms of its visual, aesthetic traits, rather by non – visual traits such as nativeness per se. This is consistent with results of European work by Fischer et al., (2011), which indicated that whether or not a species is native plays a very small role in determining whether the general public would like to see an increase in the population of that species. This also gives further weight to earlier evidence that in general people are very accepting of non – native planting. This is of great importance to the landscape architect aiming to produce climatically sustainable urban planting which is also aesthetically acceptable to the UK public.

3.2. How are psychological and physical well – being and perceived biodiversity related for people walking through areas of woodland, shrub and herbaceous planting?

Earlier studies have identified relationships between psychological well – being and actual biodiversity, (Fuller et al., 2007), and well – being and perceived biodiversity, (Dallimer et al., 2012). In both these studies the indicators of biodiversity used included plant, butterfly and bird diversity. There was no distinction between native and non – native biodiversity.

In this research analysis of questionnaire data provided limited evidence of a positive relationship between people's psychological and physical well – being and their perceptions of plant and invertebrate biodiversity as they walked through an area of planting, yet in the case of woodland planting no such relationship was identified.

In the case of shrub planting a weak relationship was identified between people's well – being and perceived plant diversity. People felt a greater sense of well – being in the shrub areas that they perceived to be more varied and species rich. This information is extremely valuable for the landscape architect aiming to design public planting to improve human experience. Many areas of public planting in car parks, business parks and town centres are currently dominated by shrub planting, which this research has revealed is the least popular of the three vegetation communities amongst the public. Research participants have described some shrub areas as 'boring', flat and static. These findings suggest that increasing the species diversity of shrub planting may improve human experience and the public's perceptions of shrubs.

In the case of herbaceous planting questionnaire respondents recorded higher levels of well – being in the areas of herbaceous planting they thought would be better for butterflies, bees and other insects. This corresponds to interview evidence, where people expressed the view that they knew bees and pollinators ‘were a good thing’. It might also be related to the presence of more flower cover, although earlier analysis has shown that although higher levels of flower cover were significantly related to attractiveness, they were not related to psychological and physical well – being.

3.3. How are perceived attractiveness and psychological and physical well – being related for people walking through areas of woodland, shrub and herbaceous planting?

Analysis of questionnaire data provided evidence of a relationship between the perceived attractiveness of areas of the planting and people’s psychological and physical well – being whilst they were walking through them. This applied in the case of all vegetation communities, yet in contrast to some findings, (Laumann et al., 2001), the relationship was not strong. The strength of the relationship varied between vegetation communities in that it was low to moderate for woodland herbaceous planting, and moderate to substantial for shrub planting. This means that walking through planting people thought was attractive would not necessarily invoke feelings of restoration. Equally people might feel a sense of well – being or restoration whilst walking through an area of planting without perceiving it as attractive.

Differences between perceived attractiveness and well – being can be partially explained with reference to people’s reactions to different planting stimuli and the circumplex model of effect, (Russell, 1980), as discussed earlier with reference to people’s response to shrub flowering at the Punchbowl in the Valley Gardens. Planting perceived as attractive is often bright and stimulating, resulting in an excited, elated affective response, whereas in contrast subtler greens provoked a calm, relaxed affective response.

3.4. Is there an overlap between designed planting that is most preferred by people and planting that they perceive as the most biodiverse? A summary

These findings indicate a clear overlap between areas of planting people perceived to be attractive and those people perceived to be rich in both plant and invertebrate species. People made no distinction between what they perceived to be native and non – native planting in their assessment of attractiveness, indicating that visual traits were more important. For the landscape architect there are several important points here; firstly, people are appreciative of plant diversity, suggesting that increasing the diversity of all planting might improve its attractiveness, (although these findings are based on perceived rather than actual plant diversity), secondly, people do value insects, and particularly pollinators, and thirdly, people appear prepared to accept more sustainable planting which is better adapted to climate change than much of our current public planting.

Findings indicated that there was a limited overlap between people’s perceptions of their own well- being and their perceptions of the biodiversity of the area they walked through, yet the positive relationship between well – being and plant species diversity in shrub planting has important practical implications in terms of improving people’s perceptions of shrubs through increasing the diversity of urban shrub planting.

A relationship between perceived attractiveness and perceived well-being was identified for all communities, but the correlation was weaker than that shown in previous research, (Laumann et al., 2001). This is partially because as findings have shown here, perceptions of attractiveness were generally associated with colourful flowering planting, whereas more muted greens were related to feelings of well – being.

The weakness of the relationship between perceived well – being and biodiversity as described above, together with the gap between perceived attractiveness and well – being are explained more comprehensively with reference to earlier evidence. This has shown that human aesthetic responses such as perceptions of attractiveness, interest, complexity and neatness were influenced more by the characteristics of the planting; flowering, planting structure and species character, than by any other factors. In contrast, aside from the role of planting structure, psychological well – being was influenced more by people’s background factors (gender, educational qualifications and whether they were a landscape professional) and their beliefs and values, than the characteristics of the planting itself. In addition, people with more biospheric (nature – centred) values were more likely to view the planting they were walking through more positively aesthetically and to feel a greater sense of well – being than others. This has very important implications for landscape architecture. It suggests that landscape architects do have the power to improve people’s aesthetic experience in public spaces but that there are limitations to how far the landscape architect can bring about improvements in psychological and physical well – being.

Part 5

Conclusions, implications for practice, limitations and further research

5.1 Conclusions and implications for practice

This is the first large scale study that has looked specifically at public perception and preference in relation to such fine – grained categories of natural landscape; a range of typologies of woodland, shrub and herbaceous planting defined by structure and species character. Importantly for Landscape Architecture and other disciplines that deal with designed planting and human reaction to this, this research has shown that planting structure and character, as well as flowering, have a considerable impact on the general public's perceptions of its attractiveness, neatness, complexity, how interesting they think it looks, as well as how biodiverse they perceive it to be.

Findings indicate that the structure of the planting or the way in which the plants are assembled to create a 'whole' experience is important in determining how attractive people think the planting is, how neat it is perceived to be and in some cases how comfortable and relaxed people feel when they are walking through it. Results suggest that people find planting most attractive when it demonstrates, perhaps subtly, some form of human modification, a taming of 'wild' nature to make it look to some degree 'cared for'. This is extremely important to the landscape architect who can manipulate planting structure through design and then management, to create a particular human experience. In woodland vegetation the results suggest that people are able to value planting that is more disordered than conventional mown grass with emergent trees, but are potentially uncomfortable in dense semi – natural woodland. They need a compromise; a degree of openness and visibility which affords sight lines through the planting, (Jorgensen et al., 2007). The preference for a more disordered style over open savannah landscape might suggest that a cultural adjustment to a more 'naturalistic' style may now be overlying the evolutionary forces previously thought to account for general preference for the savannah, (Appleton, 1975). In the case of herbaceous planting, particularly since the London 2012 Olympic Park was exposed to public view, there has been a movement towards accepting and appreciating a more structurally diverse meadow – like style. This was evident particularly amongst our interviewees who because of their heightened interest in the environment, planting and landscape, were probably more sympathetic to naturalistic planting than the average British citizen. Even amongst these people there was a highly developed sense of context, also of great relevance to the landscape architect; meadows were often considered most appropriate on roundabouts and on road verges.

For the landscape architect striving to produce attractive, sustainable planting through a warming twenty first century climate, findings indicating that people do not discriminate easily between native and non – native plant species in assessing relative attractiveness were encouraging. In general, when asked directly, people were prepared to accept non – native species; indeed some species and areas of planting were appreciated for their visual qualities. For most of our respondents and interviewees, the ecological, climatic argument for using non

– native species in the UK was the most convincing one. Less positively, findings revealed widely held misconceptions about the invasiveness of non – native plants, and their incompatibility with native invertebrates and wildlife in general. Although very recent work in a UK context, (Thomas & Palmer, 2015), has shown convincingly that non – native plants are not by definition invasive, and earlier research confirmed the compatibility of non –native planting and native invertebrates, (Owen, 1991; Smith, 2006a), more work needs to be done to make these findings both accessible and understandable to the public.

As expected, flowering and colour were shown to be important aspects of the planting affecting people’s responses. As stated previously, whilst the on-site walks were being conducted, there was very little visible flower at any of the woodland sites, yet at the herbaceous sites almost all the walks were conducted through areas where plants were flowering profusely. In the case of walks through shrubs, extremes were experienced; some areas were in full flower, such as the Punchbowl in May, whereas there was no flower at others, such as the early Hydrangea planting. Most people reacted extremely positively to flowering, seeing planting with a large amount of flower cover as the most attractive. This was particularly the case in the shrub areas, which appeared to be valued for little else. There was some evidence that landscape practitioners reacted more negatively to dramatic flowering displays than did the rest of the research participants. This gives considerable cause for concern, as this design elite may be imposing its own cultural norms and rules on a public that would actually like to see more colour, yet has little control of the aesthetic qualities of the urban planting around them. Although colourful flowers were considered the attractive and stimulating, people also showed a real appreciation of more muted low – key greens which provided the ‘background’ allowing them to relax, feel calm and a sense of escape from the pressures of the day. This is also important for the landscape architect. It shows people are prepared to accept and even appreciate planting beyond its relatively short flowering window.

As discussed earlier, this research also reveals a challenge to the designers of urban shrub planting. This was first highlighted through the questionnaires, and then through the interviews. People viewed shrubs in a highly utilitarian way, commenting on their static nature and lack of movement. There was a general acknowledgement that the bright flowering shrubs of the Punchbowl, considered attractive by many, were in fact very artificial – looking. Many public parks, verges, and particularly car parks of retail parks, business parks and supermarkets in the UK are currently dominated by monocultural blocks of shrub planting, so they do fulfil a utilitarian role. In the interviews, woodlands and herbaceous meadow planting evoked past experiences and positive place attachment. People talked about walks through woodlands and meadows as children, or of experiences in these areas with their own grandchildren. They appreciated these areas for their wildlife value. Not one interviewee referred to place attachment in relation to shrubs. The research did provide grounds for hope, or even action on the part of the landscape architect; it indicated that people responded more positively to shrub planting of varied height and profile, and that which they perceived as being more diverse in terms of overall number of plant species present.

Findings also indicated that people’s perceptions of planting were influenced by their existing beliefs and values, as well as the characteristics of the planting itself. People with more biospheric (nature – centred) values had a more positive experience when walking through the planting, and rated it higher in terms of attractiveness and other positive characteristics. In some ways this diminishes the role of the landscape architect, in that it suggests that

individuals or groups need to be attuned to the benefits of the landscape before they are receptive to it, yet more positively this presents a challenge to increase awareness and perhaps promote biospheric values. The research also revealed a clear overlap between the planting people perceived as attractive, and that they perceived as providing the highest levels of plant species and invertebrate diversity, showing that people do value biodiversity in planting, or at least what they think represents biodiversity. Indeed, interviews revealed a clear appreciation of the wildlife value of woodlands and meadow areas in particular, the first in terms of habitat for a wide range of species, the second as a magnet for pollinators.

The work also revealed that although there were strong links between people's perceptions of the aesthetic qualities of the planting and the characteristics of the planting itself, people's own sense of well – being, of feeling relaxed, calm and able to escape the stresses of the day, was very much dependent on their individual background factors, as well as their beliefs and values. This perhaps puts the role of the landscape architect in perspective; although he or she might manipulate the structure of the planting to improve human experience, there are other factors beyond the scope of the profession which impact on individual and group well - being.

5.2. Limitations

It is important to reflect upon the limitations of the study, particularly with a view to applying lessons learnt to the research design and methodology of future projects.

- In the Introduction and methods section the advantages of the holistic, immersive approach to the questionnaire, that is, asking respondents to walk through areas of planting, are emphasised. This experiential, real – world method has advantages over a remote, more detached approach; getting participants to view landscape photographs or videos. Although there were distinct benefits to the approach taken, there was also the challenge of varying weather, including temperature, wind speed, and light levels, all of which had a bearing on respondents and therefore their perceptions. Some caution must therefore be exercised when interpreting results.
- The allocation of variable descriptors to define structure/character typologies, as described in the methods section, may be criticised as too reliant on 'expert' view, as these scaling descriptors were allocated by the researcher and her supervisor. In defence of this, statistically significant results and marked patterns in terms of the effect of 'structure' and 'character' indicate that meaningful typologies were defined.
- The original intention was to seek out people who were not using the public parks or private gardens. In reality both the questionnaires and interviews were carried out exclusively with people who were users of these spaces. It would have been beneficial to gauge the response of non – users to better understand their reactions to variations in structure and character, as well as gain some insight into their reluctance to use the spaces.
- If the role of background factors such as ethnicity were to be identified and interpreted in a meaningful way, sampling in more ethnically diverse areas would be necessary. Most of the original walks took place in private gardens with dominantly white British visitors, or in public spaces where the local residents were dominantly white British.
- All interviewees had a well – developed interest in the environment, horticulture or landscapes and therefore demonstrated intensely biospheric (nature – centred) value

systems. It would also have been valuable to conduct interviews with individuals with dominantly social altruistic (human – centred) or egoistic (self – centred) underlying values.

- The use of ‘perceived biodiversity’ as a proxy for actual biodiversity may be criticised, particularly as there is evidence that people are generally poor assessors of actual biodiversity, (Dallimer et al., 2012). It was, however, deemed meaningful to assess the extent to which people perceived areas they thought were beneficial in terms of biodiversity as attractive and a source of personal well – being.

5.3. Scope for further research

A number of key issues have been identified as worthy of future research;

- The challenge to provide attractive, interesting shrub planting must be addressed. In addition to the utilitarian nature of shrub planting, it is also extremely valuable for wildlife, including bird populations. Findings indicate that people responded more positively to shrubs of varying height and profile, and those which they perceived as more species diverse. Future research needs to focus on manipulating both structural and species diversity of shrub planting in real-world urban public sites, to gauge if this does in reality improve human experience and then reaction.
- At the beginning of this project it was intended to generate an index which represented how beneficial each area of planting was for native UK invertebrates of all types, not just pollinators. This would have been a proxy for measured invertebrate biodiversity, and would have been based on a range of indicators such as species diversity, phenology, (Crisp et al., 1998; Asteraki et al., 2004), and spatial form, (Smith et al., 2006a), already highlighted in the literature. In reality this proved to be beyond the scope of this study; it is still an area ripe for further study
- The next stage in the process would be to assess actual biodiversity and to gain greater understanding of the relationships between perceived attractiveness, well – being and perceived biodiversity in relation to the three vegetation communities
- Throughout this study reference has been made to the perhaps unrepresentative nature of both the larger questionnaire sample and particularly the self – selecting interview sample. It is likely that the questionnaire sample represented the users of the public spaces and gardens studied, yet it would be both interesting and valuable to increase the scope of this study to incorporate the perceptions, preferences, beliefs and values of a wider range of ethnic or cultural groups, as well as focusing on younger members of the public.

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Appendix

Questionnaire: Public Perception of Planting

Section 1: The Context

1.1 Why have you come to this place today?

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1.2 How far have you travelled to this place today? (Please tick the box that approximates most closely)

Less than a mile		1-10 miles		11 – 50 miles		51 – 100 miles		Over 100 miles	
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1.3 How regularly do you visit this place? (Please tick the box that approximates most closely)

This is my first visit		1/Year		2 – 3 times/Year		1/Month		1/Week		More than 1/Week	
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Section 2: The Walk

For each of the following statements please tick the box most relevant to you;

2.1 I feel comfortable along this walk

Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly

2.2 This walk allows me to escape from more mundane routines and work

Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly

2.3 I feel relaxed on this walk

Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly

2.4 This walk reveals a special unique place

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

2.5 The planting along this walk is interesting

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

2.6 The planting along this walk appears good for butterflies, bees and other insects

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

2.7 The planting on this walk is attractive

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

2.8 The planting on this walk looks natural

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

2.9 The planting on this walk looks cared for

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

2.10 The planting on this walk looks designed

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

2.11 The planting on this walk looks tidy

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

2.12 The planting along this walk looks familiar to me

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

2.13 The planting along this walk is colourful

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

2.14 The combination of colours is attractive in this planting

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

In the following four questions please tick one box;

2.15 How many native UK plant species do you think there are in this planting?

Many

Some

Few

None

2.16 How many species of native UK insects (flies, butterflies, bees) do you think this planting will support?

Many

Some

Few

None

2.17 How many different plant species in total do you think there are here?

Many

Some

Few

None

2.18 How structurally complex would you describe this planting?

Complex

Moderately complex

Moderately simple

Simple

2.19 And finally, please give your overall impression of the planting along the walk;

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Section 3: Your Thoughts

For each of the following statements please tick the box most relevant to you;

3.1 I like being in outdoor green spaces

Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.2 Outdoor green spaces lift my spirits

Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.3 I like looking at colourful flowering plants

Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.4 I can distinguish between different plants

Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.5 Insects such as flies, butterflies and bees are an important part of ecosystems

Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.6 Plants, shrubs and trees provide valuable habitats for butterflies, bees and other insects

Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.7 Planting in parks and gardens should be restricted to native species

Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.8 Native plants support more native butterflies, bees and other insects than non – native plants

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

3.9 The environment is important regardless of its value to people

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

3.10 I believe global climate change is happening

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

3.11 I believe that global climate change will have serious consequences

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

3.12 I think global warming will change the plant species most suited to grow in UK parks and gardens over the next 50 years

Agree strongly

Tend to Agree

Neither Agree/Disagree

Tend to Disagree

Disagree strongly

Please turn over.....

3.13 I would be happy to see more non - native species like those below growing in UK parks and gardens



Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.14 I would accept non - native species like those above in UK parks and gardens if they were better suited to the climate than present day species

Agree strongly	Tend to Agree	Neither Agree/Disagree	Tend to Disagree	Disagree strongly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

And finally....Section 4: You

Please tick the appropriate box and give further details when requested;

4.1 Gender

Male	<input type="checkbox"/>	Female	<input type="checkbox"/>
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4.2 Age

16 – 24	<input type="checkbox"/>	25 – 34	<input type="checkbox"/>
35 – 44	<input type="checkbox"/>	45 – 54	<input type="checkbox"/>
55 – 64	<input type="checkbox"/>	65+	<input type="checkbox"/>

4.3 What is your ethnicity? Please tick the relevant box

White British/Irish	<input type="checkbox"/>	White other	<input type="checkbox"/>		
Mixed White/black Caribbean	<input type="checkbox"/>	Mixed White/black African	<input type="checkbox"/>	Mixed White/Asian	<input type="checkbox"/>
Asian Indian	<input type="checkbox"/>	Asian Pakistani	<input type="checkbox"/>	Asian Bangladeshi	<input type="checkbox"/>
Asian other	<input type="checkbox"/>			Asian Chinese	<input type="checkbox"/>
Black African	<input type="checkbox"/>	Black Caribbean	<input type="checkbox"/>	Black other	<input type="checkbox"/>
Arab	<input type="checkbox"/>	If other please give details	<input type="text"/>		

4.5 Do you currently live in an urban area (town or city), a rural area (village or countryside) or in the rural/urban fringe?

Rural	<input type="checkbox"/>	Urban	<input type="checkbox"/>	Rural/urban fringe	<input type="checkbox"/>
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4.7 Have you spent most of your life until now in an urban area (town or city), a rural area (village or countryside) or in the rural/urban fringe?

Rural	<input type="checkbox"/>	Urban	<input type="checkbox"/>	Rural/urban fringe	<input type="checkbox"/>
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4.8 Do you or have you taken holidays overseas in warmer climates?

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
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4.9 Which of the following best describes your economic status?

Paid employment/self employed	<input type="checkbox"/>	Unemployed/seeking work	<input type="checkbox"/>
Retired	<input type="checkbox"/>	Looking after family/home	<input type="checkbox"/>
Full – time student	<input type="checkbox"/>	Long term sick/disabled	<input type="checkbox"/>
Living with family	<input type="checkbox"/>	Other	<input type="checkbox"/>

4.10 Which of the following educational qualifications do you have? Please tick all relevant boxes

None	
GCSE/O levels/ Scottish standard grades	
A levels/ Scottish Higher grades/International bacalauriate	
Degree	
Masters' degree	
Doctorate	
Vocational qualifications (please state)	
Other (please state)	

4.11 Do you have experience or qualifications in any of the following areas? Please tick all relevant and appropriate boxes;

Activity	Type of involvement		
	Professional	Volunteer	Personal interest
Agriculture/growing food			
Horticulture/ Gardening			
Landscape Architecture/Design			
Environment/Nature conservation			
	Professional	Volunteer	Personal interest
The Arts			
Biological Sciences/ Botany			
Please give any relevant details if possible:			

Thank you very much for completing this questionnaire.

If you are happy for me to contact you via telephone or email to discuss these ideas in more depth, please complete the details below. These details will not be revealed to any other party or organisation.

Name	
Email address/phone number	

Thank you!

Helen Hoyle hehoyle1@sheffield.ac.uk

Interview Questions (Generic)

HH: **Interviewee's name** it was **Date ie Month 2012/2013** when I first met you and invited you to walk through an area of planting. Can you recall that experience?

Response

HH: What was it like?

Response

HH: Okay. Thank you. Can you remember the actual planting and what you were going through; what it looked like?

Response

HH: So that was the area you walked through, or part of the area, (shows photo), does that confirm what you remember?

Response

OVERALL ATTRACTIVENESS

HH: Now, what I'm going to do now is show you eight different images of eight different areas of woodland/shrub/herbaceous planting, and just spread them out on here;

8 images spread over table

HH: Taking your time, I'd like you to tell me now, which three of these you think are the most attractive. If I asked you to walk through them, as I asked you to walk through this one, which three, including the one you walked through, would you think are the most attractive? And if you could rank them, putting number 1 as the most attractive, then number 2 and 3, (gives out post – its with numbers written on).

Pause....

Decisions:

HH: Okay, thank you. Can you now explain to me why you think these three are the most attractive?

Response

RELAXATION

HH: Now I'm going to ask you a slightly different question. If I was to invite you to walk through the same areas, which three would you find the most relaxing, in order of 1,2 and 3? And it could well be the same ones.

Pause...

Decisions and response

If no response;

HH: Why do you think you would find those three areas the most relaxing to walk through?

Response

ATTRACTIVE vs RELAXING?

HH: Well thank you, you've explained them as you've gone along. Now, if we reflect on that, do you think for you there is a difference between what is attractive and relaxing in woodland/shrub/herbaceous areas, because it seems not. Some people come up with different things but you've come up with the same ones..

Response

HH: Yes, and you are finding attractiveness and being relaxing one and the same?

Response

NATIVE INVERTEBRATE BIODIVERSITY

HH: I'm now going to ask you to look at the same images and tell me which three do you think would be the best for native UK insects, including butterflies and bees, but not only butterflies and bees, so any sort of wildlife of that type.

Decisions and response

If no response

HH: Why do you think these three areas would be the best?

Response

HH: Thank you.

TIDY

HH: Now, the next thing I'm going to ask you about is which three of them are the most tidy, or neat, and again, if you can do, put number 1 as being the most tidy, then numbers 2 and 3

Decisions and response

HH: You came to those decisions quite quickly.. Do you like things that you perceive as being tidy in planting, or not?

CHARACTER

HH: Thank you. Now, the next thing we are going to reduce the number of images, and I'm going to ask you to look at just three.

HH: Now, if I asked you to focus on these three. Which of these three would you most like to walk through and why?

Decision and response

STRUCTURE

HH: Thank you. Now we are going to change the three that you are looking at;

HH: So, with just those three, the same question, which one would you enjoy walking through the most, and why?

Decision and response

SEASONALITY AND FLOWERING

HH: Thank you. Now we haven't really looked at things in different seasons, so we are going to talk about seasonality, and how that causes changes in how things look. We're going to look at two different areas, and each one at two different times of year, so...

Planting number 1

HH: That's one of them, (showing photo in early Autumn) and that's the same place at a different time of year, (Spring – showing photo). Have you got any strong feelings of which one you would find the most attractive to walk through?

Decision and response

HH: And which would you find the most relaxing to walk through?

Decision and response

Planting number 2

HH: Now, the next one...we shall look at this one. Again, I'm asking you which one would you find the most attractive to walk through?

Decision and response

HH: Thank you, I'm now going to move away from the woodland ones to a different sort of area, to a shrub area, and again you are going to see it at two different times of year. This is an area of planting which I visited in the middle of May last year, (in full flower), it's called the Punchbowl in the Crown Estate, in the Valley Gardens..

HH: And this is the same place in August, (shows photo)..

ATTRACTIVE

HH: So which of these two do you find, first of all attractive? The walk people were doing was around here to that bench there. If you were invited to do that particular walk, which would you find the most attractive?

Decision and response

RELAXATION

HH: And if I ask you a different question.., Which would you find the most relaxing to walk through, would it still be that one?

Decision and response

FLOWERING AND COLOUR

HH: Now I'm going to show you some different images. Using this theme of colour, we are going to look at different areas of planting with dominant colours. They have different forms as well..

5 Images: White – hydrangeas, Yellow – prairie, Pink – Spring wood, mixed – meadow, Blues/purples – Med bank.

HH: We have 5 different areas of predominantly different colours, well, there are four which are predominantly one colour, and then one is a mixed one. Trying to focus on the colour rather than the form, and the impact that makes on you, would you be able to rank them 1 – 5 in terms of your preference for the colours?

Decision and response

VEGETATION COMMUNITY

HH: Now, we have mainly been looking at woodland areas and you walked through an area of woodland.

HH: I think I might have said, I've been doing these walks all over with different sorts of planting, so if I invited you to walk through or past these areas here, (Shows 4 photos) I'm asking you, are there any particularly you warm to, or you would find a particularly uplifting experience? Or are there any you would find uninteresting?

Decision and response

THOUGHTS

HH: Okay, that's fine, thank you very much. We are now going to think a bit more widely about some of the other ideas in the questionnaire. In the questionnaire I asked you about climate change..erm, do you think climate change is happening?

Response

HH: Do you think we should be concerned about climate change? Do you think we should be very worried about it?

Response

HH: Okay thanks. And the question in the questionnaire asked you if you would be happy to see planting like this (Mediterranean bank) in UK parks and gardens. Would you?

Response

HH: And do you think in public spaces, would you like to see more of it there?

Response

HH: And do you have any reservations about using non - native species like Mediterranean species in the UK?

Response

HH: Well, thank you.

