



The
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Spatial affordances for preschool children's social interactions in childcare environment

By:

Junjie Huang

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To: Haohan

“We shape our buildings, and afterwards our buildings shape us.”

— *Winston Churchill, 1943 at House of Commons*

“The environment of children is not the environment for children: in many cases, the places where children grow up, play, and learn are, at best designed for them by adults, at worst they are the spaces left over from the adult world.”

— *Spencer and Blades (2006, p.iii)*

Abstract

Understanding human behaviour in the built environment has long been a vital interest to most architects. It relates to the essential need to design a suitable building for society. Gibson's affordance theory offers an insight into the behavioural potential that the environment can provide to human beings. A number of researchers have adopted affordance theory in their studies of children's environment. While most of these studies focused on children's physical activities, the knowledge of the affordances for children's social interaction is yet to be explored in depth.

By employing the focused ethnographic approach, this research conducted its fieldwork in a childcare centre in Sheffield and studied the preschool children's social interactions during their free play sessions in both the outdoor and indoor environment. The study deconstructs the childcare environment by means of behavioural affordances and demonstrates a typical taxonomy of children's social interactions in the childcare environment, followed by in-depth interpretation of case social interaction events.

The study proposes a methodology to conduct focused ethnographic research in the spatial design field, and establishes an affordance correspondence framework between children's social behaviours and environmental features, and further suggests a range of design guidelines towards a children-centred, diversified, and supportive childcare environment.

Following this study, further research can be expected in the area of children's environmental perception, interest, decision-making as well as affordance design in the built environment.

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Chapter I: Introduction

1.1 Background

It has been two centuries since Robert Owen opened the first infant school in New Lanark, Scotland. From then on, many different kinds of early age education facilities, such as childminders, day care nurseries, kindergartens, and preschools, have widely spread across the world. These children-centred facilities are established in different cultures, and have various forms, but they all have the same goal: to provide excellent caring service for children before they reach their formal school education age.

Over the past decade, there has been substantial investment in the provision for early age children in the UK (McAuliffe et al., 2006, p.V). Following the legislation of the Childcare Act 2006 and the Children and Family Act 2014, a series of changes have been made by the British Government, including establishing state-funded education from 2 years old, a revised framework and new guidelines for Early Years Foundation Stage (EYFS)¹, in order to improve the availability, quality and affordability of childcare. Inevitably, childcare facilities today are playing a more and more important role in children's early life, and therefore, are attracting more and more attention in many disciplines, such as sociology, pedagogy, psychology, ecology, etc. Research groups have been exploring how to enhance or enrich the qualities of childcare services in many different aspects. Sharing the same aspiration, coming from an architecture

¹ EYFS: In Section 39 of the Childcare Act 2006, Early Years Foundation Stage (EYFS) was firstly introduced, to provide a framework which could deliver consistent and high quality environments for all children in pre-school settings, recognising the importance of this period in a child's life. The Statutory Framework of EYFS was published and took affect from September 2008.

education background, my interest focuses on improving the childcare environment by means of spatial design.

A review of the history of childcare environment design clearly shows that architects and designers from other disciplines have been putting great effort into creating comfortable, enjoyable and inspiring settings for children for a long time (Wright, 1938, Dudek, 2000, Dudek, 2012). However, children's actual reaction to these designs is not apparent in the review. What do children actually think about their care environment? What do they need or not need when they are playing there? How do they interact with the environment settings? How do they interact with other people? All these questions are not usually answered in the design context, but are undoubtedly related to the improvements of our future designs.

Research on preschool children's play areas, for example, often refers to the layout of play equipment with "little or no mention of other types of elements or of user needs" (Cosco, 2006, p.16). In other words, in the research on children's built environment design, consideration from the children's angle is inadequate.

Some researchers from the spatial design field have tried to contribute to the understanding of children's play activities in the built environment (Hendricks, 2011). Clark and Moss (2001) suggested a distinguishing "mosaic approach" in order to listen to children's voice.

On the other hand, researchers from other disciplines such as education, psychology, ecology, child development, etc., have been consistently contributing to the understanding of the relationship between these young users and the built environment. Previous research in this area has focused mostly on individual children's perceptions of and interactions with the physical environment (Lorenz, 1956, Weinstein and David, 1987, Spencer and Blades, 2006, Bower et al., 2008). The majority of the studies have explored the impacts of the physical environment on individual activity. However, the potential indirect impacts of

the physical environment on the interaction *between* individuals are rarely mentioned.

Beyond the physical environment, the social environment is another important issue that children need to face in childcare centres. Traditionally, the concept of the social environment in early childhood literature has been described as the people surrounding children and their reciprocal interactions (Cosco, 2006, p.16). Studies on children's development have shown that the social environment in childcare centres does have significant impacts on many aspects of their development, including their social attributes and skills (Bronfenbrenner, 1979, Moore, 1986a). However, such research that has considered the impact factors relevant to individual diversity, social background, and a childcare centre's educational approach and management, has largely ignored the potential impacts of the physical environment. Burgess and Fordyce's (1989) research indicates that the size of a room and the population density may have impacts on the configuration of children's social environment. Gary Moore's (1986a) work has also pointed out that 'spatially well-defined' settings support children's positive behaviours and well being. However, these researchers have tended to examine the macro level of children's environments and activities, with little or no further detail about specific environmental features and their relationship to different types of activity by children.

In recent decades, a few researchers have tried to investigate children's built environments using Gibson's ecological theory framework of affordance (see Chapter II Section 2.4). Their approaches tried to find out the relationship between built environments and children's behaviours, with emphasis on children's perceptions and the physical environment, which has successfully expanded the research scope. However, most of their works focused environmental affordance either on elder school age children's social activity or on the health and physical condition of young children. The environmental affordance for young children's social activity currently lacks research attention. Moreover, indoor environments are currently ignored while most research studies outdoor environments such as the playground or the urban streets.

Perhaps the most important gap in current research in this area is in considering both children's behaviour and their perceptions or understanding. Some of the research has paid attention to the observed children's behaviour, some of the research has only focused on children's perception, and some of the research has only looked into children's understanding of the environment. None of the studies has successfully considered of combining these areas.

Architects, designers and ecological researchers have long been aware that the built environment is important to the users acting inside and can even influence their social behaviour in many ways (Bechtel, 1977, Bently, 1985, Lawson, 2001, p.4, Hill, 2003). As the prediction and understanding of users' behaviour and thinking depend greatly on designers' knowledge and personal experience, rigorous empirical research and an appropriate research method are needed to gather first-hand data and contribute towards a comprehensive understanding.

Childcare environments provide a more complex micro-society for children, compared to those who grown-up at home. Inside this micro-society, children learn many types of knowledge and skills, including the everyday use of the built environment and the experience of communication and interaction with others. This thesis is underpinned by a belief that every architect and designer working in this area should commit to looking into this micro-society in order to provide a better supportive environment for children and their carers.

1.2 Research Question

Reviewing above research gaps, my particular interest within this study falls on building knowledge about the potential relationship between the built environment and early age children's social activities in childcare centres. The broad research question directing this study is:

✧ How can we support preschool age children's social interactions in childcare centres by means of spatial design?

In order to address the question, four sub-questions and corresponding objectives are proposed and listed as below:

1. What kinds of social interaction do children have in childcare centre?

From a developmental perspective, children acquire their social skills gradually from birth, and are roughly reflected in their age. But we also understand each child has a unique developmental pace. Therefore, it is possible that children with the same age may still present different social skills. A childcare centre is a place where lots of children gather together. In order to better support their social interaction, it is necessary to investigate what kinds of social interaction actually exist in the childcare environment at the preschool age. The objective of this sub-question is to give an appropriate definition of social interaction for the purposes of this research, which could better define the research scope, and support the classification of the different types of social interaction in the childcare environment.

2. What kinds of spatial qualities or features are related to children's social interaction?

The environment and settings in the childcare centres are quite different from home. They are often richer and specially designed. Some environment features are even not seen at home. The objective of this sub-question is to identify different kinds of environmental qualities or features in the childcare environment, and find out which kinds of qualities or features are particularly related to children's social interaction, and in what sort of relationship?

3. What meaning does the environment generate while children are acting in the environmental context?

Children's understanding of the world is gained from experience, but they also act creatively. How do they generate the meaning of the environment while they are acting or playing inside a specific space? The objective of this sub-question is to interpret children's behaviour in specific environment spaces via

both observation data and from children's own ideas of their behaviour and the environment.

4. What affordances can be found in the childcare centre to support children's social interactions?

Combining above sub-questions, can we identify the environmental affordances in the childcare environment that could support children's social behaviour?

The objective of this sub-question is to abstract the spatial affordance list of the case study childcare environment that could provide potential supports to children's different social interactions.

1.3 Significance

By conducting the research in case childcare centre, this study employed a new research approach, focused ethnographic research methodology, to the architecture design discipline to study unfamiliar users' behaviour in specific built environments context.

The results of the study contributed to the understanding of children's social interaction, and built up the relationship between social interaction and the built environment via detail ethnographic interpretation. New meanings of the environment have been noticed and analysed. The study also expanded the affordance theory by adding brand new social interaction categories to the existing taxonomy, and brought the theory to a more comprehensive and systematic level. At the mean time, the study also provided a number of suggestions to the childcare environment design and caregiving practice, addressing the issues at social interaction level.

1.4 Definitions and scope

Preschool age children:

The term “preschool age children” refers to normal healthy children who are between the ages of three and five, prior to the commencement of compulsory education at primary school. Children with special education needs are not included in this research due to lack of available participants.

Childcare centre:

The term “childcare centre” refers to the professional non-domestic early education providers that are registered with and inspected or regulated by the Office for Standards in Education, Children’s Services and Skills (OFSTED). The term “childcare environment” in this research also refers to childcare centre environments. Domestic childcare services, as well as child-minders, are not included in this research.

Social interaction:

The term “social interaction” in this research refers to the behavioural process that is carried out between two or more social actors via either direct or indirect contact.

Social interaction is here studied based on a child-centred perspective, including both child-child interaction and child-adult interaction. Adult-adult interaction in the childcare centre is not studied in this research.

Spatial design:

The term “spatial design” refers to the design of the built environment, using different shapes, structures or materials, to create a specific space.

Affordance:

The term “affordance” is a philosophical concept developed by James Gibson. It refers to the human perception of the availability of and possibility in the environment. More detail is presented in Chapter II, section 2.4.

1.5 Thesis Structure

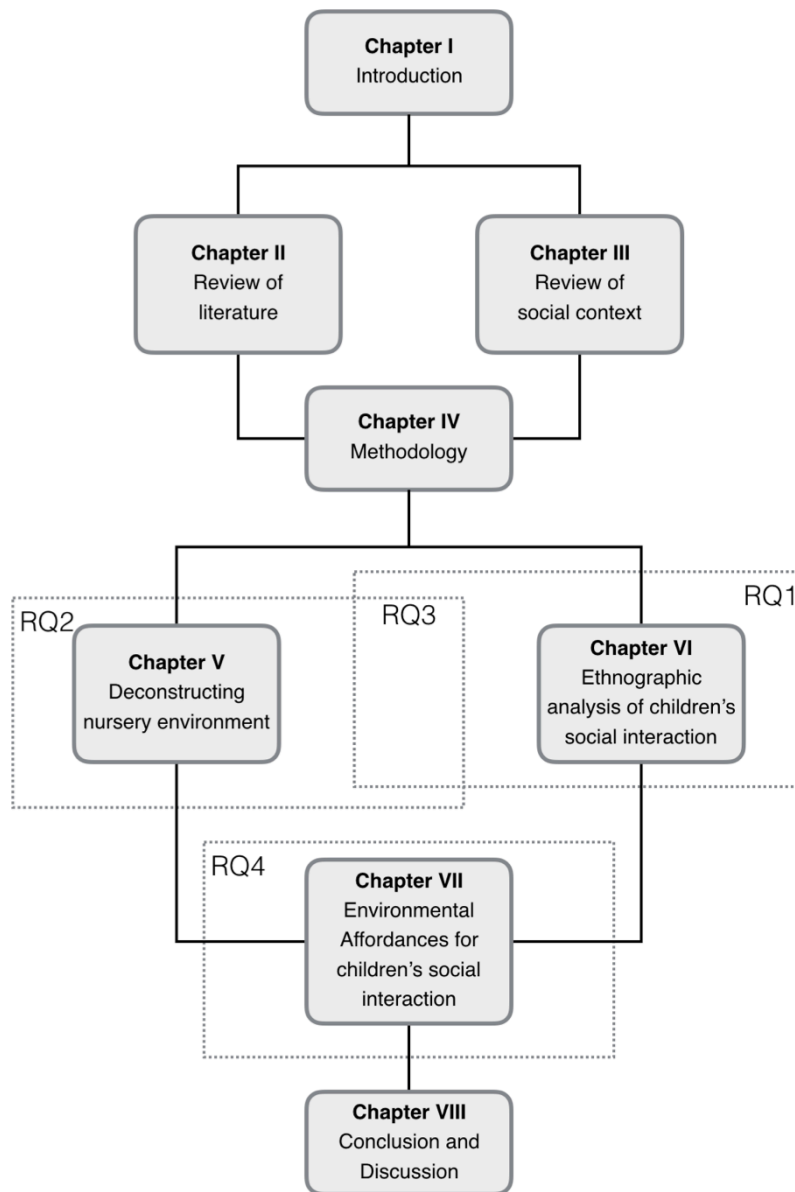


Figure 1: Thesis structure

Following the introduction of the whole study in Chapter I, Chapter II reviews the knowledge base in the focused research field, including social interaction theories, studies of social interaction in childcare environment, and the environmental impacts, and finally reviews the theory of affordance and the ecological research under an affordance theory framework, as well as the research methods that are currently used in this area.

Chapter III provides a review of the social context of childcare services in the UK, including current policy, historical development, and available design guidelines. It starts with the review of the British legislation and policy documentation of childcare services. Then the chapter goes through the historical development of childcare service in and around the UK. Finally, the chapter reviews relevant regulations and guidelines of childcare environment design, and ends up with the discussion of the growing focus on children's childcare life in legislation, policy and design areas.

Chapter IV describes the methodological approach employed in this research, including the research position, development and detailed description of the research methods, and finally describes the research strategy.

Chapter V mainly focuses on the environment in the childcare centre. Following structuralism logic, this chapter provides a detailed analysis of the settings in the centre, with the reflection on potential behavioural affordances of specific environmental features. Chapter V mainly responses to the research question 2 (RQ2): the spatial quality and features related to children's social interaction.

Chapter VI focuses on children's social interaction in the case childcare centre to address the research question 1 (RQ1). It first provides an overview of children's typical social interaction modes under social participation level criteria. Following the overview, the chapter further interprets case social interaction events in detail. Further more, the chapter concludes some basic findings of the observed children's social interaction during their play.

Chapter VII lists the major research findings in three categories, including environmental qualities in relation to social interaction - which response to the research question 3 (RQ3), affordances for social interaction - which response to the research question 4 (RQ4), and suggestions for childcare environment design - which response to the broad research question.

Chapter VIII summarises and concludes the whole study. It also provides further discussions of the problems emerged from the research, the limitations, and the suggestions for the follow-up research topics.

Chapter II: Review of the literature

This chapter focuses on the review of the knowledge base in the research field related to the research questions. The review covers the areas of the social interaction theories, the studies of social interaction in childcare environments, the environmental impacts, and finally the theory of affordance. The last part of this chapter provides a review of the most recent research works under the ecological theory framework of affordance, as well as the research methods that are currently using in many studies. The review of these studies reveals the gaps in this research area, such as lack of detailed interpretation to demonstrate how environmental affordances support related behaviours, and more importantly, the study of environmental affordances for social interaction is significantly insufficient. .

2.1 Social interaction

2.1.1 The definition of “social”

From the moment we are born into the world, we are trying to understand ourselves. Who are we? And why we exist? Meanwhile, we are trying to understand the environment around us, not just physical objects, but also including those who are extremely similar to ourselves. We have the same face. We do the same things. We eat the same food. We can communicate with each other, by eyes, by face, by gestures, by sounds, or by language. We are so similar that we share almost every other thing in the environment. Thereafter, we understand that we are the same species. We know that we are not alone. We altogether consist of a huge social environment which we call it human society.

“Social”, according to its adjective meaning in the dictionary, modifies those things of or related to society. The trace of the word “social” in etymology shows

that it comes from Middle French “social”, which is from Latin “sociālis” (means “of or belonging to a companion or companionship or association, social”), “socius” (means “a companion, fellow, partner, associate, ally”), and “sequor” (means “follow”). From the etymology, it is quite clear that “social” actually could refer to anything that exists or occurs between two or more individuals, such as intention, attitude, movement, action, interaction, or that is defined by a group of individuals, such as club, organisation, community, network, etc.

2.1.2 Social interaction as microsociology

“Every state is as we see a sort of partnership, and every partnership is formed with a view to some good.” (Aristotle, 1944, p.1252a)

Thousands of years ago, Aristotle in his book *Politics* pointed out that “*man is by nature a political (social) animal*”, and “*the impulse to form a partnership of this kind is present in all men by nature*” (Aristotle, 1944, p.1253a). He further explained partnership is the basic elements of the whole society, and forms up households, villages, and finally city-states.

Following Aristotle, George Homans also developed his view of human social systems as a complex of mutually dependent elements. He believed the study of such social systems should look into a system small enough so that we can see all the way around it, and small enough so that all the relevant observations can be made in detail and at first hand (Homans, 1962, p.39). He fulfilled this study of small groups throughout his book *The Human Group* published in 1950.

Around that time, Erving Goffman opened a new branch in sociology called microsociology, which looks particularly into the social interactions happening among small groups in everyday life, distinguishing from those behaviours and structures at a macro level. According to Goffman, “*the study of every unit of social organization must eventually lead to an analysis of the interaction of its elements*” (Goffman, 1961, p.7). He emphasised that the study of microsociology is based more on interpretive analysis rather than statistical and empirical analysis (Goffman, 2010, p.20).

2.1.3 Social interaction theories

Sociology and psychology have seen many attempts to theorise social behaviour and human interaction. A number of the key resulting theories are discussed below.

In the book “*Economy and Society*”(1922), Max Weber defines “*social action*” as actions to which the “*acting individual attaches a subjective meaning to his behaviour - be it overt or covert, omission or acquiescence. Action is ‘social’ insofar as its subjective meaning takes account of the behaviour of other and is thereby oriented in its course*” (Weber, 1978, p.4). Weber’s so-called **action theory** places emphasis not just on studying social action, but rather the interpretative *verstehen* (which means to understand in German) of the social action.

Thereafter, many of Weber’s followers started to put their attention into daily living events rather than the phenomenon on a macro level. Weber identified four forms of social action in his theory:

- **Rational action** - that based on the expectation of other’s behaviour in order to attain rationally chosen outcomes
- **Evaluative action** - that based on absolute values for individuals’ own sake
- **Emotional action** - that based on feelings and emotions
- **Traditional action** - that based on long established and habitually practised traditional expectations

Homans, by contrast, framed interaction between persons as an exchange of goods; material goods but also non-material ones, such as the symbols of approval or prestige. Whereas Weber is a central figure in this field, Homans’ work has been relatively neglected by social scientists (Homans, 1958). He further discussed social exchange as the exchange of activity, tangible or intangible, and more or less rewarding or costly, between at least two persons (Homans, 1961). According to Homans, **exchange theory** lies in the propositions

of individual human beings, rather than propositions of social groups. These propositions took account of success, stimulus, value, deprivation satiation, aggression approval, and rationality:

- **Success:** *"For all actions taken by persons, the more often a particular action of a person is rewarded, the more likely the person is to perform that action." (Homans, 1961, p.16)*
- **Stimulus:** *"If in the past the occurrence of a particular stimulus, or set of stimuli, has been the occasion on which a person's action has been rewarded, then the more similar the present stimuli are to the past ones, the more likely the person is to perform the action, or some similar action." (Homans, 1961, p.23)*
- **Value:** *"The more valuable to a person is the result of his action, the more likely he is to perform the action." (Homans, 1961, p.25)*
- **Deprivation–satiation:** *"The more often in the recent past a person has received a particular reward, the less valuable any further unit of that reward becomes for him." (Homans, 1961, p.29)*
- **Aggression-Approval:** *"A: When a person's action does not receive the rewards as expected, or receives punishment he did not expect, he will be angry. He becomes more likely to perform aggressive behaviour, and the results of such behaviour become more valuable to him." (Homans, 1961, p.37) "B: When a person's action receives the reward they expected, especially a greater reward than they expected, or does not receive punishment he expected, he will be pleased. He becomes more likely to perform approving behaviour, and the results of such behaviour become more valuable to him." (Homans, 1961, p.39)*
- **Rationality:** *"In choosing between alternative actions, a person will choose that one for which, as perceived by him at the time, the value, V , of the result, multiplied by the probability, p , of getting the result, is the greater." (Homans, 1961, p.43)*

Rummel (1976), driven by an exploration of “*conflict*”, pointed out that social interaction presents us not only with varied manifestations but also with many “*latents*”. He believed all social interactions could be characterised by their meaning, direction, intensity, extension, duration, and organization. Rummel identifies the following characteristics in each of these categories:

- **Meaning:** *Reflex (causal meaning), Act (intentional meaning), Action (intentional meaning), and Practice (rational meaning)*
- **Direction:** *Solitary, Antagonistic, Mixed*
- **Intensity:** *Deeply felt, Strongly motivated intentions, Little emotion or peripheral intentions*
- **Extension:** *Extensive, Narrow*
- **Duration:** *Momentary or relatively short duration, Extended duration*
- **Organization:** *Organized, Unorganized*

Social interactions are here understood to manifest various combinations of these characteristics.

There have been many attempts to categorise social interaction into distinct types. Here I outline a range of these categories. Goffman (1961), makes a simple distinction between just two types of social interaction:

- *Co-presence interaction*
- *Focused interaction*

The principle of distinguishing between co-presence and interaction underpins much other work in this field.

Categories sometimes also reflect an implicit value judgment about whether or not a behaviour is positive or negative, as here in Rowley’s(2009) four categories:

- *Positive social interaction*

- *Negative social interaction*
- *Peer group interaction*
- *Bullying*

Other relevant work has focused more explicitly on the underlying drive for social behaviours as the basis for establishing categories.

The general theories outlined above, along with further literature specifically on children's social interactions, will inform the analytical framework adopted for the empirical work in this study. The next section will explore previous work on children's social interactions.

2.2 Children's social interaction in childcare environments

When young children leave their home for childcare centres, they are entering not only a whole new physical environment but also a totally different social environment, where they meet many other children and adults. This change of social environment condition brings children experiences they have never had before. They will establish new relationships with the ones who respond to them, with or without concern. They make friends with each other. Their attachment shifts from parents to caregivers. Normally, after a period of attendance, they will be able to tell who they like and who they do not like. Of course, they will also have to face difficulties in building up these relationships, and then develop their social cognition and skills.

It is also very important to point out that in the research into young children's social behaviour, while some findings are framed as common and universal to all children, others suggest significant individual differences according to genetic, cultural, ethnic, or family background group.

2.2.1 Social playing

There are several types of social playing in childcare centres, like role play, group working, and interactive games. Children can play different roles in these activities either for fun or for specific tasks. They may learn knowledge and fulfil their social skills. Social playing is an essential play style in childhood games. It is normally running by children who pretend to be some social roles in the specific occasion, such as hospital, police station, shopping centre or family. Social playing games normally need collaboration to create stories related to the play themes. However, a single child can also pretend several social roles when he is playing by himself using different toy figures.

It is reported that children in the care centres start their imitation behaviour and social pretend playing at the age of 18 to 24 months, and this serves as a marker of competent peer interaction in the early toddler period (Howes, 1985).

Research also suggests that children with formally trained caregivers are more sophisticated in their social pretend play (Howes et al., 1989). Social playing happens much more easily in childcare centres than other places. This is not only because of the social environment created by other children and caregivers, but also because of the play equipment provided in the centre, such as role play corner, or kitchen toys for imitation play.

2.2.2 Cooperation and competition

Cooperation and competition are considered as the major features of social interaction in social interaction studies. A huge amount of literature stresses a general interest in both phenomena as a major human, as well as animal, adaptation. In the literature on animal behaviour, cooperation and competition for resources have been traditionally acknowledged. However, not until relatively recently have these become a particular focus of socio-biological attention (Charlesworth, 1996). Charlesworth's study on young children's cooperation and competition behaviour (1996) also support the notion that the early appearance of the ability to compete by using a range of socially

instrumental behaviours is a very widespread, if not universal, phenomenon. And according to Charlesworth, the similarity in appearance and outcome of the behaviours of children from very different cultures is striking in the study findings.

Recent research by Manaco and Pontecorvo (2010) indicated that toddlers are able to co-construct complex structures, based on different interactional levels and diverse communicative registers, for example, linguistic-verbal versus gestural-physical. In other words, by the end of the second year of life, toddlers are already able to find an implicit inter-subjective agreement about “how” they co-construct interactional exchanges and organize their participation, showing the capacity to accept and promote changes and re-adaptations of interaction.

2.2.3 Conflict and aggression

It is generally accepted that young children are spending more time in childcare centre environments with exposure to the influence of immature companion relationships. Studies have shown that spending more time with other children may increase the chances of conflict (Hennessy, 1992, p.105). Hartup’s research (Hartup et al., 1988) showed that conflicts between mutual friends, as compared to those between neutral associates, did not occur less frequently, differ in length, or differ in the situations that instigated them. However, the conflicts between friends were less intense, were resolved more frequently with disengagement, and more frequently resulted in equal or partially equal outcomes. Continued socialization was also more likely following conflicts between friends. A recent study on children’s conflicts (French et al., 2011) suggests that cultural difference exists in children’s social behaviour when the resource is limited. In this case, Chinese children exhibited more assertive and general rule bids, engaged in more spontaneous giving, and reacted more positively to assertions of others whereas Canadian children more frequently referred to norms of sharing.

If conflicts between children are not resolved, it is possible that these conflicts may develop into extreme behaviours, such as bullying, or aggression. Aggressive behaviour can distress, disturb and sometimes even injure other children in the childcare centre. Snatching, pushing and pulling, kicking and hitting, pulling hair and throwing things are commonly seen in children's aggressive behaviour. Children's aggression behaviour is particularly testing for caregivers and staff in childcare centres.

2.2.4 Territorial behaviour

The notion of territoriality, in Ardrey's publication "The Territorial Imperative" (1967), may explain that people have an instinctive desire to acquire and defend territory. However, the studies that humans clearly exhibit this drive as a hereditary characteristic can all be challenged from either a methodological or conceptual point of view (Esser, 1965). Sundstrom and Altman (1972) provide a typical example of these studies. Their subjects did not consistently occupy specific territories over time because of population shifts, and they did not find a simple relationship between dominance and territorial behaviour. Territorial behaviour did not seem to be a unitary, temporally stable phenomenon; however, it is still possible someday to be a useful element in the design process (Bechtel, 1977, p.7).

Territorial behaviour is not purely spatial. It is also considered as a social phenomenon (Lawson, 2001, p.32). Territorial behaviour indicates the psycho concern about losing resources. It is very common in animals' behaviour and early stage of human behaviour. However, people will become much more mature in terms of controlling their behaviour according to later established social standards. The limitation of spatial resources is a factor in territory behaviour in childcare centres.

2.2.5 Pro-social behaviour

Pro-social behaviour refers to those positive interactions with other people, including sharing, helping, comforting, donating and volunteering. The development of pro-social behaviour has been conceptualised in various ways (Scourfield, 2004). Some have considered that it is innate and acquired as a result of children's cognitive and emotional development. For example, in studies of infant behaviour, new born babies will cry if they hear another baby's crying (Radke-Yarrow et al., 1983). This behaviour is seen throughout infant's first year. Twelve to eighteen months old children will show toys or share them with other children or adults, and will show their willingness to help with household tasks, such as sweeping the floor or wash dishes (Hennessy, 1992, p.95). Others have proposed that pro-social behaviour develops in the second year of life, and then over the course of childhood, pro-social actions become regulated and increasingly differentiated on the basis of gender (Hay, 1994). According to Hay, gender differences in pro-social behaviour are not observed during infancy and toddler period, but are observed during the later childhood years.

2.2.6 Children's social interactive play taxonomy

Although children's social interaction is the main focus of this thesis, the context for much of the observed social behaviour is in play. It is important, therefore to have awareness of this context for the purposes of the study.

From a developmental perspective, children mature in their social skills as they grow up. In Mildred Parten's research (Parten, 1932) of children's social development, she concluded that the development of children's social interactive play may include six stages: unoccupied behaviour, onlooker behaviour, solitary play, parallel play, associative play, and cooperative play. These stages mainly define an individual child's social activity. Parten also gave different social participation 'weight' to these six types of play behaviour: unoccupied behaviour, solitary play, onlooker behaviour, parallel play, associative play, and cooperative play.

Table 1: Definitions of social play types (Parten, 1932)

Social play type	Definition
<i>Unoccupied behaviour</i>	<i>The child is not playing, but occupies himself with observing surroundings.</i>
<i>Solitary play</i>	<i>The child plays alone, and his activity is different from other children within speaking distance. He pursues his own activity, without making any effort to get close to other children.</i>
<i>Onlooker behaviour</i>	<i>The child spends most of his time watching the other children play. He may speak to the children, but does not overtly enter into the play.</i>
<i>Parallel play</i>	<i>The child plays independently beside rather than with the other children, but the activity he chooses naturally brings him among other children. He does not try to influence or modify other children's activity, or control the coming or going of children in the group.</i>
<i>Associative play</i>	<i>The child plays with other children. All the members engage in similar if not identical activity; there is no division of labour, and no organization of the activity of several individuals around any material goal or product. The children do not subordinate their individual interests to that of the group.</i>
<i>Cooperative play</i>	<i>The child plays in a group that is organized for a purpose or play theme. The goal, as well as the method of attaining it, necessitates a division of labour, taking of different roles by the various group members. Each child has a contribution to the goal.</i>

Parten's research has been widely applied in childcare education practice and inspired many later studies on children's social interaction.

Play has similarly been categorised into types, resulting in the proposal of various play 'taxonomies' by different authors. Renninger (1984) identifies five types of play:

1. *Investigative play*
2. *Functional play*
3. *Operational play*
4. *Transformational play*
5. *Facilitative play*

Perhaps the most extensive taxonomy of play types exists in the field of playwork. Here Hughes(2002), identifies sixteen typical play types in his book *A Playworker's Taxonomy of Play Types*:

1. *Symbolic play: play which allows control, gradual exploration and increased understanding without the risk of being out of one's depth, for example, using a piece of wood to symbolise a person, or a piece of string to symbolise a wedding ring.*
2. *Rough and tumble play: close encounter play which is less to do with fighting and more to do with touching, tickling, gauging relative strength. Discovering physical flexibility and the exhilaration of display.*
3. *Socio-dramatic play: the enactment of real and potential experiences of an intensely personal, social, domestic or interpersonal nature, for example, playing house, going to the shops, being mothers and fathers, organising a meal or even having a row.*
4. *Social play: play during which the rules and criteria for social engagement and interaction can be revealed, explored and amended. It includes any social or interactive situation which contains an expectation of all parties that they will abide by the rules or protocols, for example, games, conversations, or making something together.*
5. *Creative play: play which allows a new response, the transformation of information, awareness of new connections, with an element of surprise, for example, enjoying creation with a range of materials and tools, making things, changing things, or self-expression through any medium.*
6. *Communication play: play using words, nuances or gestures, for example, mimes, jokes, play acting, mickey taking, singing, debate, and poetry.*

7. *Dramatic play: play which dramatizes events in which the child is not a direct participator, for example, presentation of a TV show, an event on the street, a religious or festive event, even a funeral.*
8. *Deep play: play which allows the child to encounter risky or even potentially life threatening experiences, to assess risk, develop survival skills and conquer fear, for example, light fires with matches, make weapons, conquer fear such as heights, snakes, or creepy crawlies.*
9. *Exploratory play: play to access factual information consisting of manipulative behaviours such as handling, throwing, banging or mouthing objects.*
10. *Fantasy play: play which rearranges the world in the child's way, a way which is unlikely to occur, for example, play at being a pilot flying around the world, pretend to be various characters, people or animal, be where ever they want to be, drive a car, become six feet tall or as tiny as they want to be.*
11. *Imaginative play: play where the conventional rules, which govern the physical world, do not apply, for example, imagining you are, or pretending to be, a tree or ship, or patting a dog, which isn't there.*
12. *Locomotor play: movement in any or every direction for its own sake, for example, chasing, tagging, hide-and-see, tree climbing.*
13. *Mastery play: control of the physical and emotional ingredients of the environment, for example, digging holes, changing the course of streams, constructing shelters, building fires.*
14. *Object play: play which uses infinite and interesting sequences of hand-eye manipulations and movements, for example, examination and novel use of any object such as cloth, paintbrush, cup.*
15. *Role play: play exploring ways of being, although not normally of an intensive personal, social, domestic or interpersonal nature, for example, brushing with a broom, dialling with a telephone, or driving a car.*
16. *Recapitulative play: play that allows the child to explore ancestry, history, rituals, stories, rhymes, fire and darkness, which enables children to access play of earlier human evolutionary stages.*

Hughes has given clear enough definitions and examples to every type of his play taxonomy, despite many of them are seen seriously overlapped. Because of the overlaps, children may be observed quickly transfer from one play type to another, and may carry out more than one play types at the same time. Hughes's taxonomy is now widely used, and included as the underpinning knowledge requirements (level 3) in the National Occupational Standard (2004) for the playwork sector.

2.3 Built environmental impacts

2.3.1 Person-Environment fit and behaviour

In environmental psychology, the concept of Person-Environment relationship can be traced back to Kurt Lewin's book *Principles of Topological Psychology* in 1936. In order to explain what determines behaviour, Lewin (1936, p.4) proposed a heuristic formula:

$$B = f(P, E)$$

where B is the behaviour, P is the person, E is the environment. According to Lewin's equation, behaviour is a function of the person in the environment. The formula attempts to unify different branches of psychology (Lewin, 1936, p.12).

Later researchers (Stern, 1970, Lawton, 1977, Lawton, 1986, Caplan, 1987) have further developed conceptual models of Person-Environment (P-E) fit or congruence, as an indication of the matches between individual and environment characteristics, which have been put forward as the basis of human well being (Kytta, 2003). Person's characteristics may include biological or psychological needs, values, goals, personalities, while environment characteristics may consider physical and social environment qualities, intrinsic and extrinsic rewards, culture and social norms or values, etc. These models have already been applied in many areas, including organisation management, working environment, housing environment, education environment, and linked with the

positive outcomes, such as performance, satisfaction and well being level (Lawton, 1980, Yu, 2009, Pawlowska et al., 2014, Chuang et al., 2016).

2.3.2 Place and social interaction

Following Lewin's concept, Goffman also developed his understanding of the interrelationship between interaction and place. "Interaction (whether playful or work-like) occurs in place" (Goffman, 1972). Place, according to Goffman (1961), consists of the following six interrelated elements:

- Differentially self-reflexive actors;
- Place or setting itself (that is, the physical territory);
- Social objects that fill the setting and are acted on by the actors in question;
- A set of rules of a civil-legal, polite-ceremonial, and relationally specific nature that explicitly or tacitly guides and shapes interaction;
- A set of relationships that binds the interactants to one another;
- A shifting set of definitions reflective of each actor's co-ordination to self and other during the interaction sequence.

This helpful unpacking of 'place' highlights the importance of considering multiple components when trying to understand this concept. Such a framework suggests the interrelationship between the material and the immaterial, the social and the individual and - particularly important for this study - the social and the physical environments. The multi-faceted nature of places is reflected in studies, which have considered the relationship between environments and children's behaviours. Killen (1989, p.121) for example, exploring context, conflict and coordination in children's development, identified a range of relevant setting conditions, including toys, space, group size and familiarity.

Compared to the impacts from caregivers, parents, and peers, the potential impacts from built environmental features are seldom mentioned in many studies related to children's development in childcare centres. The qualities of childcare centre are often defined in terms of education, management, and well-

being. However, studies of particular features of the childcare environment have revealed some evidence that children's behaviour and development might link to aspects of the physical settings (Clarke-Stewart et al., 1994, p.11).

2.3.3 Room size and density

Size is a basic architectural factor of room, and already has been deeply explored by many researchers. When we consider together with the number of people inside, room size could also directly relate to the density and interpersonal distance. Calhoun (1962) discovered the development of "behavioural sink" in animals. It refers to a cessation of normal daily patterns of behaviour when the number of contacts with other individuals, due to crowding, reaches such a point that it is not possible to perform the ordinary tasks of living. "Crowding" theory indicated that individuals' anxiety disorder of the increasing density and social interaction, and in concern about lack of resources and too much contact with others. In the study of psychiatric ward bedrooms, Ittelson, Proshansky, and Rivlin (1970) found that social activity was more frequent in small bedrooms compared with large bedrooms.

The effects of density in the child's classroom have drawn the attention of child psychologists, psychiatrists and educators for many years (Burgess and Fordyce, 1989). It is known that crowding environment experiences can be stressful for children (Maxwell, 2003); they may be associated with increased dependency in children (Waldrop and Bell, 1964), and they can induce disruptive behaviours (Klein and Harris, 1979), which might decrease children's classroom performance.

Burgess and Fordyce's research shows "*that spatial density can not only affect children's social distances but can also impact on how children apportion their social space between other children and adults*" (Burgess and Fordyce, 1989). When they were allowed access to more space than was available in the classroom environment, toddlers changed the configuration of their social space to allow for more aggregation and less avoidance of classmates and teachers,

compared with the normal classroom. This effect is consistent with studies of artificial crowding which employed much higher densities.

Burgess and Fordyce also point out that contrary to expectations (Read, 1971), changing the design of the space to eliminate unstructured, open areas did not appreciably change children's response to the classroom situation. The presence of visual dividers had little effect on toddlers' classroom spacing, other than allowing children to stay slightly further from adults.

2.3.4 Window and daylight

The window is an important element in the architectural design, bringing daylight and fresh air into the space inside the building. It is generally accepted that a windowless environment is not a preference in humans' daily life. In the design of education buildings for young children, research has paid much attention to the impacts of window and daylight on children's performance and health.

Collins (1971, 1975) reviewed the research on windowless environments, and concluded that the absence of windows did not appear to have much impact on school children. However, she still advised against windowless design, since she believed that long-term effects had not been thoroughly studied (Kuller and Lindsten, 1992). Kuller and Lindsten (1992) studied the windowless classroom environment and concluded in their research that, work in classrooms without daylight might upset the basic hormone pattern, and this, in turn, may influence the children's ability to concentrate or co-operate, and also eventually have an impact on annual body growth and sick leave. This may be a partial answer to the doubts about the windowless design.

Although the need for integrated systems of daylight and artificial lighting is broadly accepted, some researchers still place most emphasis on the importance of daylight (Winterbottom and Wilkins, 2009). Studies have indicated that daylight from windows helps students to retain and learn information (Kuller and Lindsten, 1992). However excessive illumination should be avoided in

learning spaces. Schreiber (1996) suggested that children became more relaxed and interested in classroom activities when brightness was reduced.

2.3.5 Layout and resource

In childcare centres' organisation, layout relates to the effectiveness of most playing, education and social activities (Goldschmied and Jackson, 1994, p.16). The well organized, well equipped, and well maintained playroom layout can not only benefit the children play inside, but also provide caregivers with a comfortable working environment. Studies have suggested that, children can achieve better educational outcome and development in neat, clean, safe and orderly childcare settings, or in settings that are organized into interest areas and oriented toward children's activities(Howes and Olenick, 1986), or settings that have varied , age-appropriate, educational toys, materials, and equipment (Howes, 1991), or settings that have complied with professional standards (Howes, 1997). It is also clear that adequate resources can reduce the frequency of children's conflicts and other aggressive behaviours (French et al., 2011). However, it is not the final solution of the conflict and aggression problems, but can reduce such kind of behaviour in general.

2.3.6 Summary of the section

The interrelationship between setting, or environment, and behaviour is similarly reflected in an "ecological perspective", and it was in such context that the concept of affordance has been established. The next section will review relevant work relating to affordance theory, as the basis for developing a conceptual framework for the empirical work in this study.

2.4 Affordance - an ecological theory framework

2.4.1 Theory Background

In the 1950s, Psychologist James Gibson (1904-1979) developed the theory of visual perception and perceptual learning (Gibson, 1950a, Gibson, 1950b, Gibson, 1952, Gibson and Gibson, 1955, Gibson, 1957, Gibson and Gibson, 1957, Gibson et al., 1959). He then established a general framework of perception and sensation, presented in his book *"The Senses Considered as Perceptual System"* in 1966. The term *"affordance"* was coined by Gibson and first introduced in this book, as a substitute for values (Gibson, 1968, p.285). Gibson then explored the concept more thoroughly in his article *"The theory of affordance"* in the book *"Perceiving, Acting and Knowing"* (Gibson, 1977) and his last book *"The Ecological Approach to Visual Perception"* in 1979.

Gibson's theory of ecological psychology and affordance proposes that individuals discover the possibilities of their actions in the environment by perceiving the affordances of either the object in the environment or the environment itself (Gibson, 1950a, Gibson, 1968, Gibson, 1969, Gibson, 1986). In his view, *"many questions about how information is constructed by people and animals could be considered better as questions about what sources of information there are in the environment that people and animals use in their activities"* (Greeno, 1994, p.336). His perceptual theory is considered as an alternative to the main stream of cognitive science, in which he *"focused on the question of what information is available"* (Greeno, 1994, p.336).

The definition of affordance was given by Gibson himself as, *"the affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill"* (Gibson, 1986, p.127). He indicated that the term affordance implies *"the complementarity of the animal and the environment"* (Gibson, 1986, p.127).

2.4.2 The Origin of the Concept

Gibson is hardly the first person to point out the functional significance of environment or objects (Heft, 2003). Similar concepts can be captured from the Latin word such as “Utilitas”, translated as “Utility”, or from the ancient Chinese character “用”, which was first inscribed on oracle bones in Shang Dynasty (from 16th to 11th B.C.), translated as “Use” or “Function”.

As Gibson explained himself, the concept of affordance was derived, from the Gestalt psychology (particularly from Koffka and Lewin). Gibson mentioned Koffka’s concept of “*demand character*” of objects in the “*Principles of Gestalt Psychology*” (Koffka, 1935). “*Each thing says what it is ... a fruit says ‘Eat me’; water says ‘Drink me’; thunder says ‘Fear me’; and woman says ‘Love me’*” (Koffka, 1935, p.7). Koffka believed things can “*tell us what to do with them*”. For example, the postbox “*invites*” a letter, and the handle “*wants to be grasped*” (Koffka, 1935, p.353). Kurt Lewin coined the term “*Aufforderungscharakter*” which was translated as “*invitation character*” (Brown, 1929) or “*valence*” (Tolman, 1932, Marrow, 1969). The valence² of an object was “*bestowed upon observer’s experience, and bestowed by a need of the observer*” (Gibson, 1986, p.138). It was assumed to change when the need changed. For example, the postbox has demand character only when the observer needs to mail a letter.

The concept of affordance was derived from the concept of valence, invitation, and demand, however, with a crucial difference. Affordance is always there to be perceived. It does not change when the need of observer changes. Using the

² “A region G which has a valence $V_a(G)$ is defined as a region within the life space of an individual P which attracts or repulses this individual” ... The concept of valence ... “does not imply any specific statement concerning the origin of the attractiveness or the repulsiveness of the valence. The valence might be due to a state of hunger, to emotional attachment, or to social constellation... The statement that a certain region of the life space has a positive or negative valence merely indicates that, for whatever reason, at the present time and for this specific individual a tendency exists to act in the direction toward this region or away from it.” (Lewin, 1938, p. 88)

example of postbox again, no matter who need to use it, it always “*affords letter-mailing behaviour to people in a community with a postal system...*”, and “*everyone above the age of six knows what it is for and where the nearest one is*” (Gibson, 1986, p.139). “*... the affordances of the environment are in a sense objective, real, and physical, unlike values and meanings, which are often supposed to be subjective, phenomenal, and mental ... an affordance is neither an objective property nor a subjective property; or it is both if you like ... It is equally a fact of the environment and a fact of behaviour. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer*”. (Gibson, 1986, p.129)

Gibson did not mention other possible relations or connections to the concept of affordance. However, his wife Eleanor Gibson clearly described the development of the affordance concept as reflecting a “*renascence of functionalism*” (Gibson, 1982, p.55). Heft also pointed out that “*numerous parallels of this idea that appear throughout the phenomenological literature, including the works of Merleau-Ponty and Heidegger*”, and the concept of affordance has its roots in Jim’s “*Radical Empiricist*” writings (Heft, 2001, p.123).

2.4.3 Perceiving Affordances

The concept of affordance gives a new angle to the understanding of the perception process and of how the world is perceived. It also reflects the relationship between the perceiver, the behaviour and the environment.

According to Gibson, the central question of affordance is “*not whether they exist and are real but whether information is available in ambient light for perceiving them*” (Gibson, 1986, p.140). This means, from Gibson’s view, that affordances are perceived visually to perceiver, like other substantial concepts of colour, shape, size, or volume. This seems to be questionable or to say, insufficient/ imprecise. In many cases, we perceived the environment not only from visual information. For example, we may perceive a surface, which is very hot, can

afford “cooking” behaviour from our sense of its temperature rather than its appearance.

If the affordance we perceived is, as Gibson said, the information in ambient light, there should also be misinformation (Gibson, 1986, p.142). Misinformation is “picked up” misperception results. For example, one can misperceive the affordance of a closed glass door for an open doorway, and knock his head while attempting to walk through it. How to avoid misinformation for users is an important task in product design.

According to Gibson, the affordances can be perceived directly/inherently. A famous experiment called “*Visual Cliff*” which was invented by Eleanor Gibson and Richard Walk in 1960, showed that chicks and baby goats can perceive the affordance of “*falling off*” a surface at a once, while human infants are able to perceive this affordance from the time they can crawl on their own (Gibson and Walk, 1960). Campos and his colleague demonstrated in their experiment that infants began to respond to the surface 4.5 feet under the glass surface they sit on indicating by heart rate acceleration only from about 9 months old, well after most infants responded to Eleanor Gibson’s visual cliff (Campos et al., 1978, pp.149-182). The disjunction between two experiments suggested that some affordances are perceived information for animals’ basic/initial behaviour (Gibson, 1982, p.65), while others are less important and therefore awareness of these develops later.

Another very important character of affordances is that they are perceived relatively differently by individuals, or by groups of individuals with similar characters (Reed, 1996), due to their different physical conditions, psychical status and personal experience. It is easy to understand that affordance is relative to the body size of an individual. For example, knee-high for a child is not the same as knee-high for an adult (Gibson, 1986, p.128). Studies have shown the relationship between body size and the perception of climbing (Warren, 1984), sitting (Mark, 1987), and walking through (Warren and Whang, 1987)

behaviours. Similarly, other physical condition, such as eyesight and physical disabilities, can also have an impact on the perception of affordance.

The perception of affordance is also dependent on individual's intention (Heft, 2001). In the perceptive process of affordance, an individual's intention plays a role in the selection of affordances (Wozniak and Fischer, 1993). For example, a ladder may provide the affordance of "climbing up" for people who want to get access to the roof, while it provides the affordance of "bridging over" for those who want to get access to the other side of a brook. Other psychological conditions like mood also have an impact. When one gets angry or mad, everything in his eyes may provide an affordance of "throwing away".

Affordance can be taught through education process or learned from individual's experience. Children can perceive the affordance of a pen, a piece of paper or a potty, either after their parents and carers tell them how to use, or after they explore by themselves. The experience of an individual, in most cases, can be considered as the reflection of their cultural background. As a result, same objects can be perceived to have different affordance to persons from specific cultures. Chopsticks, as simple as two wood sticks, can provide affordance of "cooking", "dining" to almost every East Asian people but not necessarily for western people.

2.4.4 Perceived Affordances

Some researchers indicated that there appears to be a contradiction in the way Gibson characterised affordance (Noble, 1981, Costall, 1986, Katz, 1987). Affordances are properties of the environment specified relative to an individual perceiver, and on the other hand, they exist independently of an individual perceiver (Heft, 2001, p.124). Quoting Gibson's own word, "*... affordance, being invariant, is always there to be perceived*" (Gibson, 1986, p.139), no matter whether an individual perceiver perceives it or not. This contradictory character makes the concept of affordance different from Kurt Lewin's (1938, p.88) concept of valence.

In order to overcome this apparent contradiction, Benzeev (1984) and Heft (1989) suggested making a distinction between the potential functional properties of the environment and functional properties that are actually selected by the individual as an intentional agent. For instance, a toddler in a childcare playroom may have available to him numerous functional opportunities provided by the design or structural properties of the settings or furnishings in the room. During his stay, the toddler's behaviours show the relationship between the affordances in the room and the toddler. However, the opportunities are available whether or not the toddler takes them. The opportunities in total are the "potential affordances", and those engaged in by the toddler's behaviours are "*actually selected affordances*".

Norman introduced the concept of affordance to industrial design in his book, "*the Psychology of Everyday Things*", known as "POET" (Norman, 1988). He defined affordances as "*the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used*" (Norman, 1998, p.9). Norman emphasised the importance of, rather "perceived affordance" than "affordance", to the practical design problems, which not only depends on physical capabilities of actors, but also depends on actors' goals, plans, beliefs, and experience. This developed concept then established the design field of Human-Computer Interaction (HCI), which has been widely applied to our everyday life. According to Norman, "*the designer cares more about what actions the user perceives to be possible than what is true*" (Norman, 1999). That means application design is not only about the product itself, but more importantly about how to make the product suitable so that the users could perceive what they need to perceive.

2.4.5 Designed Affordance

Based on the concepts of potential and perceived affordance, Kytta (2002, Kytta, 2003, Kytta, 2004) drew a schema (see Figure 2) of the interactive mechanism of potential affordances, actualized affordances (including perceived, used, and

shaped affordances), and negative affordances (resulting in avoidance, escape, or the shaping of an affordance).

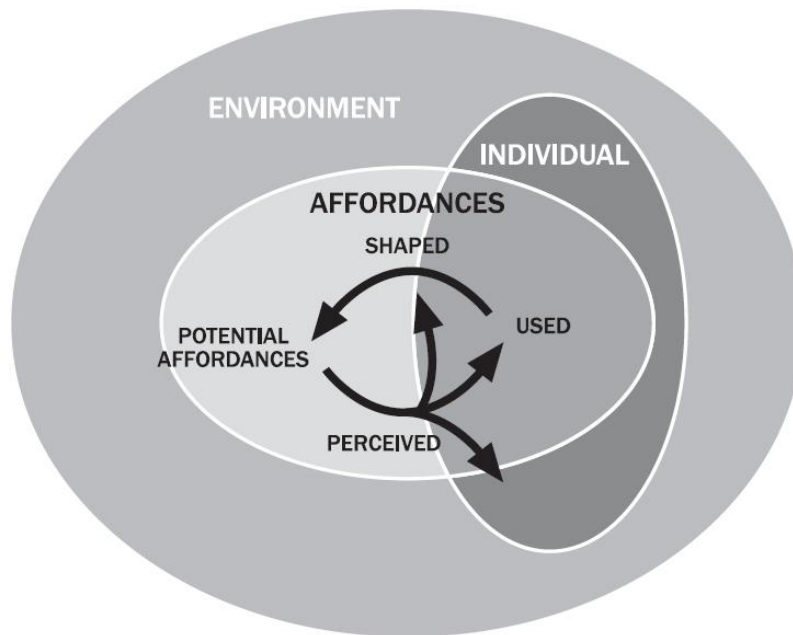


Figure 2: Affordances of various levels (Kytta, 2003, p.57)

Kytta (2003) pointed out that all environments have countless potential affordances that no agent has yet perceived. It is also impossible to list all possible affordances for different individuals, groups and situations. In Kytta's schema, actualised affordances were divided into three parts, perceived, used, and shaped affordances. An individual perceives some affordances from the potential affordances. Then the perceived affordances are selected and utilized in purpose. Finally, it is possible for individuals to shape the new environment, as a result, create new affordances or change existed ones. New affordances are then counted into potential affordances. In this way that potential, perceived, used, and shaped affordances form a cycle (Kytta, 2003). Kytta then added the negative affordances into the final version schema, to make it more sufficient. However, the mechanism of misperceived affordances is not included here.

Kytta also developed another schema (see Figure 3) which shows the designed affordance as a way to improve the Person-Environment fit (P-E fit). According to Kytta, the shaping of existing affordances or the creation of totally new ones gives opportunities to actively improve the P-E fit. For example, young people's

participation in environmental planning, in one of Kytta's studies, was seen as an effort to improve the child-environment fit (Kytta et al., 2004). This study lies on the assumption that "*children make their plans in order to try to reinforce the perceived fit between themselves and the environment*". Kytta found that children try to plan the environmental affordances that are "weak" (poorly promoted) in the environment but (2003, p.88). Based on her study, Kytta suggested that a child-friendly environment must "challenge children to explore, to discover new affordances, and to find new dimensions in existing affordances" (Kytta, 2003, p.90).

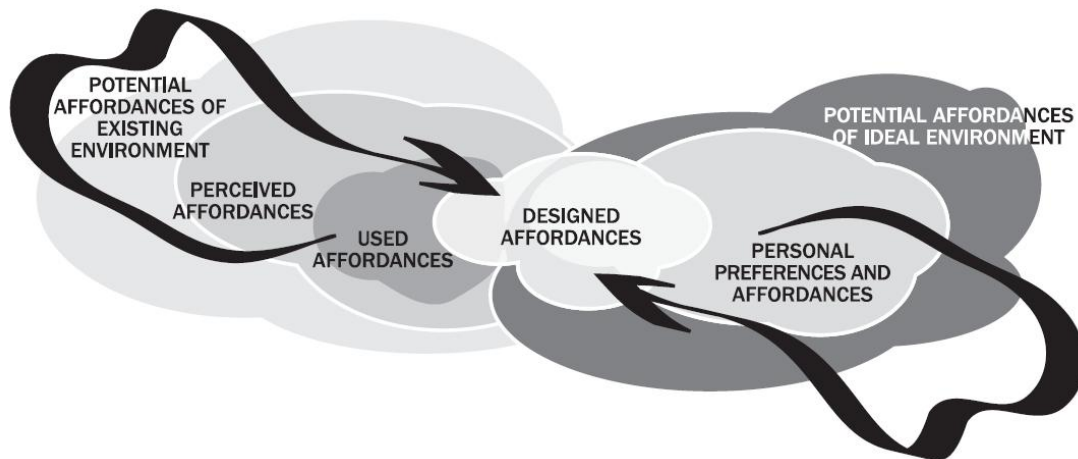


Figure 3: Designed affordance as a way to improve the P-E fit (Kytta, 2003, p.89)

2.4.6 Social Affordances

Even though affordances are perceived different to individuals, some of them can be shared within a specific group of people or even all of us. Perception of shared affordance is an essential part of socialization. "Only when each child perceives the values of things for others as well as for herself does she begin to be socialized." (Gibson, 1986, p.141)

Affordances are not only provided by the physical environment or objects. Actually, according to Gibson, other animals and people provide the richest and most elaborate affordances (Gibson, 1986, p.135). This could refer to the notion

of social affordance. Although Gibson did not use the term “social affordance”, it is still widely used by the later researchers (Loveland, 1991, Gaver, 1996, Kytta, 2003).

Loveland (1991) classified three layers of affordance. The first one is the affordance for physical transaction with the environment. The second is the specific, culturally selected affordances that reflect preferences but not necessary interaction. The third is social and communicative affordances that reflect the meaning of human activity for others. Kytta (2003) indicated that when one provides affordance to another, he will also get affordance back from others. For example, a woman’s affordance to a man and the man’s to the woman, a mother’s affordance to a child and the child’s affordance to the mother. This perceptual process is interaction and reciprocal.

Gaver (1996) pointed out that social affordances are not the same as affordances for social interaction. He also indicated that social affordances focus on the possible actions that people offer to one another and on the role of other people in giving new affordances, such as “teaching”, “chatting” and “fighting” behaviours. The affordances for social interactions can be considered as properties of both physical and social environment that can provide social behaviours for others. It is not hard to identify those places, such as stadium provides people playing soccer, roundtable provides people meeting and dining, churches and mosques provide people praying and other religious activities.

According to Gibson, the affordance can be either physical or social feature of the environment (Clark and Uzzell, 2002). Gibson emphasized the affordances provided by the presence of other people, such as social interaction, may be the richest and most intricate ones (Costall, 1995). Social behaviour is embedded in and shaped by the environment in which it takes place (Gaver, 1996). Based on Gibson’s concept, later research studies have been worked out in the affordances of children’s outdoor environment (Heft, 1988) and adolescents’ social environment (Clark and Uzzell, 2002).

2.4.7 Affordance research of children's environment

James Gibson's wife Eleanor Gibson perhaps was the first person to connect affordance concept and children's environment in research. In her well-known "Visual Cliff" experiment (Gibson and Walk, 1960), she successfully demonstrated infant's perception of the affordance "falling off" in artificial visual cliff environment. However, no one has considered suggesting a general list of affordances that is meaningful for children's environment design at that early stage.

In 1988, Heft published his paper in which a functional approach has been developed to describe the psychological resources of children's outdoor environments (Heft, 1988). He reviewed several studies of children's outdoor activities from this affordance perspective and revealed a set of functional properties of children's environments, including Barker and Wright's (1951) book "One boy's day", Moore's (1986b) "Childhood's Domain", Hart's (1979) "Children's experience of place" and some other studies.

From these works, Heft suggested a functional taxonomy of affordances of environment, in which he first superordinated 10 classifications and then the subordinated categories under each (see Table 2). He explained the value of this taxonomy as a way of thinking about environment that is psychologically meaningful.

Table 2: A preliminary functional taxonomy of children's outdoor environments (Heft, 1988)

1. Flat, relatively smooth surface:	affords walking, running affords cycling, skating, skateboarding
2. Relatively smooth slope:	affords coasting down(e.g. on bike, wagon) affords rolling, sliding, running down affords rolling objects down
3. Graspable/detached object:	affords drawing, scratching affords throwing affords hammering, batting affords spearing, skewering, digging, cutting

	affords, tearing, crumpling, squashing affords building of structures (e.g., raw materials for forts)
4. Attached object:	affords sitting-on affords jumping-on/over/down-from
5. Non-rigid, attached object:	affords swinging-on (e.g. tree branch)
6. Climbable feature:	affords exercise/mastery affords looking out from affords passage from one place to another (e.g., stairs, ladder)
7. Aperture:	affords locomoting from one place to another affords looking and listening into adjacent place
8. Shelter:	affords microclimate affords prospect/refuge affords privacy
9. Moldable material (e.g., dirt, sand):	affords construction of objects (e.g., pottery) affords pouring affords modification of its surface features (e.g. sculpting)
10. Water:	affords splashing affords pouring affords floating objects affords swimming, diving, boating, fishing affords mixing with other materials to modify their consistency

As Heft supposed, the purpose of this paper was to suggest a new way of thinking about children's environments. Ideally, the type of framework proposed here can help to stimulate future research in understanding children-environment transactions and perhaps to facilitate in some measure the design of environments for children.

Base on Gibson's theory of affordance and Heft's affordance taxonomy, Kytta tried to analyse the affordances of children's environments in the context of cities, small towns, suburbs and rural villages in Finland and Belarus. In her study (2002), a functional taxonomy of affordances (see Table 3) was developed

introducing “affordances for sociality” as a new category. However, in Kytta’s taxonomy table, the details of “*environmental opportunities for sociality*” were not provided and the affordances for sociality were not clearly linked with different environmental qualities.

Table 3: A functional taxonomy of affordances used in Kytta's research (Kytta, 2002)

Environmental qualities that support certain affordances	Affordances	Environmental opportunities for sociality	Affordances for sociality
Flat, relatively smooth surfaces	affords cycling affords running affords skipping affords skating affords playing hopscotch affords skiing affords playing (football, ice hockey, tennis or badminton)		affords role playing affords playing rule games affords playing home affords playing war affords being noisy affords following / sharing adult’s businesses
Relatively smooth slopes	affords coasting down affords skateboarding		
Graspable / detached objects	affords throwing affords digging affords building of structures affords playing with animals affords using plants in play		
Attached objects	affords jumping-over affords jumping-down-from		
Non-rigid, attached object	affords swinging on affords hanging		
Climbable feature	affords climbing affords looking out from		

Shelter	affords hiding affords being in peace and quiet
Mouldable material (dirt, sand, snow)	affords moulding something affords building of snow
Water	affords swimming affords fishing affords playing with water

Using this taxonomy, Kytta's study carried out individual interviews with 8-9 years old children. Significant differences were found among the communities and between two different countries in affordance availability, in the level of affordances (perceived, used and shaped) and in the distribution of affordances within the categories of the taxonomy. Also the location of the affordances, whether they were at home, in the yard, in immediate surroundings or somewhere further differed significantly in different communities. She also suggested the affordances for sociality needs further elaboration in the future (Kytta, 2002).

Nilda Cosco (Cosco, 2006) investigated the potential association between different types of play area design and level of physical activity of 3-5 year old children. She used a multi-method approach to study three preschool play areas and yielded information not only about environmental variables linked with greater amounts of physical activity but also revealed the potential implications for physical activity of social interactions and programming of preschool outdoor play. Her study started by proposing the theory of affordance that considers the individual and the environment as an interactive system, to guide the interpretation of findings.

Coralee McLaren recently studied children's motion in an integrated kindergarten classroom, and proposed a preliminary superset of affordances

(McLaren et al., 2011), in which she suggested other people as social affordance in the environment (see Table 4).

Table 4: A preliminary superset of affordances: Integrated kindergarten classroom (McLaren et al., 2011)

1) Flat, relatively smooth surface / open pathway:
affords walking forwards and backwards, rolling (e.g., with wheelchair) affords running, gliding (e.g., with walker) affords skipping, galloping, jumping, dancing, chasing affords crawling, sitting, kneeling, lying down affords space for mimicking, triggering others
2) Attached objects: (e.g., tables, shelves, benches)
afford jumping up and down (e.g., by pressing on surfaces) afford stabilizing (e.g. when standing, walking past) afford hiding/ crawling/ peeking-under afford leverage for standing/ crouching, swiveling/ tipping (e.g., with wheelchair) afford navigating in-between spaces (e.g., by holding on)
3) Rigid detached objects: (e.g., chairs, stools, mobility devices)
afford sitting-on, jumping-on-to afford pushing, carrying afford kneeling / crouching / spinning / swiveling-on afford rocking, tipping, crawling-over, hanging upside down afford stabilizing (e.g. when standing, walking past) afford leverage for standing/ crouching afford navigating in-between spaces afford running, gliding, balancing/sitting/resting (e.g., with walker) afford bending forward, falling backwards (e.g., with walker) afford spinning, popping wheelies, tipping, rocking, (e.g. with wheelchair) afford pushing past barriers, idiosyncratic movements (e.g., with walker, wheelchair)
4) Non-rigid, detached objects: (e.g., exercise ball)
afford sitting / bouncing on afford body surfing afford kneeling, shifting, balancing-on
5) Shelter / enclosed spaces (e.g., pretend center, cubbies)

<p>afford refuge/privacy, hiding</p> <p>afford playing/gathering with peers, watching others</p> <p>afford dancing, jumping, sitting, kneeling, rolling, crawling, crouching</p> <p>afford a passage from one place to another (e.g. open transformation)</p> <p>afford space for mimicking, triggering others</p> <p>afford standing-on, reaching-up, climbing-into (e.g., cubbies)</p>
6) Modifiable objects (e.g., doors, chairs)
<p>afford opening and closing</p> <p>afford the creation of a subspace (e.g., open castle doors)</p> <p>afford tipping, rocking, teeter-tottering, free-falling (e.g., modified, detached chair)</p> <p>afford pushing, crawling-over, leaning-on (e.g., modified, chair base)</p>
7) Social affordances (e.g., other children)
<p>afford mimicking</p> <p>afford triggering (similar/ idiosyncratic movement responses)</p>

The review of current affordance studies has clearly shown the rising interest in social issues in the field. However, none of these research works built up a detailed and clear affordance taxonomy in particular related to social interaction.

2.5 Summary of the chapter

This chapter provides a broad knowledge background to the research question via the review of the literature. It has spanned the research areas of sociology, psychology and environmental psychology, education, childhood studies as well as various forms of environmental design. A range of different approaches to describing social behaviours and concepts has been presented, and the importance of the interrelationship between the socio-cultural and the physical environments has been established. Developments in Affordance Theory have been described and critically reviewed in detail, and more specifically in relation to children and social behaviours. Both theories of social interaction and of affordance will inform the critical analytical frame for the thesis. From the review, a knowledge map of the theoretical frameworks of children's social

interaction and the affordance can be drawn out and inform the methodology design of the whole research.

In the next chapter, I am going to review the social context of current childcare services in the UK. The review will cover the policy trends, the legislation establishment, the history and development, and the design guidelines of the British childcare services.

Chapter III: Review of the UK childcare policy and development context

This chapter provides a review of the current policy and policy-related guidelines. It starts with the review of the legislation and policy documentation of UK's childcare service. Then the chapter goes through the regulations and guidelines of childcare environment design. The chapter ends with the discussion of the increasing focus on children's childcare life in legislation, policy and design areas.

Although these spaces are socially engaging areas and, in most case, are very comfortable for toddlers and pre-schoolers, there are also children who seek shelter from the noise and interaction. (Feinberg, 2010, p.72)

Children appreciate small intimate spaces and, if designed properly, the layout and structure of the space help children define what behaviours are appropriate in the library setting. (Feinberg, 2010, p.73)

3.1 British Legislation and policies of childcare services

3.1.1 Legislation development

British Government has a long history in consistent concern and support of children's education and welfare, but not until recent decades did they start to pay more attention and put more efforts into children's early years.

The registration and inspection of childcare service were firstly legislated in the Children Act 1989, and the function rested with local authorities since then.

In 1992, the Office for Standards in Education, Children's Services and Skills (Ofsted) was established following the legislation of the Education (Schools) Act 1992 and led by Her Majesty's Chief Inspector (HMCI) of Education, Children's Services and Skills, for the inspection of schools. In order to monitor the development of supply of nursery education and provide a means of recognising the redemption of the nursery voucher scheme, Ofsted started to appoint nursery education inspectors from 1996. The provision of inspection of nursery education was also made in the Nursery Education and Grant-maintained Schools Act 1996, and consolidated in the School Standards and Framework Act 1998.

The British Government launched the National Childcare Strategy Green Paper: "Meeting the Childcare Challenge" in May 1998, with its attempts to establish more high quality, affordable childcare. Following the strategy, the Care Standards Act 2000 was published. The Act widened Ofsted's power and transferred the function of registration and inspection of childcare service from local authorities to Ofsted in September 2001.

Later, the Education Act 2005 merged the nursery education and childcare service inspectorates while leaving the inspection legislation in place. Later the Childcare Act 2006 finally brought all together in statute Ofsted's nursery education and childcare service inspection and registration functions.

3.1.2 Policy trends

In December 2004, the British Government published the ten-year childcare strategy "Choice for Parents, the Best Start for Children", which led to the acceleration of the changes and development of UK's childcare circumstance in recent years. Following the strategy, the landmark Childcare Act 2006 was published.

In April 2013, the British Government published another policy "improving the quality and range of education and childcare from birth to 5 years", which applies to the whole England. The policy states that good-quality education in

earliest years can help children succeed at school and later in life, and contributes to creating a society where opportunities are equal regardless of background. With its aims to build stronger and better-qualified early years workforce, and to provide more good-quality affordable childcare for working families, actions are taken towards three major directions, extending the range, helping with the cost, and improving the quality.

In a press release published on 16 October 2014, the Childcare and Education Minister Sam Gyimah has called on childcare providers to take action after statistics show not enough children are making good progress. He said, "... the first few years of a child's life can be make or break in terms of how well they go on to do at school and beyond. The statistics published today clearly show that some progress is being made but more must be done to ensure children, especially those from disadvantaged backgrounds, are put on the right path..." (Department for Education, 2014)

He also emphasised the importance to make sure children are "*not only safe, happy and having fun but at the same time developing important skills like playing confidently with their friends, speaking, and understanding words, letters and numbers...*" (Department for Education, 2014)

Chief Executive of the Professional Association for Childcare and Early Years (PACEY) Liz Bayram said PACEY welcomes the Minister's recognition that early learning happens while children are having fun. They also welcome Minister's acknowledgement that helping young children to develop essential social and emotional skills such as talking, listening to and playing with others is as important as understanding letters and numbers. She said, "*all children - especially our most disadvantaged young children - deserve high-quality, playful early learning...*" (Department for Education, 2014)

3.2 A Short History of Childcare Centre

3.2.1 Original thoughts in the 18th century

The history of childcare and early childhood education is long and complicated. It is generally believed that before infant schools service appeared, parents or relatives mainly took the charge of their children's early care and education, until they reached the age of entering elementary schools. No early education buildings for the public were purposely built at that time. In the 18th century, Jean-Jacques Rousseau brought the idea of child-centred education with an emphasis on the rural and natural environment, against the urban moral atmosphere of pre-revolutionary Paris. (Dudek, 2000, p.30).

3.2.2 Childcare centres emerged in the 19th century

Centre based childcares turned into practice and became much more popular in Britain as well as other parts of Europe during the 19th century. Robert Owen, a Scottish philosopher and pedagogue, opened an infant school in his factory at New Lanark in Scotland in 1809 (Sanderson, 1991, p.52). Owen advocated free and unstructured play in the education of young children and did not press for formal training. He endeavoured to create a future citizen through the process of informal teaching and physical activities (Kwon, 2002). Following Owen's successful establishment, Henry Brougham established the first infant school in Westminster, London in 1819. Soon after that, more infant schools were built across England, including Islington, White Chapel, and Brompton in Huntingdonshire, Bristol, Worthing, Liverpool and Wandsworth (Wilderspin, 1824, p.23).

Later in 1837, German pedagogue Friedrich Fröbel, opened the first childcare institute, named Care, Playing and Activity Institute for Small Children, in the village of Bad Blankenburg, and began manufacturing educational play materials for children. In 1840, Fröbel coined the word "Kindergarten" (Children's Garden) for his institute, which has been widely used today. The success of Fröbel's institutional early childhood education in Germany led to the universal

denomination of this kind of Kindergarten institutions, with which it was exported to the World.

The year after 1870 saw the greatest change in British education. In this year, the Education Act of 1870 was passed in parliament. This important legal event established compulsory elementary school education for all children from the age of 5. In the absence of specialised institutions for younger children, elementary schools admitted children younger than 5 years old, to protect them from the poor and unhealthy environment.

3.2.3 Childcare services spread in the 20th century

During the Second World War, one in five schools in England and Wales were destroyed or severely damaged (Harwood, 2010, p.73). It was not recognised until 1946 that, the post-war birth rate had begun to rise dramatically. As a result, the post-war demand for infant places in the suburban areas was significantly increased (Harwood, 2010, p.73).

Open-air School

With concerns for the health and well being of poor children, Margaret McMillan established an open-air nursery in Deptford in 1911. The nursery put great emphasis on fresh air nourishment, and exercise. It allowed free access to play areas or gardens, as well as a flexible curriculum schedule. McMillan's education model still influence some aspects of the nursery practice today (Curtis, 1998).

Playgroup

Due to the decline in family size and closure of childcare service across Britain after the Second World War, children lost opportunities to play with others (Kwon, 2002). With growing parental interest and lack in Local Education Authorities' (LEAs) provision of childcare places, a new type of preschool provision "the playgroup", was created. The first playgroup was set up in a church hall in 1961 by Belle Tutaev, in purpose for looking after her small

daughter. Soon it became a movement across England. As a low-cost substitute for nursery schools, the playgroup movement was welcomed both by parents and educational authorities (Kwon, 2002).

Montessori Schools

In 1907, Montessori was asked to start a school for children in a housing project in Rome, which she called "Casa dei Bambini" (Children's House), because of her success in educating special need children who may seem to be "uneducable" in Italy. The school was in an apartment building in the poor neighbourhood of Rome and was the first Montessori's childcare centre. By 1917, there was an intense interest in her method in Britain, Europe and North America. Montessori education has an emphasis on children's self-construction, liberty, and spontaneous activity. Montessori believed children engage in psychological self-construction through interaction with their environments, and they have an innate path of psychological development. Nowadays, Montessori's approach is still trendy and its philosophy and educational methods are widely applied in many childcare centres across the UK.

Reggio Emilia Approach

During the recent decades, a new childcare and early education approach called Reggio Emilia emerged, and was recognised by western early educators and researchers. Loris Malaguzzi and parents first developed this early childhood educational philosophy in the villages around Reggio Emilia area in Italy, after the Second World War. The principles of Reggio Emilia approach are based on children's rights and their potentials. They believe children should have control over the direction of their learning, and learn through experiences via touching, moving, listening, and observing. They emphasise children's relationship with other children and with materials in the world, and encourage them to express themselves. On the other hand, teachers are considered not just instructor but also co-learner and collaborator of the children.

In Reggio Emilia approach, the physical environment is vital to the early childhood as children's "third teacher". The principle lies in the belief that children can best create meaning and make sense of their environment that supports "complex, varied, sustained, and changing relationships between people, the world of experience, ideas and the many ways of expressing ideas"(Cadwell, 1997).

3.3 Contemporary childcare centres in the UK

3.3.1 Data information

The childcare situation in the United Kingdom has evolved since the end of Second World War (Moss, 1991). Through out the post-war period, the provision of childcare in the UK fell behind its northern and western EU neighbours (Lewis, 2013). The situation has changed since the labour government published its National Childcare Strategy in 1998.

In the published OFSTED statistics of the "Registered Childcare Providers and Places in England" (2011), until March 2011, there are 26,243 providers running childcare in 1,023,602 non-domestic premises³, and 56,478 providers running childcare in 277,327 domestic premises⁴. Compared to the data collected from the another OFSTED statistic report (2003) published eight years ago, in which 68,200 providers in 300,900 domestic premises, and 31,100 providers in 980,400 non-domestic premises, we could see that, during the past eight years, the overall number of registered childcare places is remain at the same level, has

³ Childcare on non-domestic premises is where childcare is provided on premises which are not somebody's home, for example in purpose-built premises, village halls, school premises. Such childcare normally includes nurseries, pre- /after-school clubs and holiday clubs.

⁴ Childcare on domestic premises is where there are four or more people working together, for example four childminders, or two childminders and two assistants, or one childminder and three assistants. These providers can spend up to 50% of their time working on approved non-domestic premises.

increased 1.6% from 1,281,300 to 1,300,929. The overall number of childcare providers has a notable decrease of 16.7%, from 99,300 to 82,721; the numbers of domestic childcare providers shows a similar drop rate to the non-domestic providers.

An interesting fact shown in this statistic chart is that, although the total number of non-domestic providers decreased, the number of registered places increased counter from 980,400 to 1,023,602. That means, in 2003, each non-domestic provider ran about 31 places in average, but by 2011, each provider runs 39 places in average, 8 more than before. This could indicate an increased demand of non-domestic childcare services even under current socio-economic recession background in England.

Table 5: OFSTED Statistic of Registered Childcare Providers and Places in England

OFSTED Report Year	Non-domestic		Domestic		Total	
	Providers	Places	Providers	Places	Providers	Places
2011	26,243	1,023,602	56,478	277,327	82,721	1,300,929
2003	31,100	980,400	68,200	300,900	99,300	1,281,300

3.3.2 Principles and values

Principles and values are the important basis in childcare and early education practice. Different early education approaches were built upon different principles and values, embedding into their daily practice, and affect children's development in different ways.

The Montessori approach is designed to support the children's natural development in a well-prepared environment (Morrison, 1984). As Morrison pointed out, Montessori educators nowadays follow five basic principles to implement the approach:

- Respect for the Child;

- The Absorbent Mind;
- Sensitive Periods;
- The Prepared Environment;
- Autoeducation.

Similarly, Reggio Emilia approach also shows high respects for children (Cadwell, 1997). Reggio Emilia educators believe children are competent, curious and potential in connecting to the world, and believe the critical role of the environment as a third teacher. Their principles and values include:

- Children must have some control over the direction of their learning;
- Children must be able to learn through experiences of touching, moving, listening, and observing;
- Children have a relationship with other children and with material items in the world that they must be allowed to explore;
- Children must have endless ways and opportunities to express themselves.

The important difference is that Reggio Emilia approach developed its own principles and values with more emphasis on children's interaction and cooperation, and emphasis on listening to the diverse expressions from the children.

In traditional British early childhood education, the key principles and values were derived from different pioneers across Europe, such as Owen, Froebel, McMillan, and Montessori. According to Kwon (2002), the underlying philosophy of the key principles and values can be summarised as child-centred, free play, developmentalism, and individualism.

Child-centred

The philosophy of child-centred education lies on the belief in individual child's needs and interests, with respects to the differences between individuals. It focuses on the concept of more freedom to children, allowing them to make their

own choices and build up their own ideas. However, the child-centred view of children's motivation for learning has been criticised by some educators due to the dangers of "*an exclusive and unrealistic emphasis upon the child*" (Kwon, 2002).

Free play

Play has long been recognised for its important role in children's development (Nilsson and Ferholt, 2014), and has been integrated into the preschools' curriculum in Britain, following the thoughts of Rousseau, Froebel, Owen, McMillan, Lev Vygotsky, etc. It is based on the belief that children can learn from self-initiated free play in an exploratory environment, with the same emphasis on children's own choice. According to Lev Vygotsky(1978), children build up their knowledge via play activities. Although the free play has many benefits and is a necessary part of the preschool classroom, Kwon (2002) pointed out that free play has several weaknesses, for example, does not maximise cognitive development.

Developmentalism

Developmentalism is another fundamental belief in British early years education(Kwon, 2002). It emphasises a sequential result in children's development. According to Piaget's study (1952, 1973), a child must be "ready" to move on to the next developmental stage, and cannot jump over directly to a higher level in advance. Although developmentalism and "readiness" is widely dominant in early childhood education, researchers have argued that the rational power of young children has long been underestimated. The idea of "readiness" can led to a lack of structure in the curriculum, and a lack of progression in practice (Kwon, 2002).

Individualism

Kwon (2002)believe that the child-centred education principle is based on the individualism emphasising on children's individual needs and interest.

Based on the theoretical and practical works of Froebel, Montessori, and Steiner, Tina Bruce(1997, p.36) concluded 10 common shared core principles in early childhood practice:

- The best way to prepare children for their adult life is to give them what they need as children
- Children are whole people who have feelings, ideas and relationships with others, and who need to be physically, mentally, morally and spiritually healthy.
- Subjects such as mathematics and art cannot be separated; young children learn in an integrated way and not in neat, tidy compartments.
- Children learn best when they are given appropriate responsibility, allowed to make errors, decisions and choices, and respected as autonomous learners.
- Self-discipline is emphasised. Indeed, this is the only kind of discipline worth having. Reward systems are very short-term and do not work in the long-term. Children need their efforts to be valued.
- There are times when children are especially able to learn particular things.
- What children can do (rather than what they cannot do) is the starting point of a child's education.
- Imagination, creativity and all kinds of symbolic behaviour (reading, writing, drawing, dancing, music, mathematical numbers, algebra, role play and talking) develop and emerge when conditions are favourable.
- Relationships with other people (both adults and children) are of central importance in a child's life.
- Quality education is about three things: the child, the context in which learning takes place, and the knowledge and understanding which the child develops and learns.

3.3.3 EYFS Statutory Framework

In Section 39 of the Childcare Act 2006, Early Years Foundation Stage (EYFS) was firstly introduced, to provide a framework which could deliver consistent and high-quality environments for all children in pre-school settings, recognising the

importance of this period in a child's life. The Statutory Framework of EYFS was published and took effect from September 2008. The framework comprised a set of Learning and Development Requirements (apply only in England) and a set of Welfare Requirements (apply to the whole of the UK), which must be followed by all childcare providers. In EYFS 2008, childcare and early education principles have been grouped into four distinct but complementary themes:

- A Unique Child
- Positive Relationships
- Enabling Environments
- Learning and Development

In the learning and development requirements, there were six areas covered by statutory early learning goals and education programs. The areas include:

- Personal, Social and Emotional Development
- Communication, Language and Literacy
- Problem Solving, Reasoning and Numeracy
- Knowledge and Understanding of the World
- Physical Development
- Creative Development

There were in total 69 specific statutory early learning goals, which established the expectations for most children to reach by the end of their EYFS. Also as the EYFS 2008 pointed out, that all these areas are equally important and depend on each other.

The welfare requirements were set out with general legal requirements, specific legal requirements, and the statutory guidance in five aspects, including:

- Safeguarding and promoting children's welfare
- Suitable people
- Suitable premises, environment and equipment
- Organisation

- Documentation

In April 2012, the British Government issued a revised EYFS Framework based on the recommendations of Dame Claire Tickell's review of the EYFS 2008 (Tickell, 2012). The revised EYFS 2012 has changed the wording of the overarching principle, from "learning and development" to "children develop and learn in different ways and at different rates", to emphasis on the diversity in children's development. Lots of changes have been made in the learning and development requirements section, and significantly reducing the total number of specific early learning goals from 69 to 17. The new requirements covered three prime areas and four specific areas.

The prime areas include:

- Communication and language
- Physical development
- Personal, social and emotional development

The specific areas include:

- Literacy
- Mathematics
- Understanding the world
- Expressive arts and design

Together with the revised framework, a series of materials called the Early Years Foundation Stage Profile (EYFSP) was provided. These materials are split into each of the 17 early learning goals of EYFS 2012, including a variety of different types of evidence in children's learning development and also show how practitioners can gather information that supports their EYFS profile judgment.

To emphasise the importance of safeguarding, the Welfare Requirements were renamed as Safeguarding and Welfare Requirements in EYFS 2012.

During July to September 2013, the Government launched a public consultation on "The Regulation of Childcare". Following Government response to the

consultation published on 13 February 2014, the EYFS Statutory Framework has been updated again in March 2014, and was in effect from 1 September 2014. The revisions only reflected changes apply to the Safeguarding and Welfare Requirements. No changes were made to the Learning and Development Requirements as well as the early learning goals.

In 2017, British Government published another revision update to the EYFS Statutory Framework, which became effective since 3 April 2017. In the EYFS 2017, the overarching principles and 17 early learning goals remain the same as its previous version.

3.3.4 Typical layout elements of British childcare environment

As mentioned in Chapter II, the layout design of the playroom is very much related to both children and caregivers' daily activities in the childcare centre. It is recognised that appropriate, well-equipped and well-maintained playroom can promote the satisfaction for children's play and caregivers' work (Goldschmied and Jackson, 1994, p.26).

Currently, there are some typical elements in the layout of childcare playroom. Some of the elements may be seen in almost every childcare centre across Britain, while others may only be selected as outstanding service features and provided by limited amount of childcare centres. Traditionally, quiet play area and noisy play area, wet play area and dry play area, are clearly separated in the childcare playroom layout.

Teaching corner

The teaching corner is essential for educational activities purpose, and normally consists of a two side easel or white writing board which allow caregivers to demonstrate necessary educational information to the children, such as letters, numbers or spaces. Other equipment can also be supplied here to support necessary educational activities such as papers, abacus, or other specially designed education tools. During recent years, various new types of electronic

equipment have been extensively used in the childcare environment with an increasingly fast speed, including computers, projectors, and tablets.

However, in childcare centre's daily practice, teaching corner is not always occupied for educational purposes. Sometimes, it is also used to gather children and do some group activities such as singing nursery rhythms.

The teaching corner can provide plenty important learning opportunities for children and help them establish their knowledge and understanding of the world, and also learn principles of language and mathematics. All are key learning goals mentioned in the Statutory Framework of EYFS (2008, 2012, 2014, 2017).

Reading corner

Traditionally, Western early childhood education has an emphasis on children's reading ability as achievement marks. Thus it is widespread that every childcare centre has a reading corner facility together with one or more book stacks filled with plenty of books suitable for children according to their age groups. It is very necessary to establish good reading attitude and habit from the beginning of reading behaviour. Some soft furniture, like sofa or carpet, may also be provided to comfort children's reading activity. Sufficient lighting is important in reading corner for the health of children's eyes development. Reading corner contributes to children's developmental goals in literacy, language and communication, and also their knowledge and understanding of the world.

Table activity area

Table is essential furniture for daily human activities, ideal for both personal and cooperating work. This is also the same to children. In childcare centres, tables are provided for children's small-scale manipulative activities, art and craft working, or kitchen play. Notably, tables in childcare centre are also used for mealtime activity. Children are settled in one by one and then have the meal together. Table activity area can provide children plenty opportunities to

develop their fine motor physical skills, expressive art and design skills, writing skills, and communication skills.

Sand play area

Sand playing could be either indoor or outside in the playground. If space is available, a sand play tray could be located inside the playroom. However, there are several practical problem need to pay attention to if it is used indoors.

The sand tray is usually best to set in the wet area in the playroom, where required for later clean up. The sand in the tray is normally like to be spilt out by younger children (Goldschmied and Jackson, 1994, p.31). Thus a nylon sheet laid under the tray is necessary to make boundary and reduce scattering. Additionally, a dustpan and soft brushes should be prepared for clean up the spilt sand. The sand needs to be washed regularly due to the hygiene requirements and better smell. It is a task that even very young child would enjoy helping.

The sand play area can help children establish their knowledge and understanding of the world, and practice their handling of mouldable material and related fine motor skills. They are also very likely to develop their social and communication skills while interactively play with other children. All these skills are mentioned in EYFS Statutory Framework (2008, 2012, 2014, 2017).

Water play area

Water play is commonly seen in British childcare centres. Like sand play, it can be either indoor or outdoor. Usually, if space is available, a water container with the capacity for several children to play together is provided in the playroom. It should no doubt be set in the wet area where the floor is anti-moisture or easy to clean and dry. It is normally set together with or as an alternative to sand play.

There can be lots of tasks for children to do in the water play, not just for splashing, for example, washing and wiping toys, or furniture, or dolls' body and

clothes, or watering plants. Children are normally very happy to offer their help while they can play with water. Aprons that are long enough to cover children's clothes are usually provided to children, and towels are accessible for drying their hands.

Water play area allows children to experience and enjoy the play in water theme environment context, potentially contributes to children's all three prime development areas, as well as specific skills such as communication skills, fine motor skills, personal, social and emotional skills.

Construction play area

Nowadays, various construction toys are available in the market. This popular play activity is also adopted in childcare centres so that to enrich children's play resources and themes. As previously mentioned, Froebel already noticed the educational function of construction toys. His famous design of "Froebel Gifts" consists of several types of geometric building blocks and pattern activity blocks, which inspired the later development of construction toys in the consumer markets.

Typically, a construction area in British childcare centre includes a soft carpet, various kinds of wooden or plastic blocks, buildings parties and transportation elements. Children enjoy acting different roles to complete the construction task and establish self-confidence by making achievements.

Construction play area can provide children plenty of practice with fine motor skills in handling objects, and encourage children to share, cooperate, and play together, to help them develop their communication, social and emotional skills that are mentioned in EYFS Statutory Framework (2008, 2012, 2014, 2017).

Imitation play area

Observing and imitating other people's behaviour is necessary for children's early social cognition and behaviour development. From imitation play, children

could learn and practice the skills of how to interact with others in a specific occasion.

In British childcare centres, imitation play is considered an attractive game for children from 18 months. An imitation play area is often set up in the noisy area because of the large amount of conversation during play. Usually, corresponding tools or toys should be provided to children for doing imitation play, such as role playing costumes, shopping toys, kitchen toys, gardening toys, or wooden house with furniture. However, tools and toys are not necessary. There are plenty traditional social playing games mainly taken out through conversation and gestures.

Imitation play area offers children the opportunity to enjoy social play under a specific imitative social context, which might involve with loads of emotional conversations and imaginations. In some occasions, it also allows children to practise their objects handling skills. All these skills are important parts mentioned in the Statutory Framework of EYFS.

Electronic equipment

Thanks to the development of techniques in electronic industry, contemporary childcare environment may include several kinds of electronic equipment, such as Television, CD player, and computers. These different types of equipment are provided to enrich children's daily life and deliver education electronically. Although not every childcare centre has these kinds of equipment, the provision is still increasing. There are a number of debates regarding the application of such electronic equipment in childcare and education process, and the potential negative impacts on children's development.

Electronic equipment is a new technique, but it does provide a unique, attractive scenario in early childhood education, which might help children develop new knowledge and different understanding of the world. It can also help children practise their fine motor or large motor physical skills. It is an important and helpful tool facing future if it is provided and used in a proper way.

Sensation room

A few British childcare centres today have developed and set up a special room to give children interactive visual and audio stimulus. Such spaces are called the sensation room. Through the stimulus, children are expected to develop better. Yet the actual result remains unclear. The equipment inside the room is purposely designed and installed, with different interacting functions to children. Children are observed to be exciting and cheerful in these rooms, because of the new experience gained inside. The sensation room can potentially help children develop their sensational and emotional skills, and build up new understandings of the world as parts of the EYFS framework. However, having such a room is a luxury set up for most childcare centres. Not many childcare centres have this type of setting to provide children different experience. Moreover, the using of sensation room is also not always available to children, due to the high utility cost. Instead, some electronic toys play the same role as the equipment inside the sensation room.

Outdoor environment

Today, outdoor space in childcare centres is also considered as a learning area for children (Goldschmied and Jackson, 1994, p.164). Children are not only learning how to safely take large scale motor activities such as running, jumping, climbing, sliding, riding a bicycle or tricycle, but also gaining knowledge from nature plants, creatures, and other parts of the substantial world. Moreover, it is a place for them to play with other children, they learn rules of social interaction, gain social knowledge, and practice their social skills with each other. These are all important developmental and educational goals listed in EYFS Statutory Framework (2008, 2012, 2014, 2017).

Traditionally, as stated in Rousseau's child-centred education thoughts, the rural and natural environment is extremely important for children's individual development. Today, outdoor environment is recognised as providing children

sunshine, fresh air, open view, and those physical activities that are not possible to undertake indoors.

The outdoor environment is particularly emphasised in British childcare centres. As stated in the 253 OFSTED reports of local nurseries and children centres in Sheffield area, almost every childcare service has at least one accessible outdoor play area for the children. However, there could be practical problems for the childcare centres in high-density cities.

The outdoor environment in childcare centres is usually a relatively big and enclosed playground, with some toys inside, or better, facilities and equipment installed. Typical equipment includes slides, swings, rocking horse, and seesaws. Some of the centres may also have gardens, sand pits, or even water surface. Nature vegetation is preferred if possible.

3.4 Summary of the chapter

This chapter has provided the social context image of childcare services in the UK, including the policy trend, the legislation establishment, the historical development, and the design guidelines. It has set out the UK policy context within which childcare settings are provided and designed. It has described the typical spatial and activity-related expectations, to present a picture of the typical spatial and behavioural intentions of contemporary UK settings for early years provision. The review has also linked the typical childcare setting layout with the early education principles, values, and EYFS statutory framework in the UK. This review of context is relevant to the empirical work carried out in this study, especially for the development of research methodology and the actual on-site fieldworks, which will be further explained in the next chapter.

The next chapter is going to present the methodology development and the design of detailed methods. The development of the methods is based on researcher's personal situation, and the review of the theoretical literature and the social context of the UK childcare provision.

Chapter IV: Methodology

This chapter summarises the methodology generation process and the employed methods of the whole research. The chapter starts from the reflective description of the position of this research. Then it discusses the choosing of the focused ethnographic method and follows with the overview of the research strategy. Thereafter, it describes in detail the onsite focused ethnographic method, including the data collecting procedure, the case childcare environment, the research participants, equipment used, and the ethical issues. Finally, the chapter briefly talks about the data analysis method, including the rationale, interpretation method, and the generating of the meanings of deconstructing environmental elements and children's behaviours.

4.1 Position of the research

"If we wanted to establish the reality of a social system as a complex of mutually dependent elements, why not begin by studying a system small enough so that we could, so to speak, see all the way around it, small enough so that all the relevant observations could be made in detail and at first hand?" (Homans, 1962, p.39)

As already mentioned in Chapter I, the purpose of this research is to explore the potential relationship between built environment and preschool children's social interactions in childcare centre. My research interest on children's daily social interaction in the architectural space falls precisely within the scope of microsociology (please see Chapter II Section 2.1.2 for more details).

Considering the facts that I came from a foreign culture background, and had not enough relevant experience in British childcare environment, I also attempted, through the exploration of the study, to find out an appropriate approach for

architects and designers, to gain their understanding of specific human behaviour pattern (e.g. children's social interaction in my case) within the environmental context which they are very concerned about, but may not familiar with.

In this research, the emphasis lies on understanding the meaning of children's interaction in specific environmental and social contexts in the childcare centre. Thus, in-depth investigation, including direct on-site observation data of the childcare centre's daily life, is considered essential to the study. Therefore, the whole research builds on an interpretivism position rather than positivism, and thus employs qualitative approaches rather than quantitative ones.

Underlying the interpretive position is the ontological and epistemological belief in constructionism, which assumes that "the social world is constantly being constructed through group interactions, and thus, social reality can be understood via the perspective of social actors enmeshed in meaning-making activities." (Hesse-Biber and Leavy, 2011, p.5) From the constructionist's perspective, the meaning of the action is created and negotiated by the actors, but on the other hand, the meaning can also reflect the conventional, cultural and institutional origins that have influenced the actors upon their action making. Moreover, in this research, the meaning of the environment is not only interpreted from its substantial construction level, but also generated from the process of interpreting actors' actions.

4.2 Development of methodology

4.2.1 Choosing ethnographic approach

Ethnography is the study of people in naturally occurring settings or "fields" by means of methods which capture their social meanings and ordinary activities, involving the researcher participating directly in the setting, if

not also the activities, in order to collect data in a systematic manner but without meaning being imposed on them externally. (Brewer, 2000, p.11)

Coming from an architecture design education background, almost since the very beginning of the study, I realised that I had very little knowledge and experience about the cultural, social, and environmental context of the British childcare setting I was going to explore. Moreover, as I had done little research with British preschool age children before, this study was quite a challenge for me, especially as a foreigner in the field. In this situation, in order to build up my understanding of British children's behaviour directly from a foreigner's angle, I chose ethnographic study as the most appropriate approach, which could allow me to immerse myself in this 'British culture' and explore the research question deeply. However, ever since the decision was made, I realised that the most challenging part in front of me is the ethnography approach it self.

Ball (1990) looks the decision of choosing ethnographic fieldwork for the primary method for research as "a plunge into unknown", especially for those student ethnographers new to this field. He gave a very interesting but cruel comment on the ethnography approach that, "for some novitiate researchers, the entire enterprise of ethnography looks from the outset like a combination of *Star Trek* and *Mission Impossible*". This is because of the nature of ethnographic work, which involves "risk, uncertainty, and discomfort". Even crueller, adding to the uncertainty and the present possibility of failure, researchers "must go unarmed ... must stand along with their selves". No questionnaire, interview schedule, or observation protocol is available to help clarify the uncertainty and reduce risks.

Despite the uncertainty and risks, I believe ethnography approach is still the best choice to conduct this study, because of two reasons. First, the data that collected from the fieldwork to establish my understanding of children's social behaviour is unavoidable. Without the fieldwork data, future attempts of deep analysis and knowledge establishment of the link between children's behaviour and the environment would not be possible. Second, my blank experience in British

childcare and early education is not entirely a risk to the study. From an ethnographic perspective, this could be a great benefit to avoid bias and prejudgments. Base on above reasons, ethnography research methodology fits the research very well.

4.2.2 Adopting a focused ethnographic methodology

Traditionally, ethnographers in anthropology often took out long-term fieldwork study to get an over robust data of subjects' physical and mental activity pattern, as well as their environmental and social context. It becomes a dominant thought in this research field that it seems, only long-term field studies epitomise what can be called as ethnography (Wall, 2015). However, recent decades, more and more researchers started to rethink with this view. Knoblauch (2005) argued that in sociology, the problem of ethnography within the context of one's own society (what he call "sociological ethnography") are quite different from those posed by "anthropological ethnography". He suggested a complementary method called "focused ethnography" should be taken into account. He further compared the different features between focused ethnography and conventional ethnography:

Table 6: Comparison between conventional and focused ethnography (Knoblauch, 2005)

Conventional ethnography	Focused ethnography
long-term field visits	short-term field visits
experientially intensive	data/analysis intensity
time extensity	time intensity
writing	recording
solitary data collection and analysis	data session groups
open	focused
social fields	communicative activities
participant role	field- observer role
insider knowledge	background knowledge
subjective understanding	conservation

notes	notes and transcripts
coding	coding and sequential analysis

My research interest was mainly on children's social interactions that occur during their free play sessions. It is a very specific research focus comparing to those studies of children's everyday life pattern in childcare centre. In order to understand how environment supports children's social interaction, the research cannot be limited to the instant scenes of children's social interaction. The contexts of the social interactions are as important as the immediate scenes to this study, which should be properly observed and recorded. Considering the interruptions and unexpected issues may happen during the observation, video recording technology is essential for data collection in the fieldwork.

As Knoblauch (2005) pointed out that, the focused ethnography method requires fewer visits to the field, but may produce a large amount of data in a relatively short time, due to the use of the recording techniques. The data intensity also results in a time-consuming procedure during the later data analysis phase.

4.2.3 A multi-method qualitative case study

Most investigators now agree that no accumulation of facts about social behaviour and development is complete without understanding of events as they occur. Invariably, the forms and functions of social activity can only therefore be understood via direct observation of the relevant events.

(Lamb et al., 1979, p.12)

The focused ethnography fieldwork of this research was carried out in the context of a detailed case study. Taking an interpretative position, I was aware of my limited knowledge and experience of the local childcare centre I intended to study, including the culture, convention, ethos, operation, and education issues. These limitations, along with a lack of sufficient knowledge and experience in the early age education field, meant that it was not possible or appropriate to generate assumptions at the very beginning. The major task during exploring

was to understand children's behaviour in the built environment, rather than to provide explanations for collected facts. In this context, a qualitative approach is more appropriate and feasible.

I employed a focused ethnographic approach for the qualitative data collection during on-site fieldwork. This was in-part dictated by practical issues of access and availability, which limited the on-site activity to particular time periods. Since, compared to traditional forms of ethnography, the focused ethnography is quite limited in time, the use of multi-modal as well as multi-methods within those available time periods can significantly enrich the data - hence this is a common strategy in focused ethnography. In this case, any questions about total time spent in the nursery were countered in particular by the use of video to capture large amounts of detailed real-time information about behaviour in relation to the environment. Film footage, along with outputs from other methods (see below, Section 4.3) served to create vibrant pictures of the nursery's micro-sociological scenarios. The affordance theory framework itself inspired further data collection from participant children to elucidate their own thinking on the topic.

Though reflexivity is arguably always important to qualitative research and interpretation, as a researcher with foreign culture background, this became particularly necessary.

4.3 Overview of the research process and methods

The whole research process can be generally divided into 6 stages (see Figure 4):

- Stage 1: developing research question
- Stage 2: Review of the literature and social context of childcare service
- Stage 3: Developing methodology and research methods
- Stage 4: Collecting fieldwork data at case childcare centre
- Stage 5: Analysing collected data

- Stage 6: Writing up conclusions

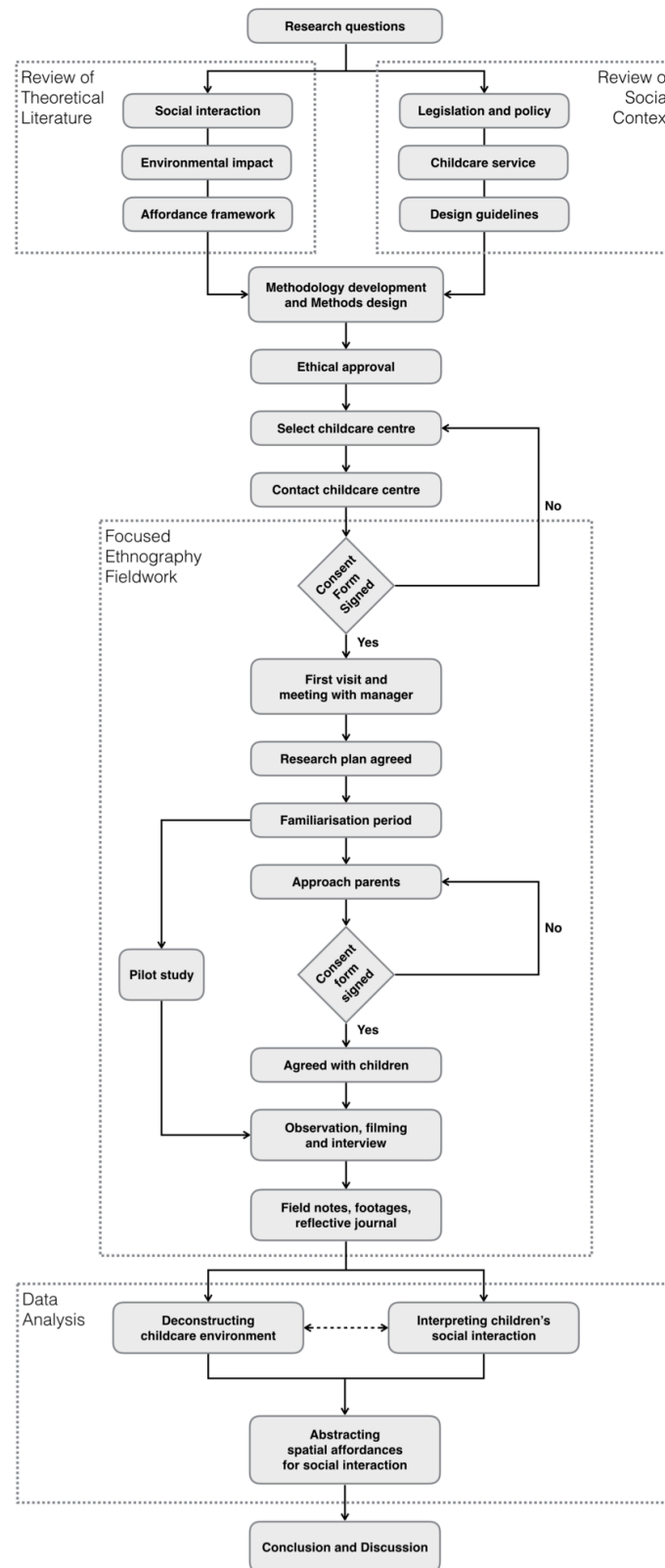


Figure 4: Flowchart of research process

The study was mainly conducted through a focused ethnographic approach, in order to build a conceptual framework for understanding the phenomena I was observing. It is not possible to carry out the research only with single method due to the complexity and dynamics of the social interactions and environmental context in the childcare centre. The methods used in the fieldwork for data collection include initial observation, participant observation, pilot study, video recording, field note, reflective journal, interview, and consultation.

Initial observation:

Initial observation started from the beginning of the fieldwork, from the first visit to the case childcare centre and through out the familiarisation period. The initial observation provided the general impression and the necessary information of the childcare centre's environment and participants. It also helps me become a familiar presence to the children in the centre and build up a trustable and confident relationship.

Participant observation:

Participant observation plays a key role in the ethnographic approach. It is a major component of the research to identify and collect the data in the field. While carrying out the fieldwork, I was not only a researcher but also one of the collected the data while staying with participant children together in the field. It also helped with the development of the analytical strategy and methods.

Pilot study:

A pilot study was conducted during the familiarization period, to test the data collection methods, to set up a practical and flexible data collection schedule, and to try out the equipment and software that were used in the fieldwork and later in the data reviewing. The pilot study also helped to optimise the daily arrangement to carry out the data collection.

Video footage:

Video recording technique was applied to restore the observation and interview data for later review and analysis. It helps greatly in understanding the complex and dynamic context of the observed social interactions, with the vast amount of details that could only be gained through the review of the footages rather than through raw data from observation and interview field notes. In some occasions, reviewing the footages even helped me to correct those false impressions of the behavioural events. I would never be possible to do without watching them again.

Field note:

Field note is one of the key data formats that produced during conventional ethnographic research and observation. It records not only the observed behaviour but also researcher's thoughts and feelings during the fieldwork. The major contents of the field notes are descriptive or conceptual words. In contrast to conventional ethnographic study, some of the field notes were produced during the review process of video footages. (Please see Appendix B for samples of the field notes)

Research sketch:

Sketch is the picture form of notes. As a researcher with architecture education background, drawing sketches is not a difficult task. When words cannot precisely express the feelings or findings, I tended to try out research sketches. I also used this technique to help build up, manage, and modify conceptual ideas. Research sketches can be drawn either on site or during the review of the video footages. (Please see Appendix B for samples of the research sketches)

Research diary:

Research diary is another recording tool that helps to remember research experience, moods, feelings or any relevant thoughts during the research process. Compared to field note, research diary is usually more organised, systematic, and comprehensive in text words. Thanks to the technique of video recording, research diaries were less in need and only written occasionally, for example,

when the camera was not ready or out of battery. (Please see Appendix B for samples of the research diaries)

Reflective journal:

A reflective journal was kept throughout the research process to support reflexivity and interpretation. It is a powerful tool to test analytical methods, examine the research findings, and communicate with myself about the research progress at any time that I feel need to. (Please see Appendix B for samples of reflective journal)

Interview:

During the fieldwork, interviews were carried out every day both with children and caregivers, to gather their views, thoughts, or feedbacks. The forms of the interviews included casual talks with participant children during free play session, and invited video feedback sessions after the recording. The purpose of the interviews was a collection of information and data, rather than a process of respondent validation.

Consultation:

Individual consultations were occasionally held with caregivers and centre's management team, focused on specific topics regarding children's social interactions in the field. Caregivers were also invited to view the video footages and comment from their own perspectives. Consultation with caregiver workers provides plenty of fruitful, inspiring information to the study. On the other hand, consultation is also an effective way as a validation tool of the findings during research.

4.4 Overview of the case childcare centre

4.4.1 Recruitment of participation

As ethnographic research requires intensive field visits to the research site, the recruitment was mainly focused on Sheffield area to avoid huge budget on travelling time and expenses.

Based on a review of Ofsted reports around Sheffield area, four local childcare centres were targeted as potential research sites. At the beginning of the recruiting process, all four centres were approached by the telephone call. Two of them refused for further contact. The other two centres expressed their interest in participating in the research project. They were both contacted via email, attached with a reference letter from the supervisory team at School of Architecture and full information of the detailed research plans. However, only one childcare centre finally agreed on the participation of the research project. No response was received from the other centre.

A follow-up interview meeting was then carried out with the primary manager and deputy manager at the recruited childcare centre. The management team reviewed the whole research proposal and discussed the details of the research plans with me. Then they signed the consent form and granted my research work to be carried out in the centre.

I worked as a volunteer at the childcare centre for three weeks. This is a familiarization period to get to know all the children in the centre and reduce their attention on me during the observation fieldwork period. Parents of the children were approached during this period, with packs of the information sheet and the consent form. Participant children were then selected based on the consent response of their parents.

4.4.2 General information about the case centre

The case childcare centre was firstly registered in the 1970s. It operates from a detached, converted house with an annexe in a residential area near the University of Sheffield. The centre is registered to care for a maximum of 64 children in the early year's age range. It supports a number of children with special educational needs or disabilities, and the children who speak English as an additional language. The setting has been awarded a 'Gold' standard for its participation in 'Pathways to Quality', a local quality assurance scheme. It receives support from the local authority and provides funded early education for three and four years old children. The centre provides service for local community including local residents, university staff and students, and members of the Student Union. It is open every weekday, except for bank holidays and the university's closure days, between 8:15 am and 5:45 pm.

4.4.3 Building description

The whole centre consists of three parts, the main office building, the annexe preschool playroom building, and the outdoor playground area. The main building is a refurbished end-of-terrace house. It is used for children under 2 years old. There are seven rooms available on the ground and first floor, with a soft play area in the basement. The pre-school children's area is located in the single storey annexe, which has one main playroom with three adjoining smaller rooms. All the children, both the pre-school children from the annexe and the younger ones from the main building, are sharing the same enclosed outdoor play space together.

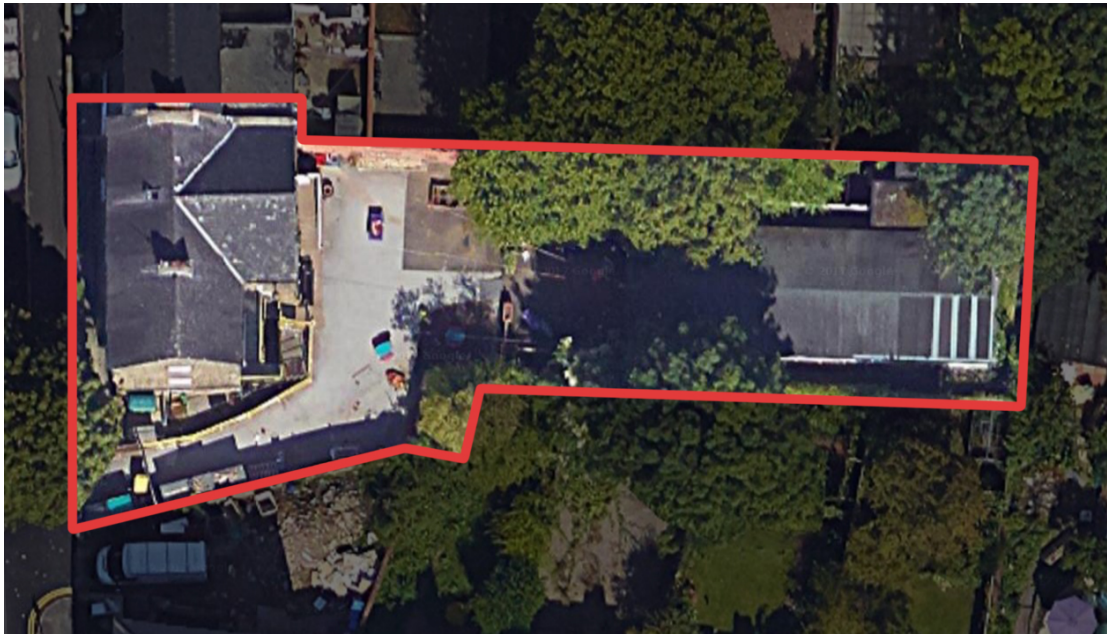


Figure 5: Satellite map of case childcare centre (supported by goggle map)

The annexe room is a single storey building sitting in the back of the playground. It has a main rectangle playroom with a quiet sleeping area at the middle of the southern wall. Two small rooms attached to the east side of the playroom. One is used for kitchen and dining. The other is multi-functional. It is used for quiet play by the older children who do not need a naptime after lunch, and also provides a storage area for caregivers' teaching and personal stuff. The reception area and toilets are on the west side of the playroom.

Case childcare centre's outdoor playground sits in between the main building and the pre-school annexe building and can get access from both buildings. It also has a direct entrance from the street outside the nursery. The shape of the whole playground is irregular.

There are quite a few indoor and outdoor settings in the pre-school playroom and playground, supporting children for different play themes. These settings are all specially designed and organised by experienced caregivers. Preliminary observation has been done during the first several visits, before taking out the actual fieldwork video recordings, in order to give the researcher a general impression of the settings.

4.4.4 Preliminary setting classification



Figure 6: Focused built environment area of the research

As the research scope of this study is mainly focused on pre-school age children, my major concerned environments are the annexe building and the outdoor playground. A preliminary study was taken out during the familiarisation period to identify the settings and activities in the environment. Below is the preliminary classification of the settings in the case centre.

Table 7: preliminary setting classification of case childcare centre

Indoor Settings	Supposed Play Theme	Preliminary Social Interaction Level
Constructing area	Building up different environment and relevant theme playing	Mid
Dressing up area	Human or cartoon characters role playing	High
Play kitchen	Imitating cooking and dining events	Mid
Play house	Imitating family life events	Mid
Art and craft area	Product creating and skill training	Low
Water playing area	Water animal social interaction	Mid
Sand playing area	Sculpturing and constructing	Mid

Group reading area	Reading and talking	High
Computer play desk	Education and computer game	Low
Outdoor Settings	Supposed Play Theme	Preliminary Social Interaction Level
Slide	Climbing and sliding	Low
Boat	Boating and fishing events	High
Basketball Frame	Ball play activities	Mid
Summer house deck	Dining and resting	Low
Sand pavilion	Building constructing	Mid
Annexe deck	Group activities	High
Water on the wall	Cooperating	High
Nature area	Exploring, hide-and-peek	Mid
Tent house (temporary)	Crowding	High

4.4.5 Overview of participants

It is very important to point out that, the case childcare centre opens to all families from the public. The children in the centre are from different family backgrounds, including local generic families, families of university staff and students, and families of the members of Student Union. The recruited participant children covered different family background. However, the composition of the children, as a whole, may provide a particular context image rather than a generic image of UK childcare services.

At the end of the two weeks' fieldwork, 23 parent consent forms, including 14 boys and 9 girls. 10 of them are aged under 36 months, while 13 are 36 months and above. 12 children in the pre-school building aged above 36 months have formally participated in this study according to the research method, while other children were recorded into the camera as participants' social environment.

Meanwhile, 11 caregivers who worked in the pre-school room during the recording period have signed their consent form and participated in the study as

well. 6 of them have also entered the feedback interview recording section after observation. Participant children's parents provided their child's basic information when signing the consent form.

According to the ethical requirement, participant children and caregivers' names were replaced by specific IDs. The ID for participant child was generated using the initial letters of his/her first and last name, followed by gender (G for girl, B for Boy), then their age in months. For example, the ID for a hypothetical boy named Tim Smith, 4 years and 2 months old (50 months), would be TS-B-50. Below is the list of participant children's information.

Table 8: Participant children information list

Participant ID	Nickname	Age	Nursery Experience	Gender	Siblings at home	Ethnic Group	Home Language
01-TL-B-56	Tobi	56	40	B	No	White British	English
02-AB-G-54	Alice	54	18	G	No	Bangladeshi	Mix (Urdu + English)
03-OA-B-53	Osborn	53	36	B	No	Mixed	English
04-GB-B-52	Gaby	52	36	B	No	White British	English
05-MB-G-52	Maria	52	40	G	Yes	White British	English
06-TA-B-50	Tim	50	37	B	Yes	White British	English
07-LD-B-48	Luke	48	36	B	Yes	White British	English
08-RS-G-47	Rebby	47	12	G	Yes	White British	English
09-AA-B-47	Allen	47	36	B	Yes	Middle East	Arabic
10-IH-G-44	Immy	44	18	G	No	White British	English
11-JH-B-42	Jim	42	30	B	No	White British	English
12-JG-B-37	Jacobs	37	27	B	Yes	White British	English
13-AB-B-36	Alfred	36	24	B	No	White British	English
14-KL-G-35	Katherine	35	24	G	Yes	White British	English
15-TB-G-34	Teresa	34	24	G	Yes	White British	English

16-SA-B-30	Sullivan	30	24	B	Yes	White British	English
17-HT-B-29	Henry	29	18	B	No	White British	English
18-JB-B-28	Jackey	28	20	B	No	White British	English
19-BK-B-25	Bobby	25	15	B	No	White British	English
20-EH-G-22	Emily	22	13	G	No	Asian other	Farsi
21-LP-G-21	Laura	21	12	G	No	White British	English
22-FH-B-18	Felix	18	7	B	No	White British	English
23-ES-G-14	Emma	14	2	G	Yes	White British	English

Caregiver's ID was generated with the initial letters of his/her first and last name, followed by gender (M for male, F for female). In the case childcare centre, female staffs were dominating the role of caregiver. The only male member was the chef who works in the kitchen.

Table 9: List of caregiver participants

Caregiver ID	Nickname
01-CH-F	Caregiver C
02-KP-F	Caregiver K
03-LL-F	Caregiver LL
04-JL-F	Caregiver J
05-LW-F	Caregiver LS
06-LD-F	Caregiver LS-J
07-EB-F	Caregiver E
08-NA-F	Caregiver N
09-SL-F	Caregiver S
10-RU-F	Caregiver RB
11-RH-F	Caregiver RC

4.5 Ethical issues

Because of the involvement of child participants, this research requires extra consideration regarding the research ethics issue. The Sheffield School of Architecture research ethic committee reviewed and approved the research methodology.

According to the research procedure, both participant children and their parent were informed about the research project and had the opportunity to ask any questions before taking part in the project. Some basic information about participant children was also gathered at the same time, based on voluntary principles.

Before recording the participant child, they were asked whether would be happy to be recorded later on. If they refused at that moment, I would not carry out the recording of this participant, and rechecked later or another day until finally had participant's permission, even only with the oral agreement. I also acknowledged the participant children of their rights to withdraw from the project even if they had already taken parts in the recording period.

During the recording period, all the children and caregivers presented in the room may potentially be recorded in the camera. Therefore, ideally, I would like to collect the participation confirmations of everybody in the room (including both children and caregivers) before the project begins. However, if there were any person who did not wish to take part, I would try to arrange a suitable recording time slot to avoid them getting involved, or to trim off the part with this person off after recording. The participant observation and the recording activity were carried out with care in order not to interrupt any of participants' behaviours.

On the other hand, practically, as most children have signed their consent form to the centre for centre's photo and video recording permit, to be able to start their nursery life. Thus, I did not need to worry too much about the children who

did not sign the consent form, if they were only recorded as the background of participant children. However, all the recordings should make sure the participant children are technically blurred in the photo or video recordings, so that none of them is recognisable from the footages or images.

Due to the variety of each child's nursery attendance schedule, parents' feedbacks of the consent form were collected in different time, and the whole procedure could last for a very extended period (some of them were more than one week). Researcher kept checking with every parent so that all of them were aware of the project.

Personal information of the participants was kept safely and confidentially. When signing the consent form, the participant children (if possible) or their parents were asked to choose whether or not to blur their face in future publication or presentation. Their faces were blurred in the image according to their choice. All children's names that appear in the thesis are replaced by pseudonym names (with the same initial) given by the researcher so that they cannot be recognisable from any reports, or presentations of this study.

All documents related to the research ethic are provided in Appendix A, including the ethical approval letter, samples of the information sheets and consent forms that were delivered to the childcare centre, the participant children and their parents.

4.6 Focused ethnographic fieldwork procedure

By using a theoretical framework based on the theory of affordance, the fieldwork included two major parts. The first part is collecting observation data of children's social behaviour in childcare settings. In this part, a reliable video recording-based observation and data collection method has been developed, complemented by ethnographic field notes. These research notes also reflected/described relevant conversations that I had with the caregivers and

children. The second part is collecting participants' feedback while they watch their own behaviour recordings (referred to elsewhere as 'the Spacebar method'). The purpose is to investigate how they think while they behave.

4.6.1 Overview of the fieldwork in case childcare centre

The case childcare centre operates from 08:15 am to 5:45 pm. Its daily routine consists mainly of two sessions. The morning session is from 08:15 am to 1:00 pm, and the afternoon session is from 1:00 pm – 5:45 pm. The research focused mainly on children's free play sessions to gather children's initiative behaviour and innovative use of the environment.

The whole onsite fieldwork observation lasted for about two weeks. Before the project started, I had spent three weeks (from 16/07/2012 to 03/08/2012) in the childcare centre working as a caregiver volunteer. This was a period of familiarisation. The purpose was to get familiar with the childcare centre environment and build up a trustable relationship with every child in the pre-school playroom, in order to reduce the impact of my presence during the data collection period later. Meanwhile, a preliminary pilot study was carried out before the data collection, in order to test out the equipment and to refine the procedure of the focused ethnography data collection, as well as the methods of data analysis.

4.6.2 Data collection procedure

1. Preparation for recording:

On each recording day, I arrived at the nursery slightly earlier than participant children and set everything up. Before participant children arrived, I spoke to all the caregivers working on that day about the video recording schedule, and checked if new caregivers should sign the research consent form or if any children were not suitable for recording. Before data collection started, I talked to participant children again about the event (reiterating what had previously been discussed when gaining individuals' informed consent) and asked if he or

she agreed to carry on with video recording. I also needed to make sure that every participant child understands that I would not interrupt their play, and they could stop recording at any time if they felt unhappy about this.

2. Observation recording:

Each day's data collecting period could be divided into two parts, the observation of children's social behaviour in various settings and the participants' feedback of watching their films from the screen. Observation recording was generally carried out in the morning session or after lunchtime, from 9:30 am to 11:30 am, and from 1:00 pm to 2:30 pm. The feedback recordings took place in the afternoon after their play session. Because lunchtime is not particularly focused in this study, I used that time to import the observation films to the computer, and quickly edited them in order to present them to the participant children later.

In the behaviour recording section, two methods have been used. One is the camera follows participant child. As one camera cannot follow two children at the same time, each observation recording section only focused on single participant child at a time. The other is that the camera was placed at the position facing specific space. It allows the camera to catch all the children's social behaviour took place in this space during the recording time.

The length of each recording section was also discussed in the study because it directly relates to the efficiency of the feedback data collection from participant children and further behaviour analysis later on. Typical lengths are 10 minutes, 15 minutes, 20 minutes and 30 minutes.

3. Feedback recording:

At lunchtime, I stopped recording and imported all the recordings into iMovie software. When children finished their lunch, I invited them to view their video recordings and recorded their feedback at the same time. Some of the children do not need to go for a nap after lunch, so they could be available for feedback as

soon as they finished their lunch. The others might need a nap, so these children were usually invited for feedback after they woke up.

During the feedback recording section, participant children were free to select any part of the video clips to watch and to express their thinking at any time. In order not to interrupt or direct any of children's feelings, I only assisted them to operate the computer and tried my best not to speak too much. However, occasionally, I still talked to participant children in order to keep a friendly and enjoyable atmosphere. The questions I asked the participants were kept in a limited amount and mainly related to the built environment.

I also invited participant children's key caregivers to watch these behaviour recordings (separately) and to give their comments from a professional childcare workers' perspective.

4.6.3 Equipment

In order to gather required observation data, video recording equipment has been employed in this study. The major data collected from the participant children and caregivers are their social interactions in the childcare environment, as well as their feedbacks when watching the selected recording events.

Since the main data collecting method in this project is based on digital video recording technique, the recording equipment is very important to the research. Two video cameras, mini camcorder VCC-003 and standard DC IXUS 990, were tested in this pilot study.

A Macintosh laptop, MacBook Pro 13", was used to edit the imported recordings and replay them to participant children and caregivers.

4.6.4 Overview of video footages

After two weeks onsite study, in a total of 46 behaviour observation recordings and 23 participant feedback interview footages were gathered. 19 of them were taken by VCC-003, while the other 50 recordings by IXUS 990. These footages' durations are from 5 minutes up to 30 minutes. The total footage length of the behaviour observation is 489 minutes, while the feedback interviews are 286 minutes in sum.

Table 10: Summary of the gathered observation and feedback footages

	Behaviour Observation		Feedback Interview	
	Participants	Settings	Children	Caregiver
VCC-003	9	1	5	4
IXUS 990	29	7	12	2
Data Length	410 minutes	79 minutes	213 minutes	73 minutes

Below is the list of observation footages taken during data collection period:

Table 11: List of fieldwork observation video recording

Date	Session	Duration	Place	Focused child or setting
06/08/2012	Morning	15'40"	Indoor	Pilot study
06/08/2012	Morning	30'02"	Outdoor	Pilot study
06/08/2012	Afternoon	10'01"	Indoor	Pilot study – setting
06/08/2012	Afternoon	5'10"	Outdoor	Pilot study
07/08/2012	Morning	15'30"	Indoor	Maria
07/08/2012	Morning	17'14"	Indoor	Maria
07/08/2012	Morning	11'45"	Outdoor	Jim
07/08/2012	Morning	29'40"	Outdoor	Maria
07/08/2012	Afternoon	09'25"	Indoor	Jim
07/08/2012	Afternoon	10'21"	Indoor	Jim
07/08/2012	Afternoon	16'10"	Outdoor	Jim

08/08/2012	Morning	15'04"	Outdoor	Jacobs
08/08/2012	Morning	11'35"	Outdoor	Luke
08/08/2012	Morning	13'39"	Outdoor	Boat Setting
08/08/2012	Afternoon	02'57"	Indoor	Jim
08/08/2012	Afternoon	30'00"	Indoor	Luke
08/08/2012	Afternoon	11'31"	Indoor	Tim
08/08/2012	Afternoon	10'03"	Indoor	Tim
08/08/2012	Afternoon	25'48"	Indoor	Construction corner setting
09/08/2012	Morning	06'56"	Outdoor	Alice
09/08/2012	Morning	10'48"	Outdoor	Alice
09/08/2012	Morning	03'27"	Outdoor	Osborn
09/08/2012	Morning	10'02"	Outdoor	Boat Setting
09/08/2012	Morning	10'00"	Outdoor	Tent Setting
09/08/2012	Afternoon	10'01"	Indoor	Osborn
09/08/2012	Afternoon	10'03"	Indoor	Immy
13/08/2012	Morning	10'26"	Outdoor	Immy
13/08/2012	Morning	13'19"	Outdoor	Rebby
13/08/2012	Morning	10'03"	Outdoor	Boat Setting
13/08/2012	Afternoon	10'01"	Indoor	Alice
13/08/2012	Afternoon	10'01"	Indoor	Rebby
14/08/2012	Morning	08'07"	Indoor	Jacobs
14/08/2012	Morning	00'38"	Indoor	Maria
14/08/2012	Morning	03'30"	Indoor	Maria
14/08/2012	Morning	10'30"	Outdoor	Jacobs, Sandpit setting
14/08/2012	Morning	09'19"	Outdoor	Luke
14/08/2012	Morning	15'51"	Outdoor	Maria
15/08/2012	Morning	11'28"	Outdoor	Rebby
15/08/2012	Morning	10'00"	Outdoor	Tobi

15/08/2012	Morning	05'02"	Outdoor	Tobi
15/08/2012	Afternoon	10'01"	Outdoor	Tim
15/08/2012	Afternoon	10'00"	Outdoor	Tobi
16/08/2012	Afternoon	06'57"	Indoor	Osborn
16/08/2012	Afternoon	06'19"	Indoor	Osborn
16/08/2012	Afternoon	15'27"	Outdoor	Osborn
16/08/2012	Afternoon	05'53"	Indoor	Reading corner setting
16/08/2012	Afternoon	10'01"	Outdoor	Side yard area

Below is the list of feedback interview recordings with children and/or with caregivers during the fieldwork study:

Table 12: List of fieldwork feedback interview recording

Date	Duration	Reviewers
07/08/2012	30'00"	Maria and friends
07/08/2012	09'00"	Osborn with Caregiver N
08/08/2012	04'58"	Luke and Jim and friends
09/08/2012	15'07"	Alice and friends
09/08/2012	15'01"	Osborn and friends
09/08/2012	19'31"	Caregiver K
09/08/2012	07'29"	Caregiver RC and Caregiver RB
13/08/2012	12'29"	Alice and friends
13/08/2012	12'30"	Alice and friends
13/08/2012	12'32"	Rebby and friends
13/08/2012	12'10"	Rebby and friends
13/08/2012	18'11"	Caregiver C
13/08/2012	27'27"	Caregiver LS-J
14/08/2012	10'43"	Maria, Luke, Tim and friends
14/08/2012	10'51"	Maria, Luke, Tim and friends

14/08/2012	10'59"	Maria and friends
15/08/2012	10'06"	Jacobs and friends
15/08/2012	09'18"	Jacobs, Rebbly and friends
15/08/2012	13'00"	Tobi and friends
15/08/2012	12'29"	Tobi and friends
16/08/2012	14'23"	Big group of children With Caregiver N and Clair
16/08/2012	14'55"	Caregiver RC
16/08/2012	12'43"	Caregiver S

4.7 Analysing the data

4.7.1 Coding schemes for data analysis

Each behaviour observation recording data was collected based on a continuous tracking method within a specific time, either following target child, or focusing on target setting. In each video recording clip, single or a series of behaviour events could be observed, and in each behaviour event, single or a series of behaviour segments could be observed.

The coding of the data is based on reading the video recordings every 5 seconds. Within each 5-second segment, several variables are considered for further analysis, including Number of participants (NP), Behaviour Setting type (BST), Space Openness Level (SOL), General Behaviour Type (GBT), Social Interaction type (SIT), and Social Participation Level (SPL).

Number of participants (NP) is the total number of children participated in the single behaviour event, regardless to their joined in time and left off time.

Behaviour Setting type (BST) is the functional description of the childcare environment that caregivers organised and furnished the space based on their education and caring need. The coding system relies on the centre's current available settings.

Table 13: Codes of the setting taxonomy in case childcare centre

Indoor Settings	Code	Outdoor Settings	Code
Constructing area	11	Slide	21
Dressing up corner	12	Boat	22
Play kitchen	13	Basketball Frame	23
Play house	14	Summer house deck	24
Arts producing table	15	Sand pavilion	25
Water playing sink	16	Annexe deck	26
Sand playing sink	17	Water on wall	27
Group reading area	18	Nature area	28
Computer play desk	19	Tent (temporary)	29
Space between settings	01	Space between settings	02
Other indoor setting	991	Other outdoor setting	992

Spatial openness level (SOL) is the weight of space's openness property. Closed space is coded as C, semi-closed space is coded as SC, semi-open space is coded as SO, and open space is coded as O.

Table 14: Codes of spatial openness level

Spatial Openness Level	Code
Closed space	C
Semi-closed space	SC
Semi-open space	SO
Open space	O

General behaviour type (GBT) defines the observed behaviour whether it is social or non-social. In this research, the non-social behaviour is coded as NS, the semi-social behaviour is coded as SS, and the social behaviour is coded as SB.

Table 15: Codes of general behaviour types

General Behaviour Type	Code
Non-social Behaviour	NS
Semi-social Behaviour	SS
Social Behaviour	SB

Social interaction type (SIT) is the coding scheme for the analysis and discuss in details. In this research, 5 basic social interaction types are considered.

Table 16: Codes of social interaction types

Social interaction type	Code
Communication	1
Exchange	2
Cooperation	3
Competition	4
Conflict	5
Other	0

Social Participation level (SPL) defines the interactive level of children's different play behaviour and especially focuses on their social interaction. The coding scheme was developed based on Parten's research in 1932 (please refer to Chapter II Section 2.2.6 for more details).

Table 17: Codes of social participation level

Social Participation Level	Watch others	Same activity theme	Talk with others	Activity with others	Organized activity	With rules	Code
Solitary	×	×	×	×	×	×	sol
Onlooker	✓	×	×	×	×	×	onlo

Parallel	✓	✓	×	×	×	×	para
Communicative	✓	✓	✓	×	×	×	talk
Associative	✓	✓	✓	✓	×	×	asso
Cooperative	✓	✓	✓	✓	✓	×	coop
Ruled	✓	✓	✓	✓	✓	✓	rule
Uncertain	□	□	□	□	□	□	unce

4.7.2 Initial transcription samples of the footage data

Observation video recordings were initially transcribed every 5 seconds.

The observation of target child:

Below is the 5s-based key frame section sample of an observation footage (8 minutes long) focusing on a target child.



Figure 7: Key frame section sample of an 8-minute observation footage on a target child

In this type of observation, a participant child usually moves from one place to another frequently. In order to mark the transit of their position, symbol “+” and “=” were given to indicate the information. The symbol “+” represents the child’s behaviour happened outside target space. And “=” represents that the child’s behaviour took place at the edge of the target space. On the other hand, the “*”

symbol in the transcription indicates that the social interaction is based on verbal communication. Below is the transcription sample of a behaviour video recording following a single child:

Table 18: Transcription sample of an 8-minutes behaviour recording (from 00:00 to 01:00)

No	Time	Event note	NP	BST	SOL	SIT	SPL
1	00:00:00	C1 is constructing his play figure, associate with 3 other children	4	15=	o	3	asso
2	00:00:05	C1 continues with his constructing. 1 child left the group, 1 child joins and parallel play beside	4	15=	o	3	asso*
3	00:00:10	C1 continues with his constructing, 1 child left	3	15=	o	3	asso*
4	00:00:15	C1 is helping another child	3	15=	o	3	coop*
5	00:00:20	C1 finish constructing and left the place, the other 2 follow	3	01	so	3	asso*
6	00:00:25	C1 plays at the space between settings, 2 join the group	5	01	so	3	asso*
7	00:00:30	C1 conflict with a child for toy	2	01	so	5	conf*
8	00:00:35	C1 runs from one end to the other with 1 child	2	01	so	4	asso
9	00:00:40	C1 comes to a play bed with his friend	2	14=	o	0	asso*
10	00:00:45	C1 stands on the bed while his friend notice camera	2	14	o	1	asso*
11	00:00:50	C1 and his friend interact with observer, in battle topic	3	13+	sc	3	coop*
12	00:00:55	C1 left, look for new place to place, and runs towards construction area	1	01	sc	0	onlo
13	00:01:00	C1 entering another playing group	3	11=	sc	4	asso*

The observation on target setting:

Below is the 5s-based key frame section sample of a behaviour video recording footage (10 minutes long) focusing on a target setting.



Figure 8: Key frame section sample of a 10-minutes video footage on a target place

As in this type of observation, children's activities do not always stay in the same place. They move their position frequently but may remain within the same behaviour pattern. Same to the coding scheme in participant child, the symbol "*" means the social interaction based on verbal communication. In order to mark the transition of their position, symbol "+" and "=" were given to indicate the information. The symbol "+" represents the child's behaviour happened outside target space. And "=" represents that the child's behaviour took place at the edge of the target space. All children and adults that entered the space during the observation are transcribed separately in columns tagged "SPL" and followed by "-b" as boy, "-g" as girl, "-a" as adults. If more than one boy was recorded, an indication number should be added in as well. Below is the transcription sample of section (from 04:10 to 05:10):

Table 19: Transcription sample of a 10-minutes behaviour recording (section from 04:00 to 05:00)

NO	Time	Note	NP	BS T	SO L	SPL- b1	SPL- b2	SPL- b3	SPL- b4	SPL- g1	SPL- g2	SPL- t1
51	00:04:10	B1 continue plays, B2 checks his chair, B4 climbs on the boat, T1 onlooker	3	22	SO 4	asso*	sol		onlo			onlo +
52	00:04:15	T1 talks to B3, B1 play with B2, B4 onlooker	3	22	SO 4	asso*	asso	talk* +	onlo			talk* +
53	00:04:20	B1, B2 both look into the corner, B4 stand, B3 and T1 onlooker	3	22	SO 4	asso	asso	onlo +	onlo			onlo +

54	00:04:25	T1 talks to B1+B2 and adjusts B2 chair, B1 onlooker, B4 plays solitary, B3 left	4	22	SO 4	onlo	asso		onlo			coop *= +
55	00:04:30	B4 throws ball out, T1 talks to B4, B1 B2 relocate the chair	3	22	SO 4	asso	asso		asso*			talk* +
56	00:04:35	T1 talks to B4, B1 B2 relocate the chair	3	22	SO 4	asso*	asso		talk*			talk* +
57	00:04:40	T1 talks to B4, B1 B2 relocate the chair	3	22	SO 4	asso*	asso		talk*			talk* +
58	00:04:45	B1 relocates the chair, B2, B4 onlooker, T1 left	3	22	SO 4	sol	onlo		onlo			
59	00:04:50	B1 relocates the chair B2, B4 onlooker	3	22	SO 4	sol	onlo		onlo			
60	00:04:55	B1 relocates the chair, B2, B4, B3 onlooker, G1, G2 discuss	6	22	SO 4	sol	onlo	onlo =	onlo	talk* =	talk* =	
61	00:05:00	B2 onlooker and push softly on B4, B4 parallel plays, B3 onlooker, B1 locate the chair	4	22	SO 4	sol	onlo	onlo =	para			
62	00:05:05	B1 located the chair, B2 onlooker, B4 parallel play, B3 onlooker	4	22	SO 4	sol	onlo	onlo =	para			
63	00:05:10	B1 located the chair, B2 onlooker, B4 parallel play, B3 onlooker	4	22	SO 4	sol	onlo	onlo =	para			

4.7.3 Transcription sample of motion events

Below is a transcription sample (from 00:00 to 04:27) of a participant child's sequential motion event when she was playing in the playroom. It briefly describes target child's motion events such as running, riding, sitting or stopping at some locations and provides the information of time, duration, coordinate position on the map (X, Y), and event location.

Table 20: Transcription sample of motion events

No	Time	Duration	X	Y	Location	Event description
00	00:00-00:35	35s	54	21	Reception room, box	Maria was sitting on the floor and picking up components then putting them back into a plastic box, together with Helen and Alfie.
01	00:35-01:08	33s	54	23	Reception room, table	Maria looked for components under a table
02	01:08-01:25	17s	54	22	Reception room, box	Maria played with the components in the box.
	01:25-01:37	12s			Reception room, box	Maria walked around Alfie to the other side of the box.
03	01:37-01:55	18s	55	22	Reception room, box	Maria sat on the floor and kept on picking up components on the floor.
	01:55-02:05	10s			Pathway, role-play	Maria looked into the playroom. Then she stood up and ran to the other side of the room.
04	02:05-02:08	3s	82	29	Role-play area	Maria stood at role-play area and looked around. She was looking for something.
	02:08-02:10	2s			Reading area	Maria spotted something and ran to the reading area.
05	02:10-02:23	13s	79	22	Reading area, open space	Maria sat on the floor and dressed herself up.
06	02:23-03:01	38s	79	22	Reading area, open space	Maria attracted by a yellow electronic toy. She pulled it over and played with it.
07	03:01-03:06	5s	78	23	Reading area, open space	Maria pushed the yellow toy to Luke and swapped with his blue toy.
08	03:06-03:23	17s	79	22	Reading area, open space	Maria sat back and played with the blue electronic toy for a while.
09	03:23-04:20	57s	79	22	Reading area, open space	Maria put down the blue toy, turned her body over to continue her dressing up work. Later she stood up to zip up the blouse. Then she picked a hair hat on the floor and put it on.
	04:20-04:24	4s			Reading area, open space	Maria walked around the reading area.
10	04:24-04:27	3s	82	25	Reading area, sofa	Maria sat down on the sofa next to researcher and smile.

4.7.4 Transcription sample of social interaction events

Below is the transcription sample (from 00:00-03:30) of a participant child's social interaction event in the outdoor environment, provided with plenty details of coordinate information, affordances analysis, and related fieldwork notes.

Table 21: Transcription sample of social interaction events

No	Time	Event	X	Y	Location	Affordance for activity	Affordance for social interaction	Research notes
01	00:00-00:55	Rebby watched caregivers putting wheel toys back to storage place.	72	38	Side yard open space	Standing, watching		
02	00:55-01:02	Locky talked to Rebby about "fire" at a tree stump under tree 3. Rebby then walked to him and watched.			Tree 3, slope	Standing, watching, Imaginative play	Talking, onlooker	Locky likes the fire theme imaginative play.
03	1:02-1:25	Rebby picked up a hat on the floor and tried to help a little girl beside to put it on.	70	37	Tree 3, slope	Picking up,	Caring, helping,	Rebby held the little girl's hand to make her secured.
04	1:25-1:43	Rebby left the little girl. She put her hand on the tree and walked around it. She talked to Caregiver LS-J that "fire is off now"			Tree 3	Imaginative play Walking around, swinging	Talking,	
05	1:43-2:19	Rebby climbed on the tree and sit on the branch, and talked with Caregiver LS-J	70	38	Tree 3	Climbing up, sitting on.	Imaginative play, talking, onlooker	Caregiver LS-J sat on the slab at the botTim of the building, as no other place to sit. Rebby talked with her in a distance.
06	2:19-2:54	Rebby climbed off the tree, and held it with one hand. She watched Caregiver LS-J talked with Jolin, and Jolin threw a piece of leaf in the air, and see how it dropped on the	70	37	Tree 3	Climbing off, holding, exploring, learning	Onlooker, talking, educating	Jolin's exploration of leaf happened around trees, as they are the nature source of leaves. Lisa tried to guide

		floor.						her to think why it was spinning.
07	2:54-3:05	Rebby walked to Jolin's position and picked a piece of leaf up as well.	64	33	Side yard	Walking, exploring, watching,	Parallel play, imitation play	Rebby copied Jolin's action for parallel play after watching her throwing.
08	3:05-3:15	Rebby stood up on the slab and stayed beside Caregiver LS-J watching Jolin throwing out another leaf.			Slab	Step on, standing, watching,	Onlooker,	
09	3:15-3:25	Jolin left the place. Rebby threw out the leaf in her hand to see if explore the same phenomenon. Lisa talked to Rebby as well. Locky came back to the yard with a rope in his hand acting as fireman. Another boy followed him behind			Slab	Standing, exploring Imagination play	Talking, educating, imitating. Co-playing	The back yard is a place that Locky see it as in a fire situation. He used all his knowledge and all the resources he could find to build up his imagination.
10	3:25-3:30	Rebby finished exploring, and jumped off the slab. She walked towards a little girl who was digging the soil with a folk by the lawn platform. Rebby picked up a folk on the ground as well.			Back yard path,	Walking, picking things up.	Approaching	

4.7.5 Triangulation of emerging themes and findings

Triangulation is a concept borrowed from navigational and land surveying techniques. In ethnographic research, it is a powerful tool to check the result and facilitate validation and reliability of the emerging findings. Denzi (1970) identified four different types of triangulation in sociological methods:

- **Data triangulation:** involves time, space, actors, objects, activities, etc.
- **Investigator triangulation:** involves multiple researchers in an investigation
- **Theory triangulation:** involves using more than one theoretical scheme in the interpretation of the phenomenon
- **Methodological triangulation:** involves using more than one method to gather data, such as interviews, observations, questionnaires, and documents.

In this research, data triangulation sits in the collected fieldwork data that contains multiple information of social interaction events in the childcare centre, such as time, place, actors, objects, actions.

On methodology level, this research employed multi-methods to record and analysis fieldwork data, including video footages, filed notes and sketches, interviews with children, and consultation with care workers. Flewitt (2006) believe, linking visual, audio and written data can gauge the reliability and validity of the research findings.

On theoretical level, this research linked the findings with various researchers and theorists' works - from classic research works that were conducted at the beginning of the last century, such as Parten, Levin, Lev Vygotsky, Goffman, Hall, Gibson, to recently completed research works and newly developed theories, such as Norman, Heft, Kytta - to seek theoretical triangulation of the emerging themes or findings.

4.8 Summary of the chapter

This chapter has provided a full picture of the empirical research process as well as the detailed methods. Base on a constructivist position and an interpretivism perspective, the focused ethnographic approach was chosen to fit the research needs and relevant methods were developed in order to collect and analyse children's behaviour data in the case childcare centre.

The case childcare centre has been introduced with the brief description of its built environment, the information of participant children and caregivers, and the detailed schedule and procedure of onsite fieldworks. Samples of video recordings, transcriptions, interpretations, and analysis are also provided

Following the first impression of the case childcare centre, in the next chapter, I am going to present the detailed analysis of the built environment and the spatial elements of the settings in the centre. The aim is to find out what kinds of spatial qualities or features may support children's activities, and potentially provide a hint to support children's social interaction.

Chapter V: Deconstructing the environment in case childcare centre

In this chapter, the analysis of the case childcare centre environment will focus both on the indoor preschool playroom and the outdoor playground, but each is discussed separately. The detailed study of the environmental support for children's social activities will be discussed in the next chapter. A crossover study of the indoor and outdoor environment affordances will be provided in Chapter VII.

The whole chapter can be divided into four parts. The first part is the introduction of the coding system and its logical principles. The second part is a general description of the case nursery physical environment and the understanding from a designer's view. The third part is to break down the case centre's indoor preschool playroom into detailed settings, components and basic elements. The fourth part is to break down the case centre's outdoor playground into detailed settings, components and basic elements. The focused questions guiding this chapter are:

- How to read the environment in the childcare centre?
- How could the coding system work?
- What meanings could be generated while deconstructing the environment?
- What environmental features lie behind the social interaction events?

5.1 Rationale of deconstructing environment

Childcare and educational environments are often mentioned as a city on the tiny scale (Hertzberger, 2008, p.4). The organising structure of the childcare and education environment is quite similar to the structure of an urban space

section. For example, classrooms or setting corners are relatively close spaces for designed purpose use, like urban buildings. The play areas located between classrooms or at the centre of the playground can be seen as urban open spaces. And the remaining in-between spaces that connect different places are considered as streets. How urban space is arranged affects many aspects of a city's function such as accessibility, or human activities. This is also true for the childcare space: during preliminary observation, this notion was deeply reflected not only in the environment but also in children's activities.

There are three basic components in urban structure: road/path, building, and open areas. In the scale of childcare environment, we similarly classify nursery spaces in terms of the functional component. First of all, there are two types of space in the nursery. One is the setting place, which supports children to stay and play, and the other is the path, which supports children move from one place to another. "Setting" is a commonly used word in describing the functions of various environment arrangement (Barker, 1968). It is usually not a single piece of space or furniture, but a set of different toys, furniture, tools or other stuff. Even without designers' involvement, childcare centre managers and caregivers could arrange the environmental settings by themselves, according to their educational and caring needs.

When creating a new living environment, we usually use relevant materials to build up the space step by step. For example, we use bricks to build up a wall. Building up four brick walls and a roof, we can make a room space. Under this process are the nature rules following the characters of the substantial material. Correspondingly, when acting in the environment, we complete our behaviour step by step as well. For example, a child plays at the slide would probably need to climb up the stairs, walk on the platform, sit down at the slide slope starting point, then slide down the slope. He may also need to hold the handrail to keep the balance. Behind the slide play behaviour are the basic principles of human body actions and the environmental elements that support these actions.

Taking the ecological position, the environment is always a synthetic system rather than independent elements making their own effects. However, this does

not mean these elements cannot be separated for analysing. Every environment can be seen as a combination of all the co-existed environmental elements.

Before we can investigate children's behaviour in the case nursery, we should first be clear about the environment's existing conditions - in other words, to read and describe how the nursery environment is set-up and the behavioural intentions that are perhaps reflected in this set-up. However, the quality and *meaning* of the environment as reflected in perceived affordances (as opposed to behavioural intentions), will be further investigated in detail, emerging from the analysis of the ethnographic data in the next chapter.

5.1.1 Element and behaviour

The whole nursery environment is a synthesis of the equipment, settings and places for children to play, to learn, and to socially interact with others. However, Nurseries usually alternate indoor play sessions with separate outdoor play sessions within its daily routines, for both practical reason and respect to children's behavioural needs. In this research, we see the whole case nursery as a micro eco-system. Within this system, many types of environmental elements are co-existing here.

The term "element" can broadly refer to every essential composition that exists in the environment. It could mean a fundamental particle in the universe to a large housing block in the city. Standing on a different level, we may see these elements in different scales. Within specific discipline or context, we may also generate different meaning of the elements accordingly. Therefore, it is very important to draw out the actual scope and meaning of the "element" we are going to discuss.

As an architectural designer, when we talk about the elements in the built environment, we are usually talking about the architectural components such as the column, arch, dome, acroterion, flying buttress, etc. These elements usually reflect the building structure of the architectural space.

Another theory, based on the conceptual viewpoint of pictorial forms, that primary elements are starting from point, to line, and plane, and finally to three-dimension volume.

“Each element is first considered as a conceptual element, then as a visual element in the vocabulary of architecture design.” (Francis Ching, 2015, p.3)

Architect Rem Koolhaas has abstracted 15 fundamental elements of architecture in his exhibition in Venice, which also form up his book series “elements”.

“In this exhibition – and in its catalogue – we examine micro-narratives revealed by focusing on the scale of the fragment: elements of architecture looks at the fundamentals of our buildings, used by any architect, anywhere, anytime: the floor, the wall, the ceiling, the roof, the door, the window, the façade, the balcony, the corridor, the fireplace, the toilet, the stair, the escalator, the elevator, the ramp...”(Koolhaas, 2014)

It is easy to see that above “element” theories all started from architecture design process position and conceptualised into several key ones. But in this research, we do not want to ignore anything in details. We choose to find out the behaviour meaning of the built environment from an ethnographic position. For this reason, the term “elements” here refers to any environmental components that are meaningful to human’s basic body actions, and at the same time, are meaningful in providing affordances to us. For example, a stair is a behavioural element, as it provides us with a pathway to the place that is above or below us; a wall is also a behavioural element as it stops us along its line. Sometimes, a new element could also be added to an existed element, for example, a handrail element added along the stair or a door opened on a wall.

It is important to point out those same elements may provide different meaning within different environmental context. For example, a wall in a bedroom is a barrier that stops us from getting in/out of the room, but a wall in a classroom could become a teaching display that allows us to write on it. Moreover, in consideration of human involvement, there are not only physical elements but also social ones. Physical elements refer to all the substantial existing, either

natural or artificial, such as door, window, table, chair, or rock, sand, water, wood block, etc. Social elements are referring to other human presence in the environment, either adults or children, such as caregivers, parents, peers, younger babies, etc. They usually should be in a complete form rather than separated parts. For example, a table is an environmental element providing the working platform for us, but a single leg of a table is meaningless. molecules, which are considered as the element of materials, are not seen as the elements of a built environment.

A physicist may be interested in the fundamental particles; chemist may put their attention on molecules of the material; biologist may look into the cells of the animals and plants; behaviourist will focus on every individual, for example, stone, brick, fence, or even wind, water, insects, human beings, etc.

Basic elements are usually referring to those most essential parts in the environment, while compounded elements are working as a combination of various basic elements. Physical elements are those natural or artificial substantial parts:

Natural elements: Natural elements are the substantial exist in the environment without any human intervention, such as the wind, water, rocks, trees, birds, bugs, etc.

Artificial elements: Artificial elements are man-made exist in the environment, such as walls, doors, windows, tables, chairs, etc. The built environment is a type of artificial elements.

The term “physical element” means the essential component that could identify either the scope or features of a specific space. For example, the lines on the ground are the visual boundary of a certain space area, but a wall is the behaviour boundary of a space; a window is normally the visual opening, while a door is the behaviour opening. Spatial elements, by contrast, ignore the structural meaning of architectural components. For example, columns are considered as the spatial landmarks.

Besides these “physical elements”, it is also important to mention other individuals presenting in the environment is another type of elements which create the social meanings and composes our social environment.

Social elements: Social elements are other human presence in the environment, such as caregivers, parents, colleagues, peers, etc.

This chapter focuses mainly on the physical elements and their meaning to human behaviour. The observed phenomenon regarding social elements will be discussed in the next chapter.

5.1.2 Setting and behaviour

The term “setting” usually refers to the time, place or condition in which something happens or exists. It has been widely used in the design of sceneries or characters in literary works, movies, or dramas, and nowadays also adopted in control panel design in the operating system.

During the fieldwork study period in the case nursery, some caregivers also use the term “setting” to refer a play area or equipment that is provided to children in the nursery. A caregiver told me that the nursery was suggested to buy a “basketball frame setting” recently after she carried out a mosaic research with a child. Borrowing the caregiver’s saying, in this research, “setting” is adopted to define a specific area or equipment that provides children different play activities.

A setting usually has or consists of several elements. For example, a slide has stairs, platform, and slide slope; a construction play corner may consist of toy shelf, toy chest, carpet, wall, etc. As mentioned above, these elements can support a series of human actions. While providing these elements together within a single place, all supported actions are also afforded. For this reason, they are provided in the setting to support those actions that children may be doing during their play in the setting.

To explain and explore such ecological relationship, Roger Barker(1968) first developed the term “behaviour setting” and its theoretical framework. As Barker explained in his theory, patterns of behaviour are “synomorphic” with the milieu (environment). This concept fits the aim of this research very well.

Seeing the environment as a whole, every single part of the environment has its impact on human’s behaviour. However, it is not possible to study all of them in this research. Here, we must focus on the major parts that have the most influence.

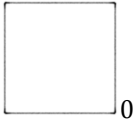
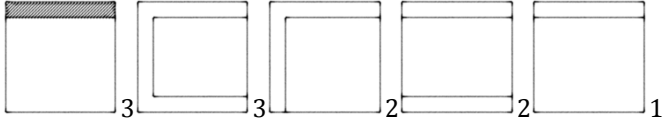
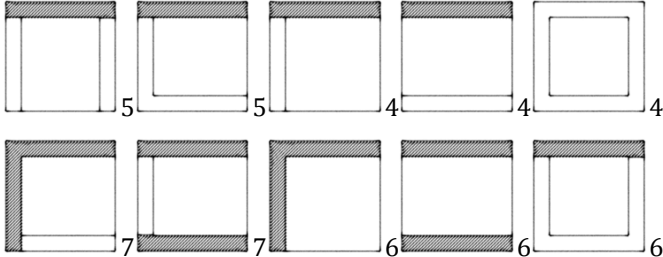
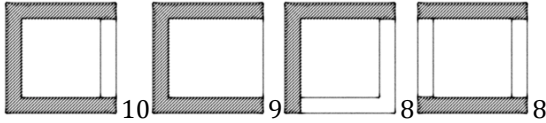
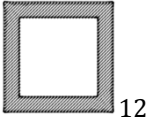
5.1.3 The openness of the space

From a more basic level, generally, according to the spatial openness, we can separate different spaces into four basic types, open, semi-open, semi-closed space and closed space.

In this research, the spatial openness is defined by the configuration of the space boundaries. For a substantial space, its boundaries may have three kinds of status, accessible easily, accessible with difficulty, and inaccessible. These statuses can be given with different weights for further calculation, for example, easily accessible as “0”, accessible with difficulty as “1”, and inaccessible as “3”. Then we calculate the total weight of each configuration and divide them into four levels.

Below is the classification of total 21 different combinations of a square space with three different boundary statuses. These 21 combinations can be roughly divided into 5 different levels according to the openness calculation result: fully opened space (0), highly opened space (1-3), semi-opened space (4-7), barely opened space (8-10), and fully closed space (12).

Table 22: Classification of square spaces with different boundary configuration

Spatial Openness	Space Formation on plan
Fully opened space (0)	
Highly opened space (1-3)	
Semi-opened space (4-7)	
Barely opened space (8-10)	
Fully closed space (12)	

5.2 General description of the case nursery environment

5.2.1 Location and establishment

Case nursery locates in the Broomhall community area of Sheffield city in the middle of England, which is close to the University of Sheffield campus. There are currently 236 registered non-domestic childcare services in Sheffield area, and 5 in the Broomhall community.

The case nursery was firstly registered in 1976 as childcare service on Non-Domestic Premise. It serves the local and surrounding area from Monday to Friday, all year round. It is accessible to all children and provides special support to those who speak English as an additional language. In its most recent OFSTED report, the case nursery was marked as good in general. The inspector was impressed by the nursery's warm and welcoming environment, and its well support to children's learning and development.

5.2.2 Overview of the nursery built environment

The whole case childcare centre consists of three parts, a three-floor end-of-terrace building, an annexe single storey building, and a large playground area in between the two buildings. Throughout this description, I will draw upon the notes I made in my journal during the fieldwork.

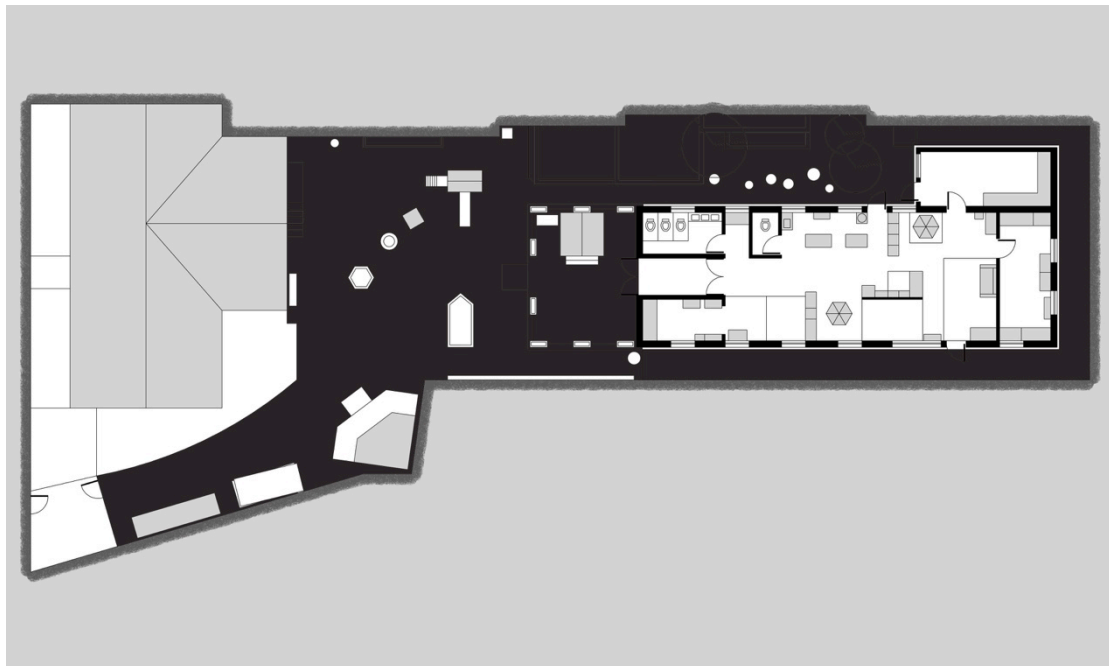


Figure 9: Ground floor plan of the research area in case childcare centre

The main reception and management office of the case childcare centre is set up in the converted end-of-terrace building. Meanwhile, children under 2 years old are cared in seven rooms in the building. Other facilities such as staff's training

room, study room, resting room, and main kitchen are also located in this building. My first impressions are recorded below:

“My first visit to the nursery was a quiet morning. With just a quick glance of the buildings on the road, it was not easy for me to identify which one is the right house. I finally found it by a small drawing board on the wall, which indicates this is a childcare building.

In front of the building, there stands a row of bushes. In the middle of the bush row, opened a small blue wooden gate...”

Behind the main building is a large outdoor playground area, where various artificial and nature play settings or equipment are provided, such as slide, wheel riding toys, seesaws, sand pool, etc. The playground contains a nature side yard area, in which quite a number of natural elements, such as earth, grass, plants, trees, stones, and wood blocks, are provided. When all the children in the case nursery are sharing the playground, they also have the chance to meet other children in different age.

“I walked through the care room to its end, where a large door is opened towards the back of the main building. A platform balcony is extended. A stone stair is built along the wall to connect the balcony and the playground. I walked down the stone stair and imagined how young children manage themselves to get down the stair. Of course, they would be well cared by the caregivers, but still, the stair might be a big challenge and perhaps a special experience for them.

On the right, there has a sloping pathway, which leads to the entrance gate of the playground. Parents can take their children to the nursery via this gate.

...

To be honest, I was surprised by the size of the playground rather than the variety of the play settings. As from the front of the nursery main building, I

could only imagine a small back yard area like other terrace buildings usually have.

...

I really appreciate the nursery team to retain the natural elements in the playground for children. As in some of my visits to other local nurseries, the natural elements are either excluded from the playground or even not provided.”

The single storey annexe building connects to the playground via a large deck. It is used for caring for the pre-school age children. It has a large playroom and three small adjoining functional rooms. According to the play themes, The playroom is divided into many different areas by furniture or partition, such as the reading area, role-play dressing area, play kitchen area, play house area, construction play area, and water/sand play area, etc. The small rooms are using as the reception room, computer playroom, and kitchen and dining room.

“At the back of the playground, there is a raised square deck surrounded by a number of short walls. A sand pavilion stands at the side of the deck.

I walked through the deck to the gate of the playroom. It was locked. After knocking on it for several times, a caregiver came to open the gate for me. Behind the gate is a corridor space. Walking through the corridor, I entered a big playroom. Its size is larger than I expected.

In front of me, on the left-hand side, is the entrance of children’s toilet and nappies changing area. Next is a newly built adults’ toilet. The manager told me this new toilet is so important in supporting caregivers’ everyday work. They used to walk a long way to the main building, which is very inconvenient. I quite like the idea that they decorated the toilets’ wall as a name and portrait showing wall. Children or caregiver can pick their own nametags from a basket below and stick it on to the wall on their arrival.

On the right-hand side, sits the reception room. Inside the room, there placed some shelves and small desks for caregivers to organise their documents and reports. Children's coats and bags are hanging on the wall.

...

Walking to the end of the playroom, I was led to the computer room. The room is using as quiet time (usually after lunch time, when some of the children need to take a nap) playroom. Several desks, chairs and toy chests are provided there. The computer desk is placing at the right end of the room.

Next to the computer room, on the left-hand side, is the kitchen and dining room. It is used for children's dinnertime. There are placed some tables and chairs and built with operating top, cupboards and water sink. A door is open towards the playground side yard. "

Focused environment

As the purpose of this research is to study the preschool age children's social behaviour in the case nursery, the focused ethnographic study was based on the environment where preschool children were playing. For practical reason, preschool children are not allowed to entre the young baby's caring area. As a result, the terrace house environment is excluded from the major fieldwork study.

In case nursery's daily routine, children's play session arrangement alternates the indoor and outdoor play. This is due to the practical reason that caregivers can have the best supervision of the children. In addition, from the pilot study, children's behaviour patterns also showed the differences between the outdoor play and the indoor play. For above reasons, in the rest of this chapter, I will discuss the preschool children's play environment into two parts, the outdoor environment and the indoor.

5.3 Deconstructing the preschool playroom environment

5.3.1 General description of the playroom environment

The single storey annexe building sits in the back of the playground. After a welcome corridor, it comes to the main large rectangle playroom. Inside the room space, a quiet sleeping is designed at the middle of the southern wall. Two small rooms attached to the east side of the playroom. One is used for kitchen and dining, and the other is multi-functioned, used for quiet playing during the nap time after lunch, and storing of caregivers' teaching equipment and personal belongings. Reception room and children's toilet room are at the west side of the playroom. An adult toilet has recently been added next to children's toilet area.



Figure 10: Plan of the single storey annexe playroom building

5.3.2 Construction play corner

The construction play corner is located at the south wall of the playroom. Children can see and access the place right after they pass through the entrance corridor. Children are usually building up symbolic constructions, such as a zoo, a city or railways, in order to represent their play environment. These constructions usually occupy quite a large area.



Figure 11: Construction play corner

The construction play corner consists of four five elements: soft carpet floor, toy shelf, toy chest, wall, and construction toys.

- **Carpet floor:** The carpet marks out the area of the construction play corner in the playroom. Carpet's edge visually defines the boundary. The carpet supports children's motor activities, and its soft textile material gives the signal of body contact, which may indicate the affordance of sitting on.
- **Toy shelf:** Toy shelf is the place to store up children's toys that can be view directly. Its spatial meaning is the functional boundary of the construction area that attracts children to stay and search.
- **Toy chest:** Toy chest is another place to store children's wooden blocks. But it is usually covered with a lid. Children need to move the lid in order to get a view and access to their play resources.
- **Wall:** The south wall is the boundary of the construction area. Its window slab provides the support of placing things.
- **Toys:** Toys are the resources for children's play. But when the specific scene is built up in the area. The toys could turn out to be barriers.

Table 23: Elements in construction play corner

Setting	Spatial component	Spatial element	Spatial meaning
Construction play corner	Construction area	Carpet floor	Supporter
		Wall	Boundary

	Furniture storage area	Chest	Boundary Storage Platform
		Drawer	Boundary Storage
		Shelf	Boundary Storage
		Toy	Play resource

5.3.3 Play kitchen corner

The play kitchen corner is located at the north side of the playroom, next to the kitchen and dining room. It consists of carpet floor, a row of different kitchen play furniture with toy storage space, a conventional table set, and several chairs.



Figure 12: Kitchen play corner

The Kitchen play corner consists of several elements as below:

- **Carpet floor:** The carpet floor defines the visible boundary of kitchen play corner. It supports children's body movement.
- **Kitchen play furniture:** Kitchen play furniture is the places where children can take out their cooking actions. It is the Functional Boundary that attracts children to stay and play. There are fridge, sink, oven, and wash machine.

- **Table:** Table is the place where children’s carry out their dining play after their cooking activity. It is a platform for actions.
- **Chair:** Chairs are the sitting spots to help children to stay longer.
- **Wall:** Wall is the physical boundary of the kitchen play corner.
- **Toys:** Toys are play resources that contribute to children’s play themes.

Table 24: Elements in kitchen play corner

Setting	Spatial component	Spatial element	Spatial meaning
Kitchen play corner	Kitchen area	Floor	Supporter
		Kitchen furniture	Boundary Platform Storage
		Toys	Play resource
	Dining area	Carpet floor	Supporter
		Table	Platform Shelter
		Chairs	Supporter

5.3.4 Role-play dressing corner

Role-play dressing is a place to store the costume clothing for children’s role-play activities. It locates at the northeast corner of the playroom.

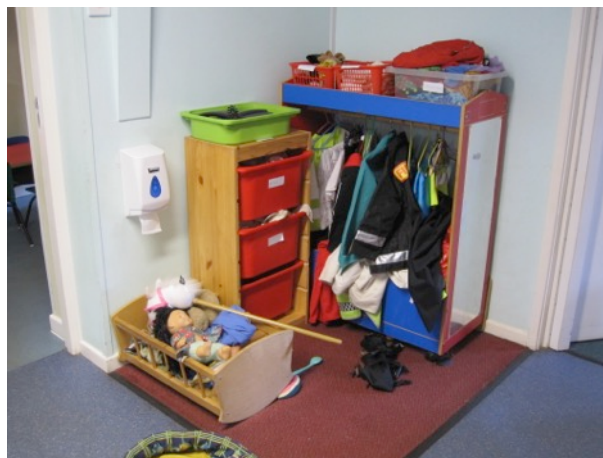


Figure 13: Role-play costume corner

Role-play costume corner contains two wardrobes, cloth chest, and a mirror:

- **Carpet floor:** The carpet floor defines the visible boundary of kitchen play area. It supports children's body movement.
- **Wardrobes:** It stores children's costume clothing, and allows children to view directly. It is a functional boundary of the corner.
- **Drawer dresser:** It stores children's costume clothing and toys. Children need to pull the drawers out first to be able to search and get the things they want. It is a functional boundary.
- **Rocking cradle:** There is a rocking cradle placed in the corner. It is a play resource for role-playing but also used for holding toy clothing.
- **Mirror:** The mirror is a functional boundary specifically supports children to see them selves after dressing up.

Table 25: Elements in role-play costume corner

Setting	Spatial component	Spatial element	Spatial meaning
Role-play costume corner	Dressing area	Carpet floor	Supporter
		Wardrobe	Boundary Storage
		Drawer dresser	Boundary Storage
		Rocking cradle	Storage Play resource
	Mirror area	Mirror	Boundary Installing
		Floor	Supporter

5.3.5 Playhouse corner

The playhouse corner is set up in the centre of the playroom building. It contains a wooden playhouse, a small wooden bed, two shelves, and partition wall decorated with alphabet drawing.



Figure 14: Playhouse corner

The elements of playhouse corner are as below:

- **Wooden playhouse:** The wooden playhouse is a large toy resource placed against the partition wall. It is a functional boundary of this corner.
- **Wooden bed:** Wooden bed is a small bed setting placed in the corner. It marks the boundary of the corner and provides a platform to support both children's body movement and play operation. And the space under the bed is not big enough for children to get in, but it allows toys to get through.
- **Wooden shelves:** Two wooden shelves are placed next to the playhouse toy, and against the partition wall. The shelves are around 80cm in height and used for displaying and storing toys. It is the functional boundary of the corner.
- **Partition wall:** Partition wall is the physical boundary separates the sleeping area from the playroom. The painting hung on the wall and the furniture placed against the partition wall brings the functional meaning to the boundary.
- **Floor:** There are no visible marks on the floor to identify the corner. The floor supports children's movement in the corner.

Table 26: Elements in playhouse area

Setting	Spatial component	Spatial element	Spatial meaning
Play house area	Playhouse space	Playhouse	Boundary Play resource
		Wooden shelves	Boundary

			Storage Supporter
		Partition wall	Boundary
		Floor	Supporter
		Toys	Play resource
	Wooden bed	Bed surface	Supporter Stage
		Floor	Supporter

5.3.6 Reading area

The reading area is on the east side of the playroom building. The whole area is covered with a large carpet. A big red sofa and several large cushions are placed on the carpet. At the corner, there is a fish tank table as well.



Figure 15: Reading area

Elements of the reading area are listed as below:

- **Carpet floor:** The carpet floor visually marks the boundary of sofa area. It supports children's various body actions.
- **Sofa:** The sofa is the key furniture in this area. It provides the support for children's body action on it. It is usually placed against the wall. Sometimes,

caregivers would move the sofa perpendicular to the wall, which makes the sofa as a functional boundary of the area.

- **Cushion:** Cushions are the sitting spots that can be identified from the carpet floor. These spots can be moved here and there according to children’s willing.
- **Wall:** The wall is the physical boundary of the area. There is a world map hung on the wall, which provides the specific educational information to children.

Table 27: Elements in reading corner

Setting	Spatial component	Spatial element	Spatial meaning
Reading area	Sofa area	Wall	Boundary
		Sofa back	Supporter Boundary
		Sofa arm	Supporter Boundary
		Sofa seat	Supporter
		Cushions	Supporter Play resource
	Carpet area	Carpet floor	Supporter
		Cushions	Supporter Play resource
	Fish tank area	Wall	Boundary
		Carpet floor	Supporter
		Table	Platform
		Fish tank	Play resource

5.3.7 Art and craft area

The art and craft area is a place between the construction corner and sleeping area. It has a table, several chairs, an easel and a drawer shelf to deliver its function. The table is a combination of several small triangle tables and then covered with a piece of a tablecloth. A number of chairs are placed around the

table. Besides the table, there is a multi purpose wooden easel with both the white board and the black board. A drawer shelf is placed for storing children’s paintings.



Figure 16: Art and craft area

The art and craft area consists of following elements:

- **Table:** The table provides the working surface for children’s art and craft activities.
- **Chairs:** The chairs are the sitting spots allowing children to stay in front of the table.
- **Easel:** The easel is the functional setting for children’s painting activity.
- **Drawer shelf:** The drawer shelf is placed near the wall, and used to store up children’s works.

Table 28: Elements in art and craft area

Setting	Spatial component	Spatial element	Spatial meaning
Art and craft area	Table platform	Table surface	Supporter
		Stationery	Play resource
		Chair	Supporter Play resource
	Shelter space	Table surface	Boundary Ceiling
		Table cloth	Boundary

		Floor	Supporter
	Storage area	Easel	Boundary Play resource
		Drawer shelf	Boundary Storage

5.3.8 Sand and water play table area

The sand and water table is placed at the north side in the middle of the playroom. Caregivers fill up the table with either sand or water to offer indoor sand and water play according to the weekly routine. When the table is not in use, caregivers covered it with a lid board.



Figure 17: Water and sand play table

The sand and water play table has following elements:

- **Table:** The table sink is raised from the floor for about 50 cm to provide children an operating pool. Children can stand all the places around the sink. No matter the table sink is covered with or without the lid, it provides the function similar to a big table.
- **Shelter:** Under the bottom of the sink is the shelter space that big enough for children to stay.
- **Sand and water:** Sand and water are two different play resources for children.

- **Shelves:** There are a number of Shelves placing around the area as storage.

Table 29: Elements in sand and water table area

Setting	Spatial component	Spatial element	Spatial meaning
Sand / water table area	Table platform	Sink	Supporter Container
		Sand / water	Play resource
	Shelter space	Floor	Supporter
		Sink bottom	Ceiling Boundary
	Storage area	Shelves	Boundary Storage
		Drawer	Boundary Storage

5.3.9 Sleeping area

The sleeping area is located in the middle of the playroom. It is set up in between a partition wall and the south wall of the playroom. The east and west sides are covered with curtains to separate the area from surroundings. The sleeping mattresses are placed on the floor and covered by duvets and pillows.



Figure 18: Sleeping area

The elements in the sleeping area are listed as below:

- **Walls:** The sleeping area is set up in between the south wall and a partition wall of the playroom. Both walls identify the boundary of the sleeping area.
- **Curtain:** The curtain is the cover of the other two sides of the area. It identifies the visual boundary but allows access to the sleeping area.
- **Mattress:** The whole sleeping floor is covered by mattresses. Mattress provides the support for children’s body actions on it. The physical feature of the mattress allows children to lie down or bounce.
- **Beddings:** Bedding is provided in the sleeping area, which makes the place a very big bed.
- **Bookshelf:** There is a bookshelf holds the reading resources for children. Caregivers put the bookshelf next to the sleeping area rather than sofa area so that they could easily reach the books when they are looking after the sleeping children after lunchtime.

Table 30: Elements in sleeping area

Setting	Spatial component	Spatial element	Spatial meaning
Sleeping area	Platform	Mattress	Supporter
		Bedding	Play resource
	Boundary	Curtain	Boundary
		Window wall	Boundary
		Partition wall	Boundary
	Bookshelf	Bookshelf	Storage Boundary
		Book	Play resource

5.3.10 Fish tank table corner

In the playroom, there are two fish tank tables on both the southeast and the southwest corners. The southeast fish tank table is combined in the reading area.

But the southwest one is placed solely next to the reception room, so I separate it as a setting in the playroom. Children were observed playing here more than the southeast one.



Figure 19: Fish tank table corner

Elements in the fish tank table corner include:

- **Fish tank:** Fish tank is the key element of the corner. The ecosystem in the tank provides children observation and discussion opportunity.
- **Table:** Table surface is the supporter to hold the fish tank. And it provides children working platform as well.
- **Floor:** Floor supports children’s body movement.

Table 31: Elements in fish tank corner

Setting	Spatial component	Spatial element	Spatial meaning
Fish tank corner	Floor	Rigid flat surface	Supporter
	Table	Rigid flat surface	Supporter
		Table legs	Holder
		Table cloth	Boundary
	Fish tank	Tank	Container Boundary
		Water	Play resource
		Fish	Play resource

5.4 Deconstructing the outdoor playground environment

5.4.1 General description of the playground environment

The outdoor playground of the case nursery is between the main terrace building and the annexe playroom building. Inside the playground, various settings are provided for children to experience different outdoor activities. The whole outdoor environment can be divided into four areas: the entrance pathway, the central playground, the side yard, and the annexe playroom deck.

The **entrance pathway** locates at the southwest of the whole nursery site. It has a security gate opens to the public road and connects with the central playground. Pre-schoolers' parents can bring their children to the annexe building via the gate, saving their time from going through the terrace building.

In the **central playground**, there are many artificial outdoor play settings provided, such as slides, summer house, boat, basketball frame, water pipe wall and sometimes temporary settings as well. Between settings is the open space where children can enjoy free activities without specified themes.

At the northeast of the playground is the **side yard**. It is a rectangle space with multi natural elements, like trees, grasses, vegetables, stones, and earth, provided to children.

The **annexe playroom deck** is the connection area between the playground and the annexe playroom building. It is surrounded by short brick fences and provided with a sand pavilion, tables and chairs, portable seesaws, and toy storages.

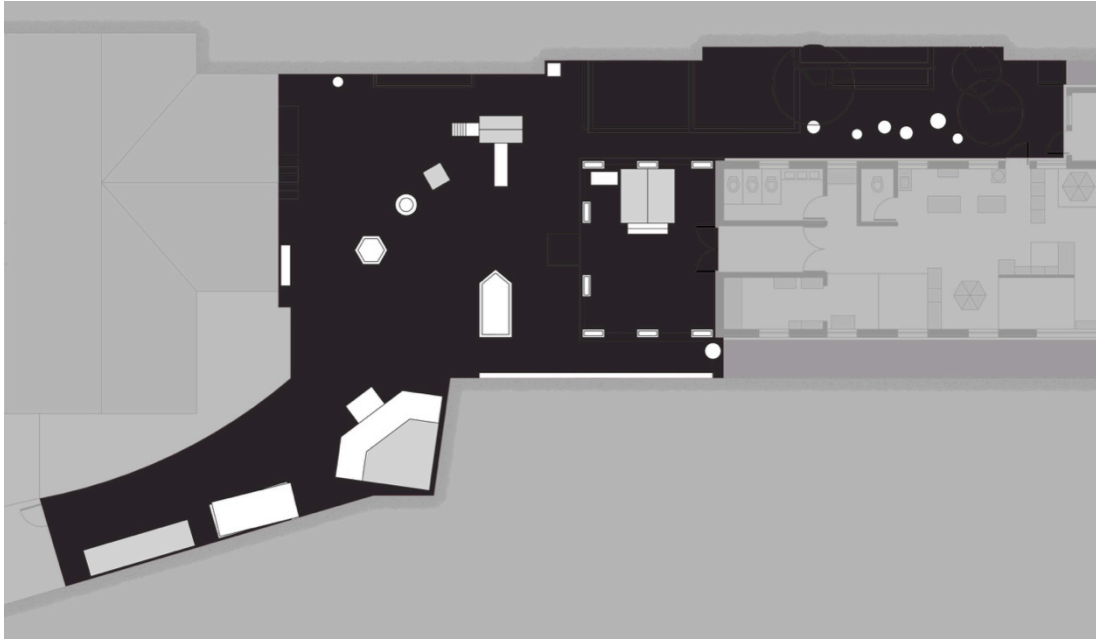


Figure 20: Plan of the playground environment

5.4.2 Entrance pathway

The entrance pathway is a long, narrow and relatively straight area connected to the central playground. It starts from the security entrance gate, which can only be opened by staff and parents. One side of the pathway is built with wooden wallboards and connects to the nursery's community neighbour. A wooden shelter is built along the wall to provide storage for the pushchairs. On the other side of the pathway, there is a curve cliff, under which, is nursery's main building. A row of handrails is built on the cliff edge for security reason. The whole pathway space is visually defined by the above three substantial boundaries. It is ending towards the central playground and opens without any clear mark. There is a summer house built at the corner of the border.



Figure 21: Entrance pathway

An important feature of the pathway is that it gently slopes from the entrance gate down towards central playground. Children often occupy the sloping pathway while they are playing wheel-riding activities.

The pathway space can be divided into three sub-spaces, slope space, corner space and a long wooden shelf. The slope space is originally a pathway to connect the entrance gate and the playground. But children use the space for their play.

- **Sloping floor:** The pathway is a long gentle sloping hard floor with a slightly curved shape. It supports children's body movement when they are in the space.
- **Entrance gate:** The entrance gate is a large gate with security lock, which only parents and nursery staff have the password to access. So in most of the time, the gate is a visual and physical barrier that defines the spatial boundary of the pathway.
- **Wooden wall:** The wooden wall is the visual and physical barrier that defines the south boundary of the pathway space.
- **Handrail:** Handrail is the boundary of the north side of the pathway slope. It secures children from falling off the edge of the cliff between the main building and the pathway slop.
- **Wooden shelf:** The wooden shelf was built to provide storage for children's pushchairs. Children usually do not enter the shelf to play.

- **Corner space:** A small corner space is created between the wooden shelter and the entrance gate.

Table 32: Elements in entrance pathway

Setting	Spatial component	Spatial element	Spatial meaning
Entrance pathway	Slope space	Sloping floor	Supporter
		Wooden wall	Boundary
		Wooden shelf	Boundary Storage
		Handrail	Boundary
		Entrance gate	Boundary (manipulative)
	Corner space	Floor	Supporter
		Wooden walls	Boundary
	Wooden shelf storage	Wooden base	Supporter Storage
		Wooden side boards	Boundary
		Wooden roof	Boundary

5.4.3 Slide setting

Slides are very classic and popular equipment in many environmental designs regarding children's play or care. Despite the different forms of the slide design, normally a slide in the playground includes three basic elements, the slide slope, the stairs and the high raised platform.

In the central playground of the case nursery, there are two slides with different sizes and various affordances.

The big slide is built with metal materials. It looks like a small two-floor-house with a sloping roof on its top. The top floor is accessible by stairs built at its end, and a slope at its right side provides the slide function. There are several metal

panels surrounding the edge to prevent children from falling off. The panels are around 50cm high so that children's sights are not blocked.

The ground floor is accessible from an open entrance right below the stairs. All three other sides are covered by similar metal panels, but they are not connected to the floor. Inside, some metal sheets are welded on the panels to provide seats.



Figure 22: Big slide setting

We can separate the big slide into below spatial elements:

- **Stair:** The stair is designed for easy access to the upper floor space.
- **Handrails:** Two handrails are mounted on both sides of the stair.
- **Watchtower:** The watchtower provides a small room of space that allows children to stay if they do not want to slide down the slope.
- **Side panels:** The side panels around the edges of the upper floor watch tower and ground floor room are the boundaries, which defines the watchtower space and protect children from falling off the upper floor. These visual barriers also enhance the spatial definition of the upper floor watchtower room and ground floor shelter room.
- **Roof:** The roof has no direct behavioural meaning, but it enhances the definition of the upper floor space, and visually supports the room imagination meaning for children's play.
- **Slide slope:** The slide slope is the main designed behavioural feature of the slide setting, which allows children to slide down.

- **Shelter Room:** The shelter room is a ground floor space created by side panels under the upper floor platform. There are some board seats mounted on the panels, providing children sitting place.

Table 33: Element of the big slide

Setting	Spatial component	Spatial element	Spatial meaning
Big Slide	Stairs	Handrails	Holder
		Step peddles	Supporter
	Watchtower	Platform	Supporter
		Side panels	Boundary Barrier Holder
		Roof	Shelter
		Openings	Openings
	Slope	Slope surface	Supporter
		Cured edge	Holder
	Shelter Room	Ground	Supporter
		Side panel	Boundary Barrier Holder
		Seats	Supporter
		Ceiling	Shelter

The small slide is fully made of plastic material. The sideboards are about 75cm high. On the side boards, there are some holes through which children can creep into the platform.



Figure 23: Small slide

The small slide can be divided into these basic spatial elements:

- **Side board with openings:** The side boards are usually playing a barrier role. But in this case, the openings on the sideboards are the doorway for children to get access to the platform. However, in the observation, children also tried to cross the sideboard by climbing over its top. (Footage ID: Time:)
- **Platform:** The platform supports children's body and activity within the space. Children can get rest there or get ready for sliding down.
- **Slide slope:** The slide slope is the major designed feature of the small slide, but much shorter than the big one. Children can climb up the slope with ease.

5.4.4 Side yard

The side yard is a long rectangle space that contains many natural elements inside, for the purpose of allowing children to explore the natural environment within nursery area. It sits at the northeast corner of the whole nursery master plan, surrounded by the annexe playroom building on its south and a long brick wall on its north. Its east side is a dead end that connected to the playroom building's kitchen. The west side is the only entrance opening towards the central playground. There are two doors in the playroom building open to the side yard, but usually, these doors are shut due to security and management reasons. As we know, the natural world is a very important part of children's knowledge. However, in this research, rather than emphasising the differences

between natural and artificial elements, I would like to focus more on the spatial or environmental qualities of these natural elements that could potentially support children's behaviour needs and inspire their using of the substantial resources.



Figure 24: Side yard

There are many spatial elements in the side yard:

- **High raised Lawn platform:** Lawn platforms are two
- **Terrace steps:** The terrace steps are built along the north side of the side yard with different heights. Inside each terrace step is the soil ground for planting. In the last step, caregivers planted some vegetable, and cordoned to keep children away. The edges of the terrace steps are covered with stone slabs.
- **Long narrow pathway:** On the west side of the side yard, a long narrow straight pathway leads children to the yard area. The pathway is defined by two largest lawn platforms and the deck platform of the playroom house. The pathway ground is the extension of the playground, but it stops right at the entrance of the yard.
- **Soft earth ground:** The ground of the side yard is covered by plenty earth. This makes a clear mark to separate the pathway space and the yard area. The ground also slightly leans towards the playroom building.
- **Three trees:** There are three trees planted the side yard. The largest one sits on the west side of the yard with a big tree trunk and strong branches. And the other two are planted on the east side. One of them has many small branches

from the low position, allowing children to climb up and sit on. Various children’s play activities were observed around or on the tree.

- **Rope ladder:** There is an artificial setting mounted on the branch of the largest tree, the rope ladder. Caregivers would normally tie the ladder on the branch so that children could not use it while caregivers were away.
- **Small objects:** There are also placed several wood blocks and big stones in the middle area of the yard ground. Children can move these objects and explore themselves of how to make use of these objects. In this research, the grass is also considered as one of the small object resources, as based on the observation, children sometimes pulled the grass off to play.

Table 34: Elements in the side yard

Setting	Spatial component	Spatial element	Spatial meaning
Side yard	Lawn terrace	Side step	Supporter Boundary Barrier
		Lawn platform	Supporter
		Grass	Play resource
	Tree	Branches	Supporter
		Tree trunk	Land mark
		Crown	Shelter
	Earth ground	Earth ground	Supporter
	Walls	Wall	Boundary Barrier
	Pathway	Ground	Supporter
		Fence	Boundary Barrier
		Lawn platform	Boundary Barrier
	Objects	Rock / Tree block	Supporter Barrier Play resource

		Grass	Play resource
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5.4.5 Boat setting

With a relatively long history, the boat setting was purposely built for the nursery playground, by using the material of recycled wood board pieces. It was built up according to an imagination boat shape, which has a rectangle body and a triangle ship head, edge board and three sitting boards. However, it is necessary to point out that the representational result is still relatively generic and plain abstracter in forms and materials.

The boat is placed at the south part of the central playground. The edge boards are around 45cm in height, which usually a challenge for young children under three to climb over and get inside of it.

The boat is detached from the ground, allowing caregivers to change its position or direction as they wish. The boat itself does not offer any movable or changeable components, but during children's outdoor play sessions, many objects can be found in the boat, which they themselves put in there.



Figure 25: Boat setting

The Key environmental features are enclosure space, representational body design, and half-high sideboards. Although the boat setting is designed as a

whole, it could still be seen as a combination of two spatial components, the boat head, and the boat body. The elements that consist the components include:

- **Headboard:** The boat head is mainly composed of a triangle piece of headboard placed on the side boards to make a triple prism shape. It is a raised platform that supports children's body movements and other objects.
- **Side boards:** The body of the boat setting is surrounded by side boards. These side boards are around 50cm high and define the boundaries of the whole boat setting. Children who want to play inside the boat need to climb over the sideboards as barriers. Sometimes they will also sit on the sideboards as they are hesitating about where to play.
- **Seat boards:** Seat boards are the sitting places inside the boat body. They support children's body movements.

Table 35: Elements in the boat setting

Setting	Spatial component	Spatial element	Spatial meaning
Boat setting	Boat head	Head board	Supporter
		Wood block	Object
	Boat body	Side board	Boundary Barrier Shelter Supporter
		Seat board	Supporter
		Ground	Supporter

5.4.6 Sandpit pavilion

The sandpit pavilion is a small wooden construction placed at the north edge of the platform. The bottom of the pavilion is a rectangle sandpit space surrounded by 50cm high wooden side boards, with plenty sands provided inside. The top of the pavilion is a sloping roof supported by four poles. There are two steps built on the front sideboard.

At times when the weather is not good enough or caregivers decide not to play sand, the sand sink is covered with several wooden boards and then the sand pavilion turns out to be a stage.



Figure 26: Sandpit pavilion

The sandpit pavilion setting is not only used for sand play. It has a sloping roof to represent its pavilion environmental feature. When the sand pool is covered with wooden boards, the setting turns out to be a platform stage. This convertible feature of the sand pavilion setting provides children different environmental affordances. The spatial elements here include:

- **Side board:** The side boards define the boundary of the sand pool area. They are about 50cm in height. Children need to climb over the sideboards or use the stairs to get into the pool.
- **Seat board:** The seat boards are 30cm wide wooden boards that placed on top of the sideboards of the sand pool. With the support of these seat boards, adults are able to sit around the sand pool while looking after children.
- **Stair:** Stairs is on the south side of the sand pool. It supports children's body step up the boundary and get into the pool.
- **Sloping roof:** The sand pavilion has a sloping roof to represent its pavilion design. The roof is also a shelter.
- **Wooden frame:** The sloping roof is supported by wooden frames. Older children sometimes hang on the frame to swing their body.

Table 36: Elements in the sandpit pavilion

Setting	Spatial component	Spatial element	Spatial meaning
Sandpit pavilion	Sandpit	Side board	Boundary Barrier
		Seat board	Supporter
		Stairs	Supporter
		Ground	Supporter
		Sand	Play resource
	Pavilion	Roof	Shelter Symbol
		Frames	Holder Boundary
		Cover boards	Supporter

5.4.7 Water pipe play wall

The water pipe play wall setting was designed and built up by the nursery staff. It was mounted on the south wall of the central playground. It provides children with a different style of water playing. Children used a small bucket tied on a rope to fetch the rainwater from a big barrel at the end of the side pathway. Then they pulled the rope to raise the small bucket and poured the water into the pipes at the highest point. They observed the water flowing down the pipes. Some children would also put small objects in the water to see the objects' movement.



Figure 27: Water pipe play wall

The water pipe play wall setting is consisted of several components to make water flowing play available:

- **Brick wall:** Brick wall is the essential element to hold the water pipes. It is also the south boundary of the space.
- **Side pathway:** the side pathway is a long narrow dead end space. Children were not often seen playing here.
- **Water pipes:** Several reused long water pipes are mounted on the brick wall.
- **Bucket tied on a rope:** A small red bucket is tied on a rope to pour water into the pipe.
- **Big barrel:** A big black barrel is placed at the end of the side pathway to storage rainwater falling from the roof.

Table 37: Elements in the water pipe play wall setting

Setting	Spatial component	Spatial element	Spatial meaning
Water pipe play wall	Water pouring area	Brick wall	Boundary
		Ground	Supporter
		Water pipe	Play installing
		Bucket tied on a rope	Play resource
	Water flowing area	Brick wall	Boundary
		Water pipe	Play installing
		Half wall of the	Boundary

		deck	
		Ground	Supporter

5.5 Summary of the chapter

This chapter has set out the hierarchy of terms to be used to systematically ‘deconstruct’ and thereby describe the built environment of the nursery, both indoors and outdoors. Each setting has been described in detail to provide a contextual understanding of the presented data. The elements of the settings have been identified with different behavioural meaning and grouped into different categories.

The ‘deconstructed’ environment – its elements and settings – form an important basis for rigorous data analysis and interpretation, allowing comparison of ethnographic data across the various settings.

With the help of these deconstructed conceptual settings, we are going to move towards the next chapter, where plenty detail of observation data collected from ethnographic fieldwork will be presented, following with in depth interpretation and analysis.

Chapter VI: Ethnographic analysis of children's social interaction

In this chapter, I am going to demonstrate observed social interactions in the nursery, together with the analysis and interpretation of these interactions through selected example moments or events. The social activities in this case childcare centre are various. How to recognise these social activities is the main task in this research. Taking Parten's classic taxonomy of social participation levels in free play as the point of departure and adapting this through dialogue between other relevant literature (please see Chapter II Section 2.2.6 for more details) and the iterative process of data analysis, six different categories of children's social interaction emerged, according to social interaction levels: solitary, co-present, onlooker, parallel, associative and organized. Within each behaviour category, example moments or events are provided following different sub-behaviour types. Five selected case events are further discussed in this chapter, with detailed interpretation of how the environmental features support children's social interaction.

6.1 Identifying social activities

"If we wanted to establish the reality of a social system as a complex of mutually dependent elements, why not begin by studying a system small enough so that we could, so to speak, see all the way around it, small enough so that all the relevant observations could be made in detail and at first hand?" (Homans, 1951, p.16)

6.1.1 Hierarchy of social interaction

Homans and Goffman both put their attention on the very small interaction process to test their theory. But the social interactions I observed in the case

childcare centre, have complex compositions and various forms. Some interaction events lasted only for seconds, while the others could last for several quarters. In Chapter VI’s social interaction event case studies, I have shown that a social interaction event usually may consist of a series of social interaction moments and episodes from its beginning to its ending (e.g. the territory controlling event, the racing event, the co-working event).

Social interaction moment is defined as the smallest action period that produces social meaning. Social interaction moment is usually an instant part in a complete interaction section. A sequential set of social interaction moments consists a social interaction episode, a complete social interaction section. And a sequential collection of social interaction sections forms up a complete social interaction event. Social interaction event is independent and parallel from other events, while episodes and moments follow a sequence and become meaningless when separated from the context.

A social event can be as small as two individual making funny faces to each other, or as large as the international negotiation.

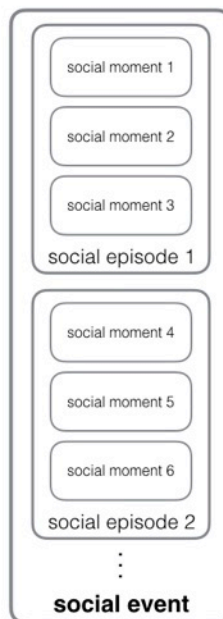


Figure 28: Structure of social interaction event

Goffman (1972) defined social interaction as the process by which we act or react to those around us. Actions and reactions are the obvious behavioural phenomenon. Behind the phenomenon is individuals' processing of the information they gather from the surroundings, both physical and social.

As a set of social interaction moments, social interaction events include interactive action and reactions that both contribute to the interaction process. These interactions can be carried out by any body that involves in the event. Here, I would like to talk a bit more about individual's actions in the environment.

6.1.2 Structure of social interaction

As a human individual existing in the environment, one has two basic types of status, non-motion and motion. Non-motion status usually includes non-motor actions such as standing, sitting, squatting, lying, etc. Motion status includes various motor actions such as creeping, crawling, rolling, walking, running, jumping, spinning, sliding, etc. Both the non-motion actions and motion actions are controlled via individual's gross motor behaviour system. With these basic status actions, individuals start their personal journey in the environment.

Based on these status actions, one can then add in their manipulative actions that are driven by the fine motor behaviour system. For example, one girl sits on a chair and plays dough on a table. Sitting is her non-motion status action, and playing dough is her manipulative action. Another example, a boy rides a hobby horse around the playground. He walks, runs and jumps while holding the hobbyhorse tight in his hand. Walking, running, and jumping are all motion status actions, and holding hobbyhorse is his manipulative action.

All social interaction moments can be further dissected into the combination of status actions and manipulative actions. For example, two children are playing basketball in the playground. At the typical interaction moment that one child chases the other child who has the ball, the chaser is using the motion status action of running, and the escapee child is using motion status action of running

plus the manipulative action of patting the ball. The chasing social interaction moment will not exist without their status actions and manipulative actions. Without such typical interaction moments (e.g. one child can not move after his leg gets hurt), basketball play activity will not be generated consequently.

6.1.3 Classifying social interactions in case child centre

During the familiarization period in the nursery, I used a research note to mark down the observed social activities. Generally, Parten's taxonomy of children's the social participation level of children's play activities (please refer to Chapter II, section 2.2.6 for more details) fit quite well in classifying these social activities. However, for my research interest, there is no need to separate unoccupied behaviour and solitary play behaviour, as it is easy to see that these two types of activities involve no social meaning.

According to my research note, there are some parallel activity events of group activity that are neither strictly parallel play nor solitary play.

(Research note 0802P)

A girl is building her model at the construction corner. A while later, a boy comes to the place. He sits down beside the girl and then crawls over the place along to the pattern of the carpet on the floor. During crawling, the boy avoided the girl's model, and the girl was not distracted by the boy's activity.

It seems they were doing a different type of things, so they were not parallel playing according to Parten's definition. And they both noticed each other, so they were not solitary playing either. This type of group activity should be defined.

Goffman's social interaction theory proposed a division of unfocused interaction and focused interaction (Goffman, 1961, p.7), and later introduced the concept of "copresence" (Goffman, 1963, p.17). He explained that the "full conditions of

copresence," have been achieved when persons "sense that they are close enough to be perceived in whatever they are doing, including their experiencing of others, and close enough to be perceived in this sensing of being perceived". "copresence renders persons uniquely accessible, available, and subject to one another" (Goffman, 1963, p.22)

Co-presence provides the most essential scene to social interaction. Only with the scene of co-presence can further scene of interaction be established. The concept of co-presence provides a way to classify the numerous observed events mentioned in my research note like above. But the rest parts of Parten's framework still fit in the analysis well, thus no adjustment is needed.

6.2 Discovering behaviour events from fieldwork data

The detailed discussion of the social interaction based on Parten's framework is shown below in relation to (and in response to) the emerging data.

6.2.1 Solitary behaviour

My research interest is about children's social interaction, but as the essential component to social interaction, to begin with, I would rather start from their solitary behaviour.

As defined, the solitary behaviour is a type of non-social, self-engaging action that no other child or adult involves. A child, who is doing solitary behaviour, acts apart from others, observes surroundings, or interacts with the environment rather than people. For instance, a child is building blocks alone; or reading a book alone; or watching the sky alone; or observing a swarm of ants on the ground alone; etc. Broadly, any behaviour that an individual can act out is potentially a solitary behaviour, if there is no other person involves.

From another angle, solitary behaviour can be viewed as the observable interaction only between individual child and the environment. Individual

children sense the environment via their body and react inside it or with it consequently with parts of their body. Among various body reactions, body movement is one of the fundamental forms, which can be easily and directly observed by the observer's naked eye.

As we know, individual's body movements are driven by different muscle groups. Based on the types of the muscle groups, we can briefly divide body movements into two different groups, gross motor movements and fine motor movements. Gross motor movements are driven by arm, leg, or other large body parts. These movements include locomotor ones and non-locomotor ones. Locomotor movement is a physical action that transfers individual from one place to another. Examples include running, walking, jumping, skipping, sliding, climbing, etc. Non-locomotor movement is a physical action that is performed while remaining in place, such as swinging, pushing and pulling, spinning, bending, etc. Fine motor movements are driven by small parts of individual's body, such as wrist, hand, fingers, feet or toes. Fine motor skill is another key aspect that marks important milestones in children's individual development. In the case nursery, I focused on the fine motor activities when children were manipulating objects. Some activities include actions combined with both gross motor and fine motor movements, for example, climbing up a rope ladder requires not only climbing actions involving with arms and legs but also grasping actions with hands and fingers.

Besides observed movements, there is also another type of solitary behaviour that involves no muscle movement, such as observing, thinking, resting, sleeping, etc. These activities are classified as unoccupied activities.

During the free play session in the case childcare centre, children in the childcare centre were usually staying together with others at most of the time, thus solitary behaviours were not frequently seen. But sometimes, when they were exploring the environment and stayed far enough from others, they were recorded acting some types of solitary behaviours, reported in categories as below: Locomotion activity, non-locomotion activity, manipulative activity, and unoccupied activity.

6.2.1.1 Locomotor activities

During my observation in the case nursery, when children are enjoying their free play session, they showed various forms of gross motor activities.

Walking

Walking is an essential skill for children since they reach toddler age. For sound pre-schoolers, they can walk with an agile like adults, and usually do not have any problem in coordinating their body parts during walking. It is without saying that walking activity can happen anywhere, as long as the place is accessible. In the case childcare centre, there are some particular places that children were observed engaging in walking activities.

Edge slab of the lawn platform

As shown in the footage recording, Jim was walking along the edge slab of the lawn platform in the side yard by him self. He followed the slab line from highest terrace step first and climbed down to the lawn platform. It is clear that the slab line attracted his attention. He purposely chose to walk along the slab rather than in the lawn platform. In the footage interview period, Jim did not respond to why he likes walking there (JH0807-0-1).

Such solitary activity was also found in other footages, e.g. MB0807-0-1, JG0808-0-1, MB0814A-0-1, OA0816P-0, etc.

Wood blocks in the side yard

Jacobs was recorded walking along a line of wood blocks in the side yard (JG0808A-0). Later he stopped in the middle and asked me for help because the gap between the wood blocks was too large for him (see in associative behaviour section).

Pathway in the playroom

Jim was observed hanging around the pathway in the playroom (JH0807P-I). He had no toys in his hand and did not stop at any play setting. Such hanging around activity has been observed several times. Tim was walking around again and again the pathway while pulling a toy behind (TA0808P-I-1). Locky was observed riding a hobbyhorse (TA0808P-I-1). Toby was pulling a toy in the pathway (TA0808P-I-2). Marry was walking in the pathway while cleaning her dress. (AB0813P-I)

Patterned carpet in the playroom

Jim was observed walked along the carpet pattern at the construction corner. At the beginning, Jim was among other children playing near the entrance. Then he left the group and walked along on the carpet following the pattern. (JH0808P-I)

Some solitary walking activities took place while the children were hanging around. But sometimes, they were engaged in pulling a rope toy or riding a hobbyhorse.

The environmental feature of these places has a strong similarity that they all define a linear space area to attract children's focus. To keep within such linear space during moving is also a challenge to them, which allows them to test out their motor abilities.

Running

Osborn was running from role costume corner to the construction corner, via the central pathway in the playroom. (OA0809P-I)

Tim was running from display wall to the door of the silent room via pathway. (TA0808P-I-2)

Children were observed avoiding challenging areas during running. Unlike walking, they chose lawn platform or the other wider areas rather than the

limited linear areas like slab edge, wood blocks or beams. Though running uses similar muscle groups, the movement speed is much higher than walking. Because of the high speed during moving, the more focus is required in the coordination of muscles to keep body balance, so that the less visual information is processed. As a result, safer route is preferred during running in order to avoid injury.

Solitary running usually happened when a child wants to move from one place to another as quickly as possible. Social running such as chase, race,

Crawling

*Tim crawled on the floor of the playroom with his rope toy in his hand.
(TA0808P-I-1)*

Jim got off the chair and crawled on the floor for a while. (JH0808P-I)

Crawling skill is developed before a child can actually stand and walk. But when pre-schoolers crawl on the floor, their purpose is usually just for fun.

Jumping

Osborn jumped on the wooden bed in the playroom. (OA0809P-I)

*Rebby was jumping on the cover board of sandpit in the playground.
(RS0813A-0)*

Children were observed jumping on/off platform surface.

Climbing

Rebby climbed up the sofa back in the playroom. (RS0813P-I)

Maria climbed up a tree branch in the side yard. (MB0807A-O-2)

Bob climbed up the edge board of the boat in the playground. (BOAT0809A)

Children climbed up various supporters, e.g. terrace step, tree branch, bed, sofa, etc.

Sliding

Immy was observed play alone on the big slide. (IH0813A-0)

Wheel riding

Jim was riding his trike around the playground while other children were playing elsewhere. (JH0807P-0)

Wheel riding is one of the major activities that children engage during their outdoor free play session. At most of the time, they were playing together.

Wheel riding is not observed in the lawn platform because there is a big step between the ground and the platform, and children are physically very difficult to put their trikes up to the lawn.

Table 38: Observed locomotor behaviour

Afford basic locomotor behaviour	Place observed
Walking	Along side slab of the lawn platform
	Around the sloped ground of the side yard
	Along the pathway in the playroom
Crawling	Along the pathway floor in the playroom
Running	Around on the lawn platform
	Through the pathway of the side yard
	Along the pathway in the playroom
Climbing	Off the terrace step in the side yard
	Up and down the rope ladder in the side yard
	Up the sofa in the playroom

Jumping	Along the line of wood blocks in the side yard
	On the wooden bed in the playroom
Sliding	On the slide slope
Wheel riding	Around on the hard floor of the playground
	On the sloped earth ground in the side yard

6.2.1.2 Non-locomotor activities

Rocking

Immy was rocking on the plastic rocking toy alone in the playground.

(IH0813A-0)

Maria was standing on the rocking boat to test her balance ability.

(MB0807A-0-2)

Spinning

Tim was spinning his body beside the sofa. He was playing with a toy in his hand at the moment and imagined the toy flying around his body. Soon he started to spin his body at a high speed. After a while, he fell on the sofa next to him. (TA0808P-I-2, Research note: Tim chose to spin near the sofa because he knew the sofa is soft enough and could support him in case if he fell with dizzy.)

Bending

Bob bent down his body beside the edge of the boat setting. (BOAT0809A)

Swinging

Maria was swinging on the rope ladder that was tied on the branch of the tree in the side yard. (MB0814A-0)

Pulling

Maria was pulling a rope hanging on the wall. (MB0814A-0)

Throwing

Jolin was throwing a leaf in the side yard. (RS0813A-0)

*Jolin and Toby were throwing balls at the corner of the side yard.
(TB0815A-0-1, TB0815A-0-2)*

Hanging

Jim was hanging his body on the top of a shelf. (JH0807P-1-2)

Maria was hanging her body on the beam of sandpit pavilion. (MB0807A-0)

Table 39: Affordances for non-locomotor behaviour

Afford basic Non-locomotor behaviour	Place
Rocking	On the rocking toy in the playground
Spinning	Beside sofa in the playroom
Bending	Down the side board of the boat setting
Swinging	On the rope ladder in the side yard
Pulling	Grass in the lawn platform
	Rope on the wall
Throwing	At the basketball frame corner in the playground
	At the sloped corner of the side yard
Hanging	On the beam of the sandpit pavilion frame in the playground

6.2.1.3 Manipulative activities

Fine motor activities usually include various manipulative activities. Children manipulate toys, tools, or other environmental elements

Patting

*Tim was observed placing the photos on the display wall of the playroom.
(TA0808P-I-1)*

Placing

*Osborn was placing his toy model on the top of a table in the playroom.
(OA0816P-I-1)*

Grasping

*Jacobs was playing water animal toys in the water tank in the playroom.
(JG0814A-I)*

Digging

Rebby was digging the earth at the lawn platform. (RS0815A-O)

Pouring

Jacobs was filling up a bucket of sand in the sandpit. (JG0814A-O)

Table 40: Observed manipulative behaviour

Afford basic manipulative behaviour	Place
Patting	At the display wall in the playroom
Placing	At the construction corner
	At the kitchen play corner
Grasping	Beside/In the lawn platform in the side yard

Digging	Beside/In the lawn platform in the side yard
Pouring	In the sandpit pavilion in the playground

6.2.1.4 Repose behaviour

Jim was resting on a chair and observing the environment around.

(JH0808P-1)

Repose behaviour includes sleeping, resting, relaxing, etc. Most types of reposing behaviour are usually in forms of still gestures or postures, e.g. standing, sitting, squatting, lying, etc.

Table 41: Observed repose behaviour

Afford repose behaviour	Place
Standing	Beside the sofa at the reading corner in the playroom
	At the doorway of the silent room
	Against the display wall in the playroom
Sitting	On a chair in the playroom
	On the sofa at the reading corner in the playroom
	On the wooden bed in the middle of the playroom
	On the floor at the reading corner
	On the edge slab of the lawn platform
	On the edge slab of the terrace step
	On the edge board of the boat setting
Lying	On the carpet of the reading corner in the playroom
	On the bed mattress at the sleeping area in the playroom
	On the headboard of the boat setting in the playground

6.2.2 Co-present behaviour

Co-present behaviour is defined by the proximity attribute of the actor's action. When co-present behaviour happens, the actor is acting close by other individuals but pays no interest to any of them or their activities. The actor focuses only on his own actions, although he may be aware of other individuals around. The actor would rather see other individuals as environmental elements than social elements. In most social interaction scenes, the actors are co-presenting at the location of the interaction event, even before the interaction can actually set up.

6.2.2.1 Collective co-present events

The collective co-present event happens when several children occupy a space at the same time, but each of them is doing different activities. There are no interaction or other link issues.

Collective co-present behaviour can start from a child enters the play area of another single child. For example:

Tim was playing the photos on the display wall. Jane came to the place, pulling a toy behind. She stayed there for a while then left. (TA0808P-I-1)

Or it can start with someone in the group turns to do other things.

Maria and Luke were sitting on the floor at the space between the sofa and the bookshelf, playing instrument toys. Maria stopped playing the toy and started to put up a white dress she picked up from the floor. When she finished, she stood up and walked around at the place to show off her dress. During this time, Luke was not distracted by Maria's activity. He enjoyed playing the toy. (MB0807A-I-2)

Collective co-present events usually happened in a large space which can hold up a number of children. This is similar to collective parallel events, which will be discussed in section 6.5.

Variety in the resources plays an important role in the collective co-present events. Only with various types of play resources can these children act out different play themes. Here, play resources are not only objects, but also can be environment elements, which support different activities.

6.2.2.2 Passing-by events

There is another type of co-present event when a child was moving through or beside a group of other people. I called it passing-by event. Passer-by sees the other people as physical environment elements rather than social elements. They do not interact with other children. For example:

Jim was watching Caregiver LS-J organising a group of children in the side yard. Around twelve children were there. Seven of them were sitting on the terrace steps. Two were standing on the edge slab. And some were walking around in the yard. Jim decided to leave them. He walked through the group of children to the other side of the terrace and then climbed down the step. He walked pass by Alice and Jane who were talking around a wood block in the side yard. (JH0807-0-1)

And another example,

Maria was riding a trike out of the side yard, entering the playground. She wanted to ride to the other side of the playground. In the playground, four caregivers were standing in her way and chatting to each other. They did not notice Maria was approaching. Maria did not choose to ride pass by, but directly through the gaps between the caregivers. (MB0807A-0)

In the case events, both Jim and Maria see other people as part of the environmental obstacles. They did not interact with any one in the groups. And both of them successfully completed their activity without any further incident. But sometimes, their behaviour may bring others trouble and cause further incidents, where they could learn their lessons. Comparing to passing by, their behaviour could be seen as intruder activity, which might send unfriendly intension to others in adults' world.

Table 42: Observed co-present behaviour

Afford copresent behaviour	Place
Collective copresenting events	At the display wall in the playroom
	On the floor of the reading area in the playroom
	In the side yard
	In the boat setting
Passing-by events	In the playground
	In the entrance pathway slope
	At the wooden bed in the playroom

6.2.3 Onlooker behaviour

Onlooker behaviour is an action taken out by a child who is observing others, without established interaction yet. Onlookers are obtaining the information they care about. This is a very important phase before M making decision and taking out action.

6.2.3.1 Spectating events

Spectating behaviour happened quite a lot when a child was curious about what others were doing. Before children actually join an on-going event, they sometimes prefer to be an outsider first. They need time to understand what others are doing and to hesitate before making decisions. During this time, they are staying outside. It is also an important activity to learn new things, new knowledge, and new rules.

Some of the observer children liked to stay near to the focused event, for example:

Locky was looking at a group of children at the role costume corner. He was talking with Rebyy at the sofa at that time. Then he was distracted by the caregiver and two children at the role costume corner and watched them

choosing costumes. He walked off the sofa and around at the outside of the corner but did not join them. Locky finally went back to Rebbby. (RS0813P-I)

Locky and Rebbby did not have a plan of what to play next. So Locky started to curious about other's activities. In this event, Locky showed his interest but also hesitation of joining the other activities via his spectating behaviour.

Sometimes, the observer children preferred to stay far from others, for example:

Mary was observing the researcher in the pathway of the playroom. She walked in the pathway at first, then stopped to clean her dress. She saw me and was curious about my camera, so she stared at me for a while. I moved to another place. Her eyes followed me. (AB0813P-I)

In this case, Mary observed me from a distance away. I moved my position to check her reaction. From this case, we can see onlookers are not necessarily co-presenting with their focus at the same place. They can stay wherever they want to observe.

At times, children would even stand inside the group to observe, for example:

Jacobs entered a group of children who were playing by the water tank. (JG0814A-I)

The nearby area around the event location is important in observing events. Its design directly relates to how well could the observer obtain the information they need. If the water tank were placed on a high raised platform, other children outside the platform would not be able to get any information. As a result, they would not be able to make further decision. This is why all the stadiums are designed as a bowl, and put the event in the centre lower level, while spectators are sitting higher around.

6.2.3.2 Peeping behaviour

Peeping is an interesting activity. It happens when a child wants to observe other children secretly. Peeping children need shelter to hide their body and feel

secure. The peeping child may have no established link with others, or may already have an established activity with other children, for example during hide-and-seek play.

Observed peeping events in the case:

*Bob was peeping other via the gap between fences at the summer house.
(AB0809A-0-2)*

*Maria was peeping Tim before she rode out from the back of the slide.
(MB0807A-0)*

Maria was hiding behind the slide. (MB0807A-0)

In peeping behaviour, the shelter is a key environmental feature for peeping children to protect them from being noticed.

Table 43: Observed onlooker behaviour

Afford onlooker behaviour	Place
Spectating events	At the water and sand play table
	At the construction area
	Around the big tree in the side yard
	At the boat setting
Peeping events	At the boat setting
	On the watchtower of the slide
	At the shelter under the slide setting

6.2.4 Parallel behaviour

Parallel behaviour is a type of behaviour where children co-present at the same place, but also act similarly to other children. For example, riding wheel toys with other children in the playground, but not talk to each other; building blocks with other children, but not sharing any ideas or resources; drawing pictures with other children at the same table, but not sharing any ideas or resources; etc.

6.2.4.1 Collective parallel events

The collective parallel event is when several children play together at a place, and they are doing similar things. For example:

Locky and Rebbly were playing at the construction corner. Locky was building up a railway and played with train toys. (RS0813P-I)

Bob and Teresa were sitting at the art and craft table drawing their own pictures. (OA0816P-I-1)

Similar to a collective co-present event, a collective parallel event needs a big enough space to hold parallel activities. Similar resources should be sufficient in the place to support similar behaviour.

6.2.4.2 Mimicking events

Mimicking events happens when a child is copying other children's actions. For example:

Immy followed Rebbly running around the playground. (IH0813A-O)

Rebbly threw a leaf after she saw Jolin's throwing action in the side yard. (RS0815A-O)

As above, enough space, and sufficient resources are required

6.2.4.3 Lining up events

Children were observed lining up at the entrance of the pathway to the side yard. (MB0807A-O)

Children were lining up along the wall in the entrance corridor. (JH0807P-I-2)

A linear environment element, or demarcated edge or boundary could potentially help children to line up as required. As shown in the footage, relative width (here narrow) pathway space is potentially another factor.

6.2.4.4 Encounter/Collision events

Encounter event happens when children meet each other on their way either in the same direction or counter direction.

Osborn encountered Jim in the entrance pathway slope. (OA0816P-0)

Maria encountered Teresa in the playground. (MB0807A-0)

Jim encountered Alfie playing hobbyhorse in the playroom. (JH0807P-I-1)

Most encounter events (where children might intend to occupy the same space or use the same resource, for example) can be solved without further interaction, but in some cases, encounter events can lead to serious conflict problems, which need extra interaction to resolve.

According to my observation, children are occasionally encountering each other while moving around in the playground or in the pathway of the playroom.

Table 44: Observed parallel behaviour

Afford parallel behaviour	Place observed
Collective parallel events	At the construction area
	At the art and craft table
	At the side yard
	At the slide setting
Mimicking events	At the reading area
	At the role play costume corner
	At the entrance pathway slope
Line up events	In front of the pathway to the side yard
	In the entrance room

Encounter events	At the entrance pathway slope
	At the aisle of the playroom

6.2.5 Associative behaviour

The associative behaviour is co-presenting in the same place, behaving similarly with others, and in addition, sharing their thoughts or resources via conversation or interactive behaviour. For example, play dough with other children, and share each other’s dough resource; build up models with other children, and exchange their element resource and ideas; push other children’s trike in the playground; scramble a toy with other children; chasing other children in the playground; fight with other children on the floor; etc.

6.2.5.1 Accompanying events

Peer groups were involved in quite a number of accompanying events, here understood to involve relatively static, non-locomotor activity.

Alice and Jane were reading a book together at the wooden slope of the summer house. (AB0809A-0-2)

Rebby and Locky were sitting together on the sofa in the playroom. (RS0813P-1)

Enough perceived space to stay is necessary in accompanying events. A good view is also important.

6.2.5.2 Share events

Children were sharing the rope ladder in the side yard with the help of an adult caregiver. (RS0813A-0)

Sharing is a taught concept that adults always remind children about.

The scarcity of the resource is important in sharing events.

6.2.5.3 Exchange events

Maria and Luke exchange their toys at the reading area (MB0807A-I-2).

Locky and Rebbly exchange toys at the construction area. (RS0813P-I)

The resource is a key environmental feature in supporting the exchange event. Without sufficient resource supply, the exchange is not possible to take place.

6.2.5.4 Help events

Children usually turn to adults for help directly when they get hurt, or feel uncomfortable, or get lost. But sometimes, other children may be able to perceive when a child gets in trouble and help him or her out.

I often observed younger children were hesitating to slide down, and then caregivers or other peers offered their help to the child:

A young boy (around 2 and a half years old) was sitting at the top starting point of the slide for quite a while. He seemed not confident to slide down. He looked down the slide again and again. Caregiver C was looking after Helen at that moment. After a while, she noticed the young boy's eye contact. Caregiver C then walked to him and helped him slide down. (MB0807A-O)

Young children's perception of the affordance of falling off from a high position is well known in Eleanor Gibson's famous "Visual Cliff" research (Gibson and Riccio, 1984). In the slide case, a two-year-old child can perceive the height of the slide platform, as he fears to slide down directly. But he did not leave the place because he perceived the affordance of slide play. He hesitated because the environmental feature in front of him made him feel unsecured. He perhaps cannot imagine what will happen during sliding down. He is not confident in his ability to control his body (balance and speed). Older children are observed to be more confident. This may suggest that such confidence could be built up over many times of slide play experience, similar to the learning process of ride a bike.

Caregiver LS-J helped Jim while he was trapped by a wood block. (JH0807P-O)

Jacobs helped Jim while the slide slop trapped his trike. (JH0807P-0)

The difficulty level is the key environmental factor of the setting where helping events can be observed.

6.2.5.5 Conflict events

Spatial conflict events

Osborn's territorial claims (MB0807A-0, please see section 6.3.1 and Appendix C for more details)

Mary and Jacobs argued about their right to play at the boat setting's head board. (JG0808A-0)

Toy conflict events

Maria and Teresa scrambled a toy in the playroom. (MB0814A-I-2)

The scarcity of the resources or space room is the key environmental reason in conflict events.

Table 45: observed associative behaviour

Afford associative behaviour	Place observed
Accompany events	At the wooden slope of summer house
	In the entrance pathway
	At sofa area in the playroom
	At sleeping area
Sharing events	At the boat setting
	At the tree branch in the side yard
	At the reading area
Exchange events	At the reading area in the playroom

	At the construction area
Help events	At the side yard
	At the slide
Conflict events	At the side yard
	At the boat setting

6.2.6 Organized behaviour

Organized behaviour is the highest level of social interaction. The events usually follow some rules that are given by the participant actors. All the actors associatively behave with others, share the same goal or agreed rules, follow organized procedure, and even may appoint role division during the event. The actors may or may not present at the same place, may or may not behave similarly and may or may not share the same type of resource.

For example, building up a zoo with blocks together in the construction area; role-play together at the drama corner; run a race with peers in the playground; play battle games with peers in the playroom; clean up the playroom with other children, etc.

6.2.6.1 Co-working events

Luke and peers were co-working at the water pipe wall. (LD0814A-0)

Maria and peers were co-working on pouring grass around in the playground. (MB0807A-0)

Maria and peers were co-working on tying a rope to the branch of the tree. (MB0814A-0)

Maria was often observed involving in co-working events.

The complexity and amount of workload of the target are important to co-working events.

6.2.6.2 Role play events

Maria and Helen were playing pregnancy game at the sleeping area in the playroom. (MB0807A-I-2)

Alice and Jane were playing kitchen and dining game at a table in the summer house. (AB0809A-O-1)

A setting that has similar scenery to the play theme is preferred in the role-playing events. But we should never underestimate children's imagination ability. For example:

Locky and Jim were playing fire engine game at the boat setting. (Boat0813A)

The boat setting has designed seats and a triangle "head" part, which could potentially represent any transporting vehicles.

6.2.6.3 Racing events

Racing is one of the favourite competition games in the childcare centre. During my fieldwork period, I saw several times of racing events and the generating process of their own racing rules. (MB0807A-O, IH0813A-O, OA0816P-O, etc.)

Children were observed playing racing games quite a lot in the entrance slope pathway. Compared to the rest of the nursery playground area, the shape of the pathway space is relatively long and narrow. Visually, such space clearly suggests a direction of movement - towards its head or end rather than side to side. (This does not mean people cannot move towards side edge.) The width of the pathway space is enough to run three to four trikes at the same time.

Second, the pathway space is surrounded by physical boundaries on three sides.

Third, another very important physical quality of the pathway, as mentioned above, is the sloping ground. A slope allows objects to follow gravity and move towards the lower end. As a result, the pathway is naturally a good location to act out racing games.

Settings that contain the same (or sufficiently similar) conditions in their components are preferred for competition events, supporting a perceived “fairness” required for the event.

6.2.6.4 Fantasy play events

Osborn played battle fantasy with other children in the playroom. (OA0816P-I-1, OA0816P-I-2)

Locky played fire rescue game with Rebbly at the tree in the side yard. (RS0815A-0)

Children creatively used the environmental elements to represent the fantasy scenery they needed during the play.

The meaning of the space emerges from their imaginations.

Table 46: Observed organized behaviour

Afford organized behaviour	Place
Co-working events	At the wall of water pipe
	All around the playground
	On the watchtower of the slide setting
	At construction ply area in the playroom
Role play events	At the sleeping area
	At the reading area

	At the play kitchen
Race events	At the entrance pathway slope
	All around in the playground.
Fantasy play events	All around in the playroom
	At the boat setting

6.2.7 Summary of the section

All the behaviour and social interaction events emerged from the ethnographic analysis journey of the fieldwork data were settled in the above six different sections, or in another word, six different categories in different social participation level. Some of the events were observed directly from the field in the case childcare centre or recorded video footages, and recorded via my field note, or sketches, or reflection journals, or via the transcription of the video footages. These emerged behaviours or social interaction events consist of a huge knowledge pool in order to support further ethnographic data interpretation and analysis.

6.3 Interpreting case social interaction events

A social event consists of many social interaction moments. The social interactions can be seen as the smallest meaningful elements in social events. A social event may include only one type of social interaction or may consist of various types of social interactions. To understand a social event, it is always best to get a full picture of the interactions generated from the beginning of the event until the end.

During my fieldwork period, I have observed many interesting cases, which have inspired my understanding of the relationship between children's social interaction. I would like to interpret in details these events to show how children

creatively employed the environment features to support their social interactions, and as a result, accomplish the whole social event in specific places in the childcare centre.

6.3.1 Territory, invasion, aggression

Case #1: Aggressive behaviour in the side yard

Participant: Osborn, Gaby, Maria, Tim, Luke, Teresa, Helen,

Footage ID: MB0807A-0

Time: 03:40~06:30

Location: Side yard

(For full event description, please see Appendix C)

In this case event, children's interaction sequence can be briefly listed as below:

1. A group of children entered an area in which occupant children were already playing. Occupant children perceived other children's invasion.
2. Occupant children stopped the invader children and requested them clear. Invader children responded with neutral and antagonistic actions.
3. Occupant children raised their action level to threaten and bully. Invader children responded with antagonistic actions.
4. Invader children occupied a play resource in the area. Occupant children responded with aggressive scrambling action.
5. Occupant children attempted to occupy invader children's play resource. Invader children responded with compromised action, giving up possession of the environmental resource and protected their own resource.
6. Occupant children kept on threatening and persisted with bullying action. Invader children responded with compromised action and left the area.

During this event, we can see Osborn perceived and used various affordances in the nursery's side yard environment to meet his social demands of territory

control. He noticed other children's invasion by watching over the entrance point. He claimed his possession of the whole area and requested other children get out of the area by jumping up to a higher position afforded by the environment several times. He walked around the area and rushed towards invader children from a long distance with high speed to raise his threaten level.

Environmental features play important roles in supporting children's perception and actions during the processing of the social event.

Perception of the boundaries:

A territory is physically defined by the boundaries of an area. These boundaries can be perceived via individual's sensation system, no matter whether by auditory, vision, tactile, olfaction, or even gustation. For human beings, the two most common sensation systems for boundary perception are the vision and the tactile. In some occasions, auditory can play an important part such as warning system in the traffic crossing area.

The side yard is a dead end space, which is surrounded by walls and terrace platforms and only opened at one side towards the central playground. In other words, the boundaries of the area are clearly defined by the physical components.

The occupant children's claim is based on the perception of the scope and boundary of the area. Imagine, by contrast, if the occupant children were in an open area without clear boundaries.

Perception of the invaders:

The invaders are defined as such by the act of crossing the boundaries of the occupant children's perceived territory area. In this event, the environment, therefore, provides additional support for the occupant children to perceive the coming invaders.

The edges of the terrace platform and the annexe building deck form a narrow pathway. The height of the terrace edge is only around 50cm. As a result, the children inside the side yard can easily see other children moving in the pathway. This environment feature helps occupant child Osborn notice the invaders are coming, and further initiated the territory claim event.

Blocking on purpose:

A blocking event usually happens in an encounter situation where the two moving parties meet together in opposite direction and stop their movement before crashing into each other. Collisions may still occur if one of them does not stop. In the case event, when the occupant child Osborn decided to stop the invasion, he purposely stood in front of the invader children's way to block their movement. His action was obviously successful as the invader children group stopped.

The environment support behind this particular social moment is that the occupant child Osborn perceived the narrow entrance opening to support his blocking action. Osborn is likely to be able to predict the invaders will stop, as rationally there is not enough space for them to skirt around him.

Threatening / bully / aggression / strength showing off:

In the case event, occupant child Osborn was trying to force other children to get away from the side yard. The motor actions he chose were jumping, running, punching, pushing, kicking, etc. He also used verbal actions such as shouting loudly at the invader children.

Occupant child Osborn stood in a higher position many times.

While standing above others, Osborn could have a full sight of other children and help in making his decision to show off his strength actions or aggressively attack actions. There are also distal causes of the aggression event in the side yard that is supported by the environmental feature. Usually, because of gravity

and sunlight, a higher position has its inherent meaning of advantage in biological competition. A higher position also has the meaning related to power in human societies across different cultures.

Feedback

Osborn was invited to watch the video by one of the caregivers. On the question of why he kicked others' trikes, Osborn replied, "*I don't know... I can't remember... I just want to play there on our own a little bit*". Osborn's thought raised an important question: whether we should treat occupying a territory the same as occupying a toy. We may all familiar with such scene, if a child wants to play a toy that has already been taken by other children, he should wait until others finish playing with that toy or would like to share the toy. This is also a universal principle that applies in adults' daily life. When it comes to the public space, we usually think it is innate a place where everybody has the right to occupy. Thus no matter who stays in the space, others can use it at the same time. But in fact, if the space is well-defined and relatively closed, the newcomer to the space may disturb the existing occupant's on-going activity. In some occasions, this may be not very fair to those who have already occupied the space for a particular use. If one needs to wait for his turn to play a toy, why he does not need to wait for his turn to use the space? It is a question for both early year practitioners and environment designers, what could be the best solution in practice to better support children's territorial needs.

Talking about the environmental impact, Caregiver LS-J's provided her view on this incidence, "*I found we have captured video from very aggressive play before and showed that to children, I think, sometimes, we found that they've not been able to understand what they are doing...*" "*Looking in from outside is quite different from being in there.*" She said, "*we try to create places where there are barriers when they feel like alone...You know where the children sleep? The sleep home corner... and because of that wall, they would behave very differently behind that wall, because they thought they have a barrier between adults and (themselves)...*"

6.3.2 Let's race

I observed many race events in the fieldwork. Here I pick two typical racing cases to discuss the built environment support for racing.

Case #2: Running race

Participant: Rebbly, Immy

Footage ID: IH0813A-0

Time: 04:27~07:11

Location: Entrance pathway slope

(For full event description, please refer to Appendix C)

The racing event was initially the idea of Rebbly. I do not know whether she has similar experience before or outside her nursery life, but it is quite clear that she got the thought right after throwing her ball down the pathway slope. The indication here is that the gravity is one of the things that could inspire children to act out various play activities.

Rebbly set the race start point at the entrance wall, which provides a very clear visual boundary. But the interesting part in her choice is that she sets the end point at the junction between the pathway and the playground. Compared to the entrance wall, the junction has no clear visual boundary. However, it could still be recognized via some changes/contrast in spatial features:

Space width:

The long narrow pathway connects to the large playground space. Thus, there is a spatial change regarding the width along the pathway direction.

Ground slope:

Connecting with the relatively flat playground, the gradient of the sloping pathway, therefore, provides a contrast in this spatial feature. One can notice by walking from one surface to the other without much difficulty, although it has a smooth transit.

Side boundary direction:

The side boundaries of the pathway are defined by a wooden wall on its south and a metallic fence on its north. There is a summer house located at the end of the wooden wall. As a result, the south boundary folds the pathway space towards the north. The fence pulls towards the north at around the junction point as well. These changes are visually noticeable.

Material change:

In the case nursery, the surface material is continuously covered by concrete from the pathway to the playground, so no noticeable change here can help in recognizing the transit of the two spaces.

The meaning of separated spaces is generated from above differences and contrasts, or in other words, changes. Even children in early age perceive the potential meaning of these changes, as evidenced in events like this race.

Another reason for Rebbby to choose an invisible end point is that comparing to a physical stop barrier, an invisible point allows children to exceed the end position. (7th and 8th round) As a race is a high-speed movement activity, a physical stop barrier may bring a significant risk for them to get hurt. An invisible stop can give enough space for them to reduce speed. This is why most human running races use soft bands or road marks to demonstrate the finishing line. The higher speed, the more space they need after the end point.

Another example is about wheel riding race.

Case #3: Who is faster?

Participant: Osborn, Toby, Gaby, Tim

Footage ID: OA0816P-0

Time: 09:49~15:27

Location: Entrance pathway slope

(For full event description, please refer to Appendix C)

Although at the end, these children still did not get to a full agreement upon their wheel race rules, we could still see they were trying to develop and refine the rules round by round.

The whole event can be separated into two major parts: the preliminary rounds and the formal rounds. Before these children could set up their riding race nicely, they had some riding rounds without very clear racing rules. We could call the 1st the 2nd and the 3rd as the preliminary race here. The last two rounds were better organized.

While having the racing game, children shared one common target, to be first to return the starting point, and common agreements upon the same starting point and finishing point. But the starting time, return point, and the race route all remained unclear. Soon they came to the disagreement point about who won the game. They started to think of a fair solution to establish their race game.

Role assignment:

In this event, the gamers were Osborn and Toby. Two other children were acting with specific roles in the formal racing rounds, Gaby as the starter man, and Tim as the announcer man. Gaby was invited by Osborn to act as starter man. Tim joined their play later and acted as the announcer man as he wished. Osborn and Toby had no disagreement about their roles.

Equipment:

Osborn and Toby both occupied a wheeled toy that could support them to have the competition in a similar situation. However, Toby's tricycle was double seated one, which means, his trike was bigger, longer and heavier than Osborn's, thus more difficult to control. But children did not care

very much about the differences of their equipment. They agreed to race in this way.

Starting point:

The starting point is without much argument. They both agreed to set the entrance wall as the start point. However, they did change their position in each round. For example, in the 4th round, they set their trike in a line at the north side of the entrance gate, but in the 5th round, they moved to the southern side.

Starting time:

Before Gaby was invited as the starter man, Osborn and Toby were set off as they wished in order to win. In the 1st preliminary race round, Osborn set off first. In the 2nd round, Toby set off first. They could not continue with such.

After Gaby joined as starter man, the decision of the starting time was no longer made by the racer. The racing rule seemed to be much fairer. But practically, children still argued about the starting time. Toby missed one Gaby's starter shout in the 4th round. As a result, he did not wait for the shout at 5th round.

Return point:

In this wheel-racing event, children have a common tacit understanding about the return point, but obviously, they did not set up agreements upon this. Every round, Osborn and Toby returned at a different place in order to win the game. This is one of the major problems that caused different result each round. And both Toby and Osborn complained about each other playing an unfair game.

Race route:

They have no agreements on the race route at all. During the preliminary rounds, Osborn and Toby rode into the playground area going freely as they wished. But in the last two rounds, they only used the pathway slope area to complete their race.

Finishing point:

The finishing point was set as the same as the starting point. They had no argument about this in all rounds.

From a developmental angle, the disagreements during children's free race playing could help them understand what makes an unfair race game, and how to play the race game within fair rules.

6.4 Rethinking social interaction from the fieldwork

6.4.1 Sequence of social interaction

Children's social event in the case childcare centre usually starts from low social participant level interaction to a high-level interaction and then ends with low-level interaction sequence.

Without any pre-established rules or shared agreements, there will be no direct jump from non-social activity to high-level social activity. For example,

Teresa was playing puzzle alone. Jacobs came to the place and looked at her for a while. He then tried to cooperate with Teresa based on his previous experience of the same situation, but Teresa did not accept Jacobs's willing to assist and moved his hand away instead. (JH0814A-1)

This social event started from Jacobs's co-present and onlooker activity. When Jacobs wants to raise the interaction level to cooperation, Teresa refused him. Teresa considered Jacobs as a contender rather than a collaborator to her play. She refused Jacobs's cooperation because she does not have shared rules with Jacobs, they cannot keep in the high-level social interaction. However, Teresa refused Jacobs was an associative moment anyway.

From the developmental perspective, children build up their social skills gradually understanding and familiarization with the social situations from low social level to high social level. For example, a child first co-presents with other children by chance, and then incidents such as conflicts of toy possession may take place during the co-presenting period. There may come out a result of these conflict incidents, no matter by aggressive solution or with adults' intervention.

Because of this experience, they are possible to build up their personalised understanding of conflict incident, about its process, rules, as well as the social interaction skills towards a solution. Finally, they are capable to deal with these conflicts in future. Such developmental process also applies in cooperation, competition, etc.

6.4.2 Information in social interaction

In processing any social interactions, information is no doubt playing a very fundamental role. The eventual use of information is to predict the future outcomes and to help make optimal responses according to the current situation. In order to make effective responses, we must first receive and understand other's information correctly.

It is easy to understand, receiving information is environmentally sensitive. Insufficient or false information results in ineffective responses or even incorrectly responses and may further lead to problematic situations. For example, if the lighting level is inadequate, the visual information will be difficult to gain. If a person is silently acting dangerously behind a wall, you may not be able to find out such information until he turns out at the corner of the wall.

Visual information

Solid walls, furniture, boards, panels, or shields are visual barriers that block our view sight. Children were observed using these barriers for hiding, peeping, etc. For example, once after a tug of war incident, Mary bent down her body behind the side board and cried there.

Sound information

Solid visual barriers usually cannot stop sound from transmitting around. But solid walls with sound absorbing material can provide a relatively quiet environment to the place.

In the case childcare centre, sound is an interesting source to attract children's attention. The observation shows when a group of children were shouting, singing or talking loudly, other children were gathered to the place to see what was happening there. A child splashing water also produced attractive sound to other children.

All responses, or to say, decisions of response, are made upon the overall understanding of the current situation. And the understanding is based on the collected information of the current situation and intergraded with personal cognition process. Sometimes, falsely recognized information may cause unwanted social interaction events (e.g. Osborn's aggressive assertion on territory).

Distance can reduce the information to be gained by others, thus can provide relatively private area. When children needed to talk secretly or to personal activity, they were observed walking away for a distance from the crowds. (e.g. Osborn went away to the corner of the playground to have himself not being disturbed when he got angry during a racing game.)

6.4.3 Proxemics of children

Hall (1969, pp.117-125) developed his proxemics distance phase circle to describe interpersonal distance. Obviously, his focus was dropped mainly on adults' scale. Because of smaller body size, this is of course not applicable to children. But Hall's concept provided a possible way to define the interpersonal relationship by proxemics distance.

Table 47: Hall's interpersonal distance phase

Interpersonal distance	Close phase	Far phase
Intimate distance for embracing, touching or whispering	less than 6 inches (15 cm)	6 to 18 inches (15 to 46 cm)
Personal distance for interactions among good friends or family	1.5 to 2.5 feet (46 to 76 cm)	2.5 to 4 feet (76 to 122 cm)

Social distance for interactions among acquaintances	4 to 7 feet (1.2 to 2.1 m)	7 to 12 feet (2.1 to 3.7 m)
Public distance used for public speaking	12 to 25 feet (3.7 to 7.6 m)	25 feet (7.6 m) or more

Based on my observation, an estimated interpersonal distance of a typical 4 years old preschool children's proxemics circle can be suggested as below:

Table 48: Estimated interpersonal distance of preschool children

Interpersonal distance	Close phase	Far phase
Intimate distance for embracing, touching or whispering	10 cm or less	10 to 25 cm
Personal distance for interactions among peers	25 to 40 cm	40 to 70 cm
Social distance for interactions among acquainted caregivers	70 to 150 cm	150 to 200 cm
Public distance used for public speaking	200 to 450 cm	450 cm or more

6.4.4 A passive learning journey

Do children really know the function meaning of specific space? How do they build up their understanding? In most cases, children follow caregivers' request, to do specific things in the particular area. For example, they build block buildings and play train toys in the construction area; they read books in the sofa and carpet area; they play kitchen and dining games in the kitchen toy furniture corner; they draw pictures and make crafts on the craft table; etc.

All above situation may indicate that children in this nursery have knowledge about the link between the activities they want to do and the place they could go to carry out those activities. However, there are some cases showing that younger children's perception is not anchored.

It is interesting to see how children learn from their experience and build up their knowledge about the environment. Younger children may not directly perceive the designed function of a certain space when they need to do something. But they learn from the inconvenient incidents caused by their choice. For example, a group of children discuss, in later observation and interview, the child did not show his full understanding of the issue.

6.4.5 Personal difference

Because of children's different developmental stage, it showed strong personal differences among the preschool children in the case childcare centre.

During my fieldwork period, I have seen Jim (3 years and 6 months old boy) was usually very quiet and carried out quite a large amount of solitary behaviour during free play sessions. In contrast, Locky (3 years and 2 months old boy) always involved himself in talking and interactive play with his peers. Another example, Maria (4 years and 4 months old girl) was participated in quite a lot of co-working and sharing activities, while Osborn (4 years and 5 months old boy) appeared to be more aggressive to other children.

Age, culture background, gender are all potential variables, however, the personal developmental pace could be a more important factor in causing these differences.

6.5 Summary of the chapter

This chapter has looked into the observation data via ethnographic and interpretative approach. Starting from conceptualising the composition of social interaction, this chapter has then summarised the emerged solitary behaviour and social interaction events from the fieldwork data. All the events were categorised by means of its social participation level. Then further explorations have been made during the in-depth interpretation of the key social interaction events in Section 6.3, focusing on revealing the roles that the environmental

settings or elements were playing in those interaction events, as well as the environmental affordances the events revealed. During the ethnographic analytical process, interesting findings were emerging gradually, which lead to a deep rethink of the social interactions that took place at different settings in the centre. My understanding of children's social interaction has also been greatly inspired and developed during the rethinking process.

In the next chapter, I am going to demonstrate the findings of the built environment features that support children during their social interactions in the childcare environment, and link these features with affordance theory, as well as the design and the childcare practice.

Chapter VII: Built environment qualities, spatial affordances, and design suggestions

This chapter discusses the major research findings in three categories: built environment-social interaction relationships, affordances for social interaction, and suggestions for the spatial design of childcare centres.

7.1 Built environment and its relationship to social interaction

Qualitative thematic analysis has resulted in the emergence of a number of key concepts that bridge between the built and social environments. These are here expressed as qualities of the spatial environment, which have been observed to relate to social behaviours.

7.1.1 Space as play resource

While observing children's playing in the childcare centre, I always think of the question, what does space actually mean to them? Obviously, all substantial materials are potential resources for children's activities. As they are still at the age of developing their understanding and knowledge of the world, they tend to explore anything and test any possibility in their activities.

Play resources are usually referring to substantial objects such as toys, instruments, equipment, or installation. But space, considering its substantial attribute, can also be seen as another type of play resource. Space provides play

activity mainly in two ways. First is via contacting with the features of the physical material elements that compose the space. It has been seen that children were not only using the lawn platform surface for motion activities like walking or running, but also for exploratory activities like digging the holes or pulling the grass. Such activity gives children the knowledge of the substantial world, such as the texture, colour, shape or feeling of the component elements. The other is via experiencing the space itself. The spatial features such as stair, tunnel, slide, or rope ladder, afford children the possibility to build up their spatial awareness, and further support their social interaction according to their needs. For the narrow pathway as an example, sometimes, children were observed using the narrow pathway to block others' way, but there were also occasions that children lined up there, even before they entered the place.

As explained, resource plays a very important role in social interaction events. Many social interactions were observed occurring when actors are using the space as a type of resource. For example, children talked with each other to exchange their findings while exploring the earth ground, or shared a chair with peers, or blocked other children's way to the slide, or even aggressively asserted their territory of the side yard during their play.

7.1.2 Spatial scarcity

As a type of resource, the supply status becomes a key issue in using the space, especially when it is not sufficient to fulfil the demands either in its physical amount or other forms.

It is easy to understand that when a space area is not big enough, children tend to have conflict events over it. Children were seen many times arguing, scrambling or even fighting over their possession of a chair, a cushion, the rope ladder, the slide slope, or the head board of the boat setting. Children might be able to perceive the spatial boundaries of these objects or places, but it is also important to point out that, scarcity is also defined by individual demands, which is diverse from one another. For example, when Osborn asserted his territory

over the whole side yard area, his demand was so abnormal that other children could not understand.

On the other hand, scarcity can also bring sharing or exchange events. Some children tend to share their occupied space with others (e.g. cushions, boat seat, or doorway). Such social interaction requires the occupant children to understand others' needs, and sacrifice their possessions by reducing their spatial demands. Sometimes children may exchange their positions when both of them feel they have done enough of playing at their current place (e.g. water/sand play table, kitchen play corner, small wooden bed, boat setting).

There is another relevant situation here. When a child demanded a place (e.g. slide, tree branch, rope ladder, pathway) that has already been occupied by another child, and he decided to compromise his demand on time (occupy the space later), he would just wait until his turn (the other child left the place). There is also evidence that a group of children automatically lined up in a queue in order to go through narrow spaces (e.g. the pathway to the side yard, slide stairs).

Base on above evidence, preliminary propositions can be drawn out as below:

- a) If A's demand on the space occupation is overlapping with B's demand, and none of the two parties accepts compromise, the social interaction between A and B develops to conflict.
- b) If A's demand on the space occupation is overlapping with B's demand, and one of the two parties compromises and reduces his demand, the social interaction between A and B develops to sharing.
- c) If A's demand on the space occupation is overlapping with B's demand, and one of the two parties compromises for reducing their demands on time, the social interaction between A and B develops to queuing.

7.1.3 Spatial difficulty

The difficulty level of a certain space is usually a personal dimension related to individuals' ability to carry out their actions. To most young children (under 3 years old), steps, half walls, platforms that are designed according to an adult's scale are usually barriers, because of the development stage of their motor skills. Preschool age children (3~5 years old) are generally more skilful in using these spaces. However, younger pre-schoolers sometimes still show their hesitation or struggling in accomplishing the actions or tasks with spatial difficulty. I saw several times, for example, Jacobs standing on a wood block for a long time as he was so hesitated to jump over the gap to another wood block; or Bob sitting at the top of the slide with fear to slide off straight away. Such situations are quite common in the childcare environment (e.g. at the step of lawn platform, at the sideboard of the boat setting, at the sofa, at the slide slope).

More interestingly, following struggling situations caused by spatial difficulty, I observed a number of helping and cooperation events. For example, Jacobs asked for an adult's help following his hesitation at the wood block; Locky helped a boy to put his chair over the sideboard of the boat setting; Reby helped a girl pushing the tricycle up a slope; or caregiver moved away a stone that blocked Jim' trike wheel to help him out from struggling.

The spatial difficulty we are talking about here is an abstracted environmental feature that combines with different spatial aspects, such as the barrier height, the slope degree, the gap width, etc. All these aspects may increase the difficulty level in different ways to impede the accomplishment of individuals' action or interaction in the space.

Skilful children were also observed to purposely take advantage of spatial difficulties in competition or other social games. For example, Maria as escapee in a chasing game event ran up and down the lawn platform, steps, wood blocks in the side yard to escape the chasers; another example, Osborn encountered a number of obstacles which was set up by his peers while they are having a wheel

riding race in the central playground. Preschool children are quite aware of what these spatial difficulties mean to them during social games.

The spatial difficulty is an interesting dimension as it also applies to adults. The difficulty means one must put extra effort to achieve their goals, which means not as efficient as other method or achieve other goals. For example, if one moves horizontally from one position to another on a flat surface, we mark the energy cost as 1, and if he moves from a ground surface up to a platform with the same distance, the energy cost then should plus the part of moving higher.

Spaces with difficulty may not be the favourite place children would choose to play. But sometimes, they do enjoy playing there as they can test out their ability and new skills. Children are born to face challenges, these spatial difficulties can help them developing not only body skills but also social skills. In this sense, we would argue that a spatially easy-going environment might not be a good quality to support children's motor and social developmental needs.

7.1.4 Balance between spatial complexity and simplicity

Complexity is an important feature that describes the character of something with many parts in intricate arrangement. Usually, the higher a thing's complexity is, the more information it contains. It is the same when we talk about space. Spatial complexity means how complex the composition of a space is, and it indicates how much information the environment provides to the users. As Robert Venturi (1977, p.16) pointed out in his book *"Complexity and Contradiction in Architecture"*, complexity can provide "richness of meaning" in architecture.

The spatial complexity can be seen from many different angles, for example, aesthetics, informatics, or semiology. What I am going to talk about here is the relationship between spatial complexity and behaviour. To those individuals acting in the space, the information of the environment is essential for them to make decision for their next action. Not every single piece of information is directly related to their next action, but generally, the more complex the

environment is, the more information they will receive and need to deal with, which, from another angle, means the more energy cost one may have to pay out. Base on the efficient and economic principle, in order to save energy in decision-making under the same situation, individual actors in the environment will try to reduce information by simplifying, categorising the useful information, and ignoring the unnecessary or redundant information, for example, when a person arrives at the airport and is in hurry for his transfer flight, he probably won't be distracted by other environmental information in the airport but only focuses on the signs of transfer direction.

It is not hard to understand that spatial complexity relates to the diversity of affordances that support various solitary actions and social interactions at the setting. In contrast, would simplicity provide less behavioural opportunities? Let us first put the side yard and pathway slope together for a simple comparison. The side yard is obviously more complex than the pathway slope, in terms of its spatial affordances. In the side yard, where a number of different settings are provided, children were observed co-presenting for various activities, either in a group or alone. In a typical scene there, some of them were exploring the creatures together at the corner of the side yard; while a group of children were sitting on the terrace steps for a rest; some children were playing with the rope ladder in the meantime; and a child was focusing on the earth on the ground. Comparing to the side yard, a typical scene in the pathway slope is that children were riding trikes there, while other children were walking or running there. Of course, this does not mean the simplicity of the pathway slope is not important. The pathway slope is still the most popular place when children would like to have a race event. Such phenomenon may suggest that well-designed spatial simplicity could encourage and provide significant support for specific activities.

The process of reducing information usually is completed in one's brain without much conscious, base on individual's experience and knowledge. In another word, without enough experience and knowledge, the process will not be able to start. For example, when there is a chair, an adult would probably stick to the thoughts that it is a seat for sitting. With different sets of experience and

knowledge, the process will finish with a different result. Young children may see the chair as a totally different object because they don't have enough experience and knowledge. They are still at the very beginning stage to build up their understanding of the world, and learn how to deal with environmental information. Their potentials are not restricted as those adults are. They are much more creative. They think the environment in different ways. For example, in Locky's eyes, the tree in the side yard is "a big house caught on fire", and the wood blocks are the platform for "rescue"; Maria enjoyed the rocking toy as a skateboard; And Mary wanted to fix the headpiece of the boat setting that is not broken. Here, Mies van der Rohe's famous quote "less is more" is approved again.

Both spatial simplicity and complexity have their reason not to be overlooked. It is not easy to say which would be more important than the other. It all depends on what kind of activity we are looking for. For the childcare service provider, it is definitely not wise to only provide single style solution. A combination or synthesis of both types of spatial quality would be preferable so that it is easier to keep an overall balance of the spatial complexity in the childcare environment. However, by what means to combine or synthesize these two contradictive spatial qualities is such an interesting question that architects and designers could play for a long while.

7.1.5 Spatial novelty

Novelty is attractive to most people. Novelty features something different to our experience, or something new to expand our knowledge base. We like novelty stories, novelty foods, or novelty environments, even though sometimes, it might also indicate the uncertainty and danger.

This surely applies to children. To most children, once a novelty thing is found, they tend to approach it, pay much attention to it, and show great interest to experience it. It is essential for their developmental need to explore new things, and to test out different possibilities. Especially to newcomer children, they may have already experienced some of the similar settings somewhere outside the

childcare centre, such as the slide, the swing, the rocking toy in the park, or the tricycle, the playhouse, the sofa at home. But the centre as a whole is unique and new to the newcomers, with its new spatial design, new feature, new equipment, new toys, and new persons. However, to those who have been attending the centre for a long time, they are already familiar with the environment and know quite well how to use the space as they want. The environment thus contains less novelty to them, which means their needs might not be met.

Spatial novelty level can be raised via adding new items to the environment. When new items are placed into the childcare environment, the novelty level change at once. During my fieldwork period, caregivers once took a new tent house to the centre and placed it in the playground. This novelty created by the little space soon caused a collective event among the children:

“...To me, it is really a very simple and normal tent without any particular or interesting feature. But to the children, it was a wonderful afternoon because of the new toy. They were soon gathered together to the tent, and could not wait to try it out. Three, four, five...The small room was full up with children in a short time. Those who did not get in at the first time had to wait outside. Some children were too excited and started to squeeze their body in, even though there was not enough room left for them. What a chaos! Caregiver did not stop them because everyone was so happy...”

This event shows how children were grouping together at the time of new spatial novelty was found. It is also important to point out that, without organized guiding, the crowd at the novelty place may lead to chaos sometimes. Thus more supervisory attention should be paid at the place.

After gathering together at the novelty place, onlooker events and communication events were observed. Those children who remain outside the new space will not easily choose to leave, as their interest and attention have been strongly attracted. They will only leave after they finally try it out. Before that, they did not stop observing the other children’s activity at the novelty place.

On the other side, the children who have experienced the novelty feature tent to exchange their feeling with others, via verbal or nonverbal communication. They may talk, scream, laugh, or make funny faces and postures. Such a high amount of communication was not observed in other types of gathering event without novelty features, such as the sandpit play, or the slide play.

Novelty could arouse children's spiritual status. But I would also like to mention that novelty would reduce to a lower level once children have experienced it. Thus it is very important to keep the childcare environment refreshing.

7.1.6 Spatial proximity

While proxemics studies the interpersonal distance between individuals, the spatial proximity I would like to talk about here relates to the distance between the individuals and the settings, as well as the impacts on social behaviour.

Every setting occupies a part of space to allow its function to be accessible. When children make use of the space, they may either play inside the room of the setting (e.g. slide slope, sandpit, construction corner) or at the edge of the setting (e.g. the edge of a table, the side slab of the lawn platform, the side board of the boat setting). The children playing fully inside the setting were often observed experiencing some part or even the whole of the inner space. They can be called as "experiencer", and the space area that can be reached by the experiencer can be called as "experiencer space". Those playing at the edge of the setting were observed manipulating toys, tools, crafts, or their body parts over there. They can be called as "manipulator", and the edge space that includes both the objects and the manipulators can be called as "manipulator space".

Experiencers and manipulators both built up direct connections with the setting via their action contacts. But there are also children who do not occupy any part of the setting but indirectly link with it. Some of them are staying around and observing the setting or other children's activity. These children can be called as "onlooker", and the space that onlookers are occupying can be called as "onlooker space". The area outside the onlooker space is occupied by the

children who are moving either to the setting or to other places. They can be called as “migrator”, and the space that migrators are moving in can be called as “migrator space”. The experiencers and manipulators both are the existing users to the setting, while on the other side. The onlookers and migrators are the potential users.

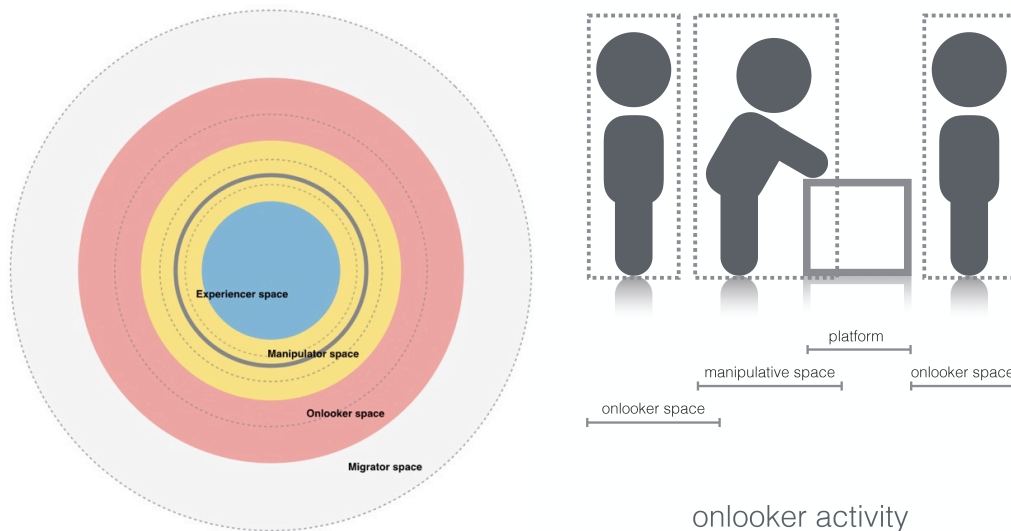


Figure 29: Spatial proximity in onlooker activity

Children’s onlooker behaviour has been studied from different dimensions in early year education, social science and child development disciplines (Parten, 1932, Goodstein, 2013). However, the space that helps onlookers to accomplish their observation activity is often overlooked and not been properly recognised by both designers and caregivers (Olds, 2001, Day and Midbjer, 2007, Feinberg, 2010). Many times I observed children occupying the onlooker space before they made the decision to join others’ play at the setting. Young children, especially those who have not yet well integrated into the social environment in the centre (e.g. new comers, children with social impairment), need extra time in their decision-making. They were observed more likely to stop in the onlooker space area, and spend more time around there.

Carefully designed onlooker space gives children enough buffer area before they enter a stressful social condition thus could potentially help their socialization process. It is very important to maintain a suitable onlooker space between settings. A bad example is that, in the playroom, there was a table particularly used for art and craft activities. The table was put in a limited area between the sleeping area and the toy shelf of the construction corner, and surrounded by nursery furniture on three sides. There was only a little space just enough for chairs, which is used as the manipulator space, and left no onlooker space at all. As a result, the onlooker children were not able to stand behind those manipulator children who were sitting on those chairs. Although there was still one side left open to onlooker children, but the space was also overlapped with the pathway of the playroom. Their spectating activities were observed interrupted now and then by the fast-moving travellers on the pathway.

In contrast, there is a good example in the side yard, the rope ladder area. The rope ladder was tied to a strong branch of a big tree in the side yard. Its one side is the terrace steps and the other side is the lawn platform. Every time when caregiver set the rope ladder ready for play, children were gathered together in the side yard. One child climbed up the ladder, other children stayed around and observed. The different heights of the terrace step and the lawn platform provides children different onlooker spaces. Some of children might sit on the edge of lawn platform. Some of them would rather stands on the terrace steps, or even just stand in the gap between the rope ladder and lawn platform. As a result, every child could have the chance to see what was happening and learn from other's mistakes. This setting was not purposely design and built for onlooker space, but the result seems good.

Spatial proximity is not only a horizontal dimension, but also vertical. In Ball's (1973, p.26) proxemics theory, authority, leadership, social status, all have vertical spatial connotations of interpersonal spacing. The person who has higher vertical position asserts greater power and status to others. This has also been recognised by the caregivers in the case childcare centre. During my fieldwork, they told me several times that it is very important to lower down

their body position to children's level for better interactions with them. This principle is also written in their "Code of Conduct for Students on Placement" (please see Appendix A). In the spatial design of the sand pit pavilion, wooden boards around the edge provides caregivers an alternative caring position rather than sitting in the sand with children. In contrast, the spatial affordance in the construction corner in the playroom is so limited that could not support caregivers' needs. They have no choice but to sit down on the floor. On the other hand, Children who wanted to assert their power over others, were observed occupying the childcare settings with higher level platform elements, for example, Osborn and Gaby jumped on the lawn platform, terrace steps, and wood blocks to assert his territory and jumped off towards other children to show off his strength and power. They also sometimes jumped onto the wooden bed in the playroom while playing battle imaginative play with peers.

7.1.7 Spatial privacy

The importance of privacy as psychological needs has been well understood in our daily social life, and also reflected in the design of built environment (Altman, 1975). We may need privacy spaces to deal with personal issues on many occasions, such as at work, at dinner, or at a cocktail party. Our needs are supported by the design of the environmental settings, such as desk with partitions in the office, or sofa corner in the restaurant, or even a small silent room next to the dining hall.

For many times, I saw children in the case childcare centre seeking for a place to secure their privacy, either because they were emotionally uncomfortable, or they just wanted to be alone for a while. But unfortunately, such place is rarely provided in the centre. Children found their own ways to make use the environment that potentially provides spatial privacy, such as corners, boards, shelters, barriers, or partitions.

Once in a wheel racing game, Osborn got upset about Toby's unfair play. He quitted the game, and rode into the corner between the summer house and the

wall of the entrance pathway slope. But obviously, that is not a good place for Osborn's privacy, as Toby soon found him, approached him, spoke to him, and even tried to pull his trike out of the corner. Osborn struggled for a while. As adult, I understood that Toby intended to comfort Osborn. But "I don't want him talk to me..." Osborn told me during our conversation later in that afternoon.

Another example event took place at the boat setting. Mary was in the boat setting and involved in a tug of war with Locky and Jim about their possession right of a rope. Mary failed to save her rope, and soon after the war she burst out crying. She squared down behind the sideboard of the boat setting, and sank her head into her legs to cry, until a caregiver came over to look after her.

Spatial privacy is not only a personal need for solitary activities but also contributes to children's social interactions. Toby once crawled into the room under the table to hide himself from being found by others. Some children liked to stay in the shelter room under the slide setting and peeped out from the gap to observe other children's activity.

There are also examples of spatial privacy demands in group activities. Children, especially those elder ones, were observed whispering occasionally during their play. They could whisper almost everywhere in the centre whenever they felt necessary. Usually, they whispered into each other's ear, with their hands covering around. Sometimes they chose to walk away from other children to enlarge the distance. Alice and her friend Jane were once seen changing their sitting place all around the playground, as they could not find out an undisrupted spot to focus on their book reading.

The level of spatial privacy needs differs from individuals and activities. It is also very important to point out that, whilst paying enough attention to the spatial privacy need, safety is also an issue that should never be ignored. Especially in childcare centres, along providing spatial privacy to children, environmental design should also well support caregivers' awareness of children's status.

7.1.8 Fast space

In case childcare centre, many children like running and wheel riding. These activities usually need high expenditure of body energy to speed up children's motion in the environment. During my fieldwork I have noticed some areas were relatively more popular among runners and riders, while some places were seldom used for fast speed motion activity. Below is a table showing the locations where different speed types of motion behaviour were observed.

Table 49: Locations of motion behaviour in different speed

Walking	Running	Wheel riding
Entrance pathway slope Central playground Pathway to the side yard Lawn platform Edge slab of the lawn platform Terrace step Wooden block Side yard Cover board of the sandpit Sandpit Deck of annexe building Wooden slope of the summer house Summer house Dead end Pathway	Entrance pathway slope Central playground Pathway to the side yard Lawn platform Terrace step Side yard Deck of annexe building Wooden slope of summer house Dead end Pathway	Entrance pathway slope Central playground Pathway to the side yard Side yard Wooden slope of summer house
Entrance room Aisle in the playroom Construction area Sofa area Role play corner Water/sand play area Art and craft area Play kitchen area Sleep area	Aisle in the playroom Construction area Sofa area	N/A

From the table, we can easily tell that fast motion activity covers fewer locations than slow motion. Despite those platforms where wheel toys are not accessible, the locations for fast motion do have some similar features, and can be called as “fast space”.

Fast space prefers longer length along the direction of children’s motion. This is not difficult to understand. For an object safely moving in a specific space, if the object’s speed is higher, the requirement of the space length turns to be longer, as it needs longer distance to accelerate and reduce its speed. For instance, when driving on the motorways, the distance between two cars should keep longer than in the city.

Fast space prefers flat and smooth surface without little barriers. Uneven surface and unexpected barriers both can reduce speed, and sometimes even make children’s movement stopped. No one would like this to happen when they enjoy their smooth movement.

Fast space prefers slope. Comparing to the flat surface of the central playground, children were observed gathering to the entrance pathway slope area to start their riding or race games. This has been explained in Chapter VI as a result of taking the advantage of gravity force. There is another type of fast speed motion activity, which is not mentioned in the table, – sliding. The only available space for sliding in the centre is the slide slope. Sliding down is no doubt a fast motion caused by gravity. It requires smooth surface with sufficient slope inclination.

Fast space prefers safer area. Children were observed walking along the edge slab of the lawn platform for many times. But when they were running, the edge slab was not their first choice. Children tended to run in the middle of the platform because they knew they would not fall off there. Same phenomenon was found at the wood blocks. Children preferred walking on the wood blocks rather than running on them. Fast speed motion needs good sense of body balance and good coordination skill of body parts. It turns out to be dangerous

when moving on the place where extra focus needed. Such as platform edges, wood blocks, terrace steps, and beams are all hazardous area to young children.

Racing games undergo in such fast spaces that could afford high speed movement. In the case childcare centre, racing games often took place at the entrance pathway slope rather than in the central playground. As explained, the entrance pathway slope has a flat rigid concrete surface and a slightly sloped inclination. It also has a clear starting point – the entrance gate, and an open ending point. The clear starting point reduces the time of setting up a race game. The open ending point offers a changeable option according to the rules of each game. It is also a buffer area for children to reduce their speed after reaching the ending point.

It is necessary to say that, when children are moving fast in fast spaces, extra attention should be put on them, even if they are not performing any dangerous behaviour or in dangerous areas. Rebbly once hit a little baby's car against the half wall on the deck while helping it moving around in the playground. The child was badly hit on the car body and soon burst out crying. Rebbly was shocked by the incident as well. She watched caregiver comforting the baby for a while and then ran away.

7.1.9 Spatial duplication

Some spaces contain similar settings, for example, a classroom with lots of similar desks and chairs, or a playground with a number of same wheel riding cars, or a slide with several similar slide slopes. The purpose of duplication is to provide similar spatial features and conditions to the individuals who are using these parts at the same time, for example extra chairs, extra stairs or extra line marks.

Spatial duplication is an interesting feature that can offer opportunities for children's mimicking events and competitions such as racing as well as other social games. Mimicking behaviour could happen after one child sees other's activity. For example, after Jim saw Rebbly slides down the slope on her stomach,

he slides down with the same posture. If there is another slide slope provided beside the one Rebbly is playing (spatial duplication), we can imagine that Jim now has the chance to slide down on his stomach together with Rebbly. Mimicking behaviour happens at the same time. With the extra slide slope, Jim and Rebbly can now have a slide race which previously impossible with only one slope provided.

Other than providing same elements aside, expanding the space area sometimes can also be considered as providing duplicated spatial feature because of the extra room space. However, it is important to mention that space expansion could potentially change children's perception of the space at the same time.

With duplicated spatial elements, each child user has same environmental condition. It is more difficult to take advantage from the environment. In that sense, their social statuses become fairer. This is quite important in parallel playing as well as some types of social games such as musical chair play.

7.2 Spatial affordance for social interaction

In this section, I am going to talk mainly about findings regarding affordance theory and its taxonomy.

7.2.1 The meaning of affordance

In previous research of affordance, researchers are divided into two groups. One group focused on the observation evidence, while the other mainly focused on children's perception reflection. Affordance, according to Gibson's definition, would depend on both parties' results. Questionnaire or picture survey data does provide an insight on how children may perceive the environmental affordance. However, life situation is complex. Many variables may have impacts on children's choice while actually using the environment. On the other hand, as an unavoidable way to access to children's perception, the validity of questionnaire

or picture survey data is also restricted by children especially young children's experience, knowledge and communication skill.

Spaces can be defined by the human activities, which is also the direct evidence of observed affordance. Sometimes, children do not even know exactly which place they prefer for specific activities. Locky imagined the tree as a house caught on fire. Osborn aggressively asserted his territory control over the whole side yard. These events can only be understood by reading the environmental context. And the meaning of the environment to children can thus be generated for their own use under specific situations.

Children are still on the way of learning from surroundings, through their personal, social and cultural experience. They will finally build up their understanding of the environment and form a more specific spatial affordance perspective for their daily life.

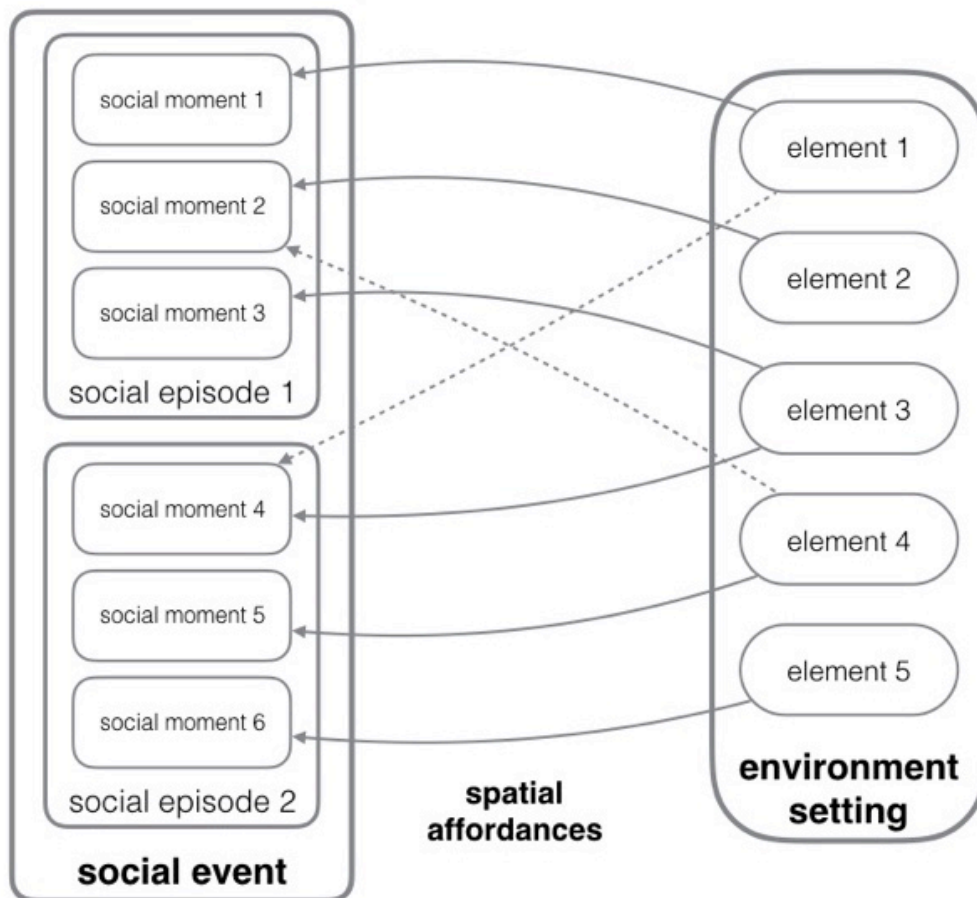


Figure 30: Affordances support social interaction event

7.2.2 Hierarchy of spatial affordances

As social interaction builds upon various individual's non-social actions, correspondingly, the spatial affordance thus should first support those non-social actions, then as a whole supports social interaction.

The first level of the spatial affordance is to support individual's existence in the space, including motion and non-motion status actions such as standing, sitting, squatting, lying down, etc. Environmental elements such as surface, ground, platform, or slope provide affordances for these actions. These elements are so-called "supporters".

The second level is to further support manipulative actions such as holding, patting, pressing, tickling, etc. Objects and those small environmental elements such as holders, poles, buttons provide affordances for manipulative actions.

The third level is combining specific environmental elements to support a complete specific behaviour, for example, basketball play needs a combination of hard floor, a basket frame and a wall or a pole to hold the frame; slide play needs a high raised platform, a path to the platform (stairs or climbing frame) and a sliding slope; construction play, needs a flat surface area with various constructive objects; role play, needs a storage place to hold the costumes and a stage to perform the show; etc. The combination principles vary to different activities.

The fourth level is to expand the play area to allow more individuals to participate in specific activities, such as larger basketball play area, wider sliding slope, bigger construction corner, or larger stage, etc. Essentially, bigger spatial size can accomplish the needs.

The fifth level is to add in symbolic features to create spatial rules for using the space in specific social interaction events. For example, adding in different line marks on the floor to turn a basketball play area into specific basketball court; adding in barriers, railings, and flags to turn a sliding slope into a skating court;

adding in audience seats to turn a role play corner into a small theatre, etc. This level is the highest one for a specific social interaction event.

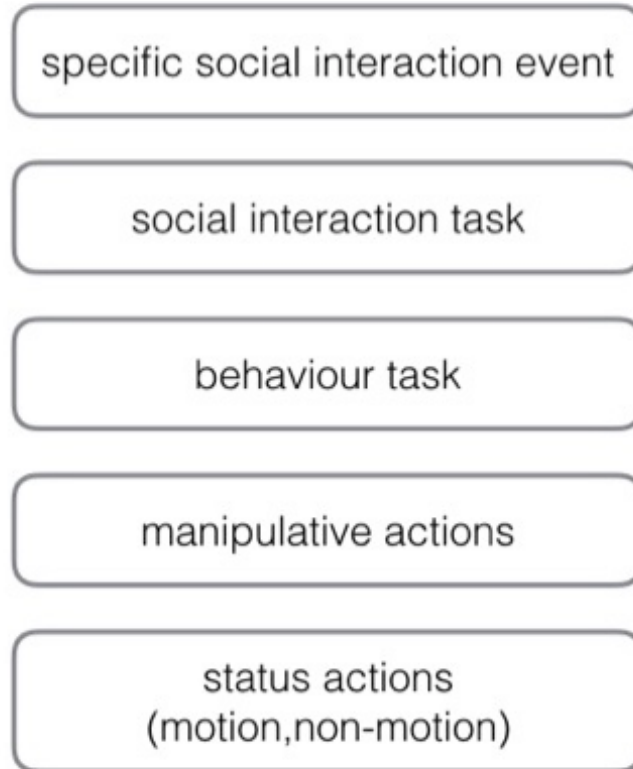


Figure 31: Hierarchy of spatial affordance support

7.2.3 Taxonomy of affordances in childcare environment

Below is the taxonomy of spatial affordance in the childcare environment developed based on previous research studies separately conducted by Heft (text in black colour), Kytta (text in red colour), McLaren (text in green colour), and on the new findings from the fieldwork study (text in blue colour). New categories of the environmental features are added into the taxonomy framework in order to cover more detailed situations. A brand new column of the environmental affordances for social behaviour is also added to the right of the taxonomy table, providing direct links to the specific environment features.

Table 50: Taxonomy of spatial affordances in childcare environment

Environment features	Affordances for solitary behaviour	Affordances for social behaviour
Rigid, flat, surface (e.g. concrete floor, wooden floor, marble floor, ice floor)	<p>Affords sitting, standing, kneeling, lying down</p> <p>Affords crawling, rolling</p> <p>Affords walking</p> <p>Affords running</p> <p>Affords skipping, jumping, hopping, dancing</p> <p>Affords squatting</p> <p>Affords creeping</p> <p>Affords ball playing</p> <p>Affords painting</p> <p>Affords cycling, skating, skateboarding, skiing</p>	<p>Affords mimicking, triggering others</p> <p>Affords role-playing</p> <p>Affords playing rule games</p> <p>Affords playing war</p> <p>Affords following</p> <p>Affords co-presenting</p> <p>Affords spectating</p> <p>Affords encountering, parallel playing</p> <p>Affords accompanying, sharing</p> <p>Affords chasing</p> <p>Affords racing (running, cycling, skating, skateboarding)</p> <p>Affords fighting</p>
Non-rigid, flat surface (e.g. earth floor, lawn, carpet)	<p>Affords sitting, standing, kneeling, squatting, lying down</p> <p>Affords creeping, crawling, rolling</p> <p>Affords walking</p> <p>Affords running</p> <p>Affords skipping, jumping, hopping, dancing</p> <p>Affords painting</p>	<p>Affords co-presenting</p> <p>Affords spectating</p> <p>Affords encountering, parallel playing</p> <p>Affords accompanying, sharing, mimicking</p> <p>Affords chasing</p> <p>Affords racing (running, cycling)</p> <p>Affords fighting</p>
Soft surface (e.g. net, mesh, air mattress, sofa, sand, mud, mire, snow)	<p>Affords sitting, standing, kneeling, squatting, lying down</p> <p>Affords creeping, crawling, rolling</p> <p>Affords walking</p> <p>Affords bouncing, hopping</p> <p>Affords painting</p>	<p>Affords co-presenting</p> <p>Affords spectating</p> <p>Affords encountering, parallel playing</p> <p>Affords accompanying, sharing, mimicking</p> <p>Affords fighting</p>
Smooth slope surface (e.g. slide slope, ice slope)	<p>Affords coasting down</p> <p>Affords skateboarding</p> <p>Affords creeping, crawling, rolling</p> <p>Affords climbing</p> <p>Affords sliding</p>	<p>Affords co-presenting</p> <p>Affords spectating</p> <p>Affords encountering, parallel playing</p> <p>Affords accompanying, sharing, mimicking</p>

	<p>Affords ball playing</p> <p>Affords painting</p> <p>Affords rolling objects down</p>	<p>Affords chasing</p> <p>Affords racing (sliding, <i>skating</i>, <i>skateboarding</i>)</p> <p>Affords fighting</p>
<p>Rough slope surface (e.g. earth slope, concrete slope, wood slope)</p>	<p>Affords sitting, standing, kneeling, squatting, lying down</p> <p>Affords creeping, crawling, rolling</p> <p>Affords walking</p> <p>Affords running</p> <p>Affords skipping, jumping, hopping, dancing</p> <p>Affords ball playing</p> <p>Affords painting</p>	<p>Affords co-presenting</p> <p>Affords spectating</p> <p>Affords encountering, parallel playing</p> <p>Affords accompanying, sharing, mimicking</p> <p>Affords chasing</p> <p>Affords racing (running,)</p> <p>Affords fighting</p>
<p>Raised platform surface (e.g. table, bed, chair, bench, lawn platform, terrace step)</p>	<p>Affords sitting, standing, kneeling, squatting, lying down</p> <p>Affords creeping, crawling</p> <p>Affords walking</p> <p>Affords running</p> <p>Affords jumping up/down, hopping, dancing</p> <p>Affords climbing up/down</p> <p>Affords manipulative playing</p> <p>Affords painting</p>	<p>Affords co-presenting</p> <p>Affords spectating</p> <p>Affords encountering, parallel playing</p> <p>Affords accompanying, sharing, mimicking</p> <p>Affords chasing</p> <p>Affords racing (running,)</p> <p>Affords fighting</p> <p>Affords hiding</p> <p>Affords peeking</p> <p>Affords sharing</p>
<p>Marked boundary (e.g. lines, material boundary)</p>	<p>Affords sitting, standing, kneeling, squatting, lying down</p> <p>Affords creeping, crawling, rolling</p> <p>Affords walking</p> <p>Affords running</p> <p>Affords skipping, jumping, hopping, dancing</p> <p>Affords cycling, <i>skating</i>, <i>skateboarding</i></p>	<p>Affords co-presenting</p> <p>Affords spectating</p> <p>Affords encountering, parallel playing</p> <p>Affords accompanying, sharing, mimicking</p> <p>Affords chasing</p> <p>Affords racing (running, cycling, <i>skating</i>, <i>skateboarding</i>)</p> <p>Affords conflict, territory controlling</p> <p>Affords imagination games</p>
<p>Rigid, non-movable, solid boundary (e.g. wall, heavy furniture)</p>	<p>Affords leaning</p> <p>Affords stabilizing</p> <p>Affords climbing up/down</p>	<p>Affords co-presenting</p> <p>Affords spectating</p> <p>Affords sharing</p>

		Affords co-working
Movable boundary (e.g. door, curtain, light furniture)	Affords manipulating Affords pushing/pulling	Affords co-presenting Affords spectating Affords hiding Affords peeking Affords sharing
Transparent boundary (e.g. glass wall, fence)	Affords leaning Affords stabilizing	Affords co-presenting Affords spectating Affords communicating (verbal, non-verbal)
Climbable feature	Affords exercise, mastery Affords looking out from Affords climbing	Affords escaping Affords teaching Affords competition
Aperture	Affords moving through (creeping, crawling, walking, running) Affords locomoting from one place to another Affords looking and listening into adjacent place	Affords peeking Affords spectating
Shelter	Affords creeping, crawling, rolling in Affords walking in Affords microclimate Affords prospect/refuge Affords privacy Affords being in peace and quiet	Affords co-presenting Affords privacy Affords sharing Affords conflict, territory control Affords hiding
Detached objects (blocks, toys, balls, cushions)	Affords manipulating Affords throwing Affords digging Affords building structure Affords jumping on Affords kneeling Affords stabilizing	Affords sharing Affords conflict
Molddable material (dirt, sand, mud, dough)	Affords construction of objects Affords pouring Affords modification of its surface features Affords moulding something Affords kneeling	Affords sharing Affords conflict

Water	<p>Affords splashing</p> <p>Affords pouring</p> <p>Affords manipulating</p> <p>Affords swimming, diving, boating, fishing</p> <p>Affords mixing with other materials to modify their consistency</p> <p>Affords playing with water</p>	<p>Affords co-presenting</p> <p>Affords spectating, peeking</p> <p>Affords sharing</p> <p>Afford co-working</p>
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It is important to point out that, the presented taxonomy could not cover everything in every event due to the limited time period and sample size of this study. More contents could be expected to add into the taxonomy following the further study in the recent future.

7.3 Suggestion for childcare environment design

7.3.1 Design for social interaction

As architects, we support users' social interaction by changing the outcome of the environment via our design. It is very important to be clear about the environment's role in the interaction scene.

There are basically two ways that environment supports users' social interaction. One is that the environment is like the vessel, and holds the social interaction undergoing, for example, the sofa corner in a cafe. The other is that the environment directly involves in users' interaction process, such as the seesaw in the playground.

The efficiency of the environment lies on the affordances of the elements that support every social moment. Designers should be very clear of what social interaction moments are needed to accomplish the social interaction event. If a specific social interaction type is the target of the design, then the designer should collect enough information so that a general impression of the social

interaction can be produced, and if necessary, a detailed focused ethnographic study could be a choice.

7.3.2 Design for the spatial scarcity

As Jeremy Till pointed out that the scarcity in design is possible to be constructed, "*(design) agency has the opportunity to intervene in multiple ways and across the full temporal life of any project.*" (Till, 2014) The questions for practitioners is about what, why and how to design a healthy spatial scarcity.

It is really a contradictory question for practitioners to think whether a childcare environment should provide scarcity or sufficiency to children. It is important to point out that, scarcity does not simply mean less amount or fewer opportunities. Carefully designed spatial scarcity should educate children of the social rules following the issue caused by scarcity. Giving children the opportunity to involve in various social situations, so that they could learn necessary knowledge and skills to face complex social life in future. Indeed, scarcity can be easily generated via reducing the number of opportunities in the environment, but what it brings children is more important to designers. Musical chair play is a good example of applying spatial scarcity principle in daily childcare life. However, on the other hand, spatial scarcity should not be found all over the childcare centre. It should be well controlled and well distributed.

Another issue is that when a design project is to bring scarcity feature to the users, it would be best to think how to provide support for others that are attracted but not able to use it at a once.

For caregivers, it is very important to educate children about the rules upon spatial scarcity. For example, following Osborn's territory event, all children were told that space also should be shared, but if one child occupied the space first, and there is no space left, other children should respect the child's right and wait until he finishes playing.

7.3.3 Design for the spatial difficulty

The spatial difficulty is very important in the childcare environment. It plays a more important role than we may think. It provides support for children in many different ways. Spatial difficulty can help children build up the understanding of their body limits. Children enjoy challenges, as surmounting limits is the key mark of children's developmental milestones. In an easy-going space, obviously, children won't have the chance to test out their physical possibility.

The spatial difficulty is the feature that requires extra effort. It can be set up in the environment by adding more barriers to the space, increasing the gap between steps, raising the height of the platforms, putting more weight on the movable objects, or reducing the width of the doorway, etc. It relates greatly to children's body size and their motor skill development.

The spatial difficulty does not mean danger. We should not be scared by what it is called. However, the difficulty level should be carefully considered, as it may hurt children's confidence on the other hand. Extra attention should be paid when designing the environment for the children with special needs.

7.3.4 Design for the spatial novelty

The spatial novelty brings surprise and fun to children, by providing new and different features to the environment. Children are easily get excited by the novelty things they find. Thus, it might suggest to childcare practitioners to have regular change programme to the childcare environment for better service.

Adding new items to the centre is an easy way to prompt the spatial novelty, for example, the new tent house in the playground mentioned earlier. Change the normal shape or colour into a new look is another way to raise the novelty level. For example, the commonly seen flat slide slope to a wave slide slope.

Spatial novelty could also be created via changes to the configuration of the environmental elements, such as furniture or setting arrangement. But the novelty level depends on the difference before and after.

Providing manipulable features to the setting or environment elements may potentially keep the spatial novelty high for a long time. Every time children change these responsive elements creates a different result to the environment, which keeps refreshing the spatial novelty.

Finally, design something that hides in the environment is a very impressive way to create spatial novelty. For example, architect C told me about a small mouse hole he specially designed at the bottom level of the wall for Lanterns Children's Centre. He said, "Children love looking through it... they find a new world..."

7.3.5 Design for onlooker space

The needs of onlookers have been hugely ignored in the environmental design. Well-designed onlooker space provides a buffer space from migration space to manipulative space. For most manipulative platforms, onlooker space can be easily created by increasing the space between the manipulating platform and the surrounding settings. However, in the limited space provided in most childcare centres, expansion is not always applicable. Overlapping of the onlooker space of different settings should be avoided if possible.

Lower down the level of manipulative space is another choice to provide better spectating views. This is usually seen in the design of theatre or cinema.

Transparency material such as glass can also provide onlooker behaviour but can stop onlooker from being manipulator or experiencer.

7.3.6 Design for fast space

Speed activities such as racing, are popular and so commonly seen in the childcare centres. However, the spaces in which these activities took place are

not always adequate in qualities that related to speed. Although children may be competent enough to find out the most appropriate space to perform their speed actions (as mentioned in Chapter VI, Section 6.7.3 and 6.8.2), it is our responsibility, as designers and childcare providers, to make sure their spatial needs are meet.

As discussed previously (Please see in Section 7.1.8), fast space needs longer distance, as corresponding to the fast motion speed in racing events. The faster the speed is, the longer the racing space should be.

Clear marks are preferable if the racing space aims to support the well-organised racing games. Without clear marks, children would probably generate their own racing rules according to the available environmental features.

Children in fast motion need extra consideration in safety issues. Racing space should provide an open or soft ending rather than a rigid ending boundary for safety purpose.

The sloping ground provides the function to accelerate children's speed, hence can be a good feature for racing. However, extra care should be paid to the slopping racing space, as this could also raise the risk of injuries. The slightly sloping ground would be more appropriate.

Barriers can be added in the racing space to prompt the spatial difficulty. However, it depends on the styles of the racing event, whether focusing only on the speed or on integrated capabilities.

7.3.7 Design for privacy needs

Privacy is related to the openness of a space (Please see Chapter V, Section 5.1.3, for the explanation of openness). Different openness can provide different level of the spatial privacy. As the privacy needs are usually the drives in various situations and may relate to different personalities, it is important for childcare centre to provide different space settings with various levels of spatial privacy,

so that to better support children's different privacy needs. These privacy corners or settings should be located at different places in the centre to maximise the location coverage.

The solid walls or partitions, and the obscure furniture with tall height can provide full privacy to children. Translucent walls or partitions, fence and handrails, shelters, furniture with the height lower than eye level, curtains or tablecloth, low-level windows, can all provide partial privacy. Transparent walls or partitions, open areas, French windows, or platforms provide no privacy for children.

Sound isolation can also be a good method to promote spatial privacy but it should be carefully used, as it may prevent the emergency situation in the private space to be heard by caregivers, and cause serious consequences to children's security.

7.4 Summary of the chapter

This chapter concluded the major research findings from the ethnographic analysis of the fieldwork data. The whole chapter consists of three parts. In the first part, I demonstrated the important spatial features of the built environment, which support children to implement their interaction with others in the childcare environment context. Categorized in nine different themes, the relationship between spatial features and children's social behaviour were discussed thoroughly. In the second part, I focused on the findings in spatial affordance, with an emphasis on the spatial affordances for children's social interaction. Finally, in the last part of the chapter, I have linked these findings with both design and childcare practice and provided with suggestions that would improve the spatial qualities of the built environment in childcare centres, in order to meet children's social interaction needs.

The study is now coming to a point that major research questions have all been addressed. In the next chapter I am going to provide an overview of the whole study, and to further discuss the issues emerged from the research and future research proposals following this study.

Chapter VIII: Conclusions and discussion

This chapter firstly goes through the whole research process, and then it summaries all the contributions to knowledge. Following the discussion of the limitations in this research, future studies topics are outlined.

8.1 Overview of the research process

The study was initiated to explore how can spatial design provide supports to the preschool children's social interaction in childcare centre environment by the following four questions:

- What kinds of social interaction do children have in childcare centre?
- What kinds of spatial qualities or features are related to children's social interaction?
- What meaning does the environment generate while children are acting in the environmental context?
- What affordances can be found in childcare centre to support children's social interactions?

Following a detailed review of the research literature in both social interaction and affordance theories, research gaps were found in:

- 1) A general picture of the social interaction types in the childcare environment is missing.
- 2) Research study of the environmental affordances for different social interactions in the childcare environment is also missing.

A further review survey was carried out in the grey literature of policies, design regulations and guidelines. It showed from the survey that, social interaction issues in the childcare environment receive more attention nowadays, but

- 3) Guidelines in childcare environment design, which particularly focus on children's different social interactions, are not found.

In developing the methodology to seek the answer of "what" and "how" spatial affordances support children's social interaction, a multi-method focused ethnographic approach was introduced and further developed in details to collect observational data about children's social interaction directly from the fieldwork. The initial idea is to cover the missing literature. Focused ethnographic methodology turns out to be most appropriate and realistic.

A local childcare centre in Sheffield was selected based on the replies received from contacts with a number of childcare service providers. The focused ethnographic fieldwork was carried out during July and August of 2012, including both the familiarization period and the data collection period. The fieldwork data includes:

- Video footages of children's activities, following participant children's route and specific setting observation
- Fieldwork notes on observed incidents and comments that were not recorded in the camera
- Fieldwork diaries of daily research activity summary and self-reflection
- Feedback interviews with both children and caregivers
- Photos of the environmental context taken onsite

The analysis of the data was divided into two parts. One is to deconstruct the childcare environment based on setting taxonomy borrowed from caregivers. The other is the transcription and interpretation of children's social interaction video footages.

Thematic research findings were emerged from the interpretative analysis of ethnographic fieldwork data and outlined the suggestion for childcare environment design.

8.2 Contributions to knowledge

8.2.1 Social interaction in the case childcare centre

The study firstly fills the research gap by providing a general picture of preschool children's social interaction types in the childcare centre, as a response to the research question of "what kinds of social interaction do children have in childcare centre".

Throughout the ethnographic analysis process, deep understanding of children's social interaction in childcare centre has emerged, including social interactions' structure that based on the individual's actions. Three different social interaction levels (social moment, social episode, and social event), the developmental phase of children's social interactions in the environment from low participation level to high participation level, children's proxemics scale, and different behaviour pattern of the indoor and outdoor environment, etc.

By conducting this research, the comprehensive social interaction taxonomy in the case childcare centre has been drawn out based the ethnographic observation analysis, which could apply in future studies.

8.2.2 Built environment features related to social interaction

To the research question "What kinds of spatial qualities or features are related to children's social interaction", via interpreting the relationship between built environment and social interaction in depth, this study has provided the findings as below:

- The physical environment can be defined by human activities.

- The space can also be seen as the resource for play.
- The spatial scarcity can cause conflict, argument, sharing and queuing behaviour.
- The spatial difficulty can encourage help, competition, and territorial behaviour.
- The spatial complexity can support co-presenting and parallel event.
- The spatial novelty can generate gathering event, and raise children's communication level.
- The spatial proximity has important meaning to the relationship between individual and the setting and should look more carefully to the onlooker space.
- The spatial privacy should be well established in the childcare centre to provide a place out from social contacts.
- The fast space can be used for high-speed activities.
- Spatial duplication can encourage mimicking and competition events.

These findings, together with the ethnographic interpretations in social interaction analysis, provide the answers to the research question: "what meaning does the environment generate while children are acting in the environmental context".

8.2.3 Affordances for social interaction in childcare environment

Following the interpretation of the relationship between social interaction and the built environment, a new taxonomy of spatial/environmental affordances has been generated, as an answer to the research question, "what affordances can be found in childcare centre to support children's social interactions".

Standing on previous research works, this study has provided new entries of the environmental feature that support children's individual actions and more importantly, social interactions. Moreover, this study provides a more comprehensive and systematic approach to the study of affordance theory, considering "social" in relation to affordance, where there has rarely been a

distinction made between the possible/observed individual and social behaviours.

8.2.4 Suggestions to design practices

In responding to the broad research question of “how to support preschool children’s social interaction in childcare centre environment by means of spatial design”, a series of design suggestions have been made to fill in the gap of the missing specific design guidelines to support children’s social interaction in childcare environment:

- Design suggestions for social interaction;
- Design suggestions for the spatial scarcity;
- Design suggestions for the spatial difficulty;
- Design suggestions for the spatial novelty;
- Design suggestions for onlooker space;
- Design suggestions for fast space;
- Design suggestion for privacy needs.

8.3 Discussion

8.3.1 The importance of focused ethnographic method to the study

While many research studies carried out a method of scanning the childcare settings one after another, to collect analytical data to investigate the relationship between social interaction and environment, I would argue here that, although it may be a very efficient way, the data collected by single scan is limited in achieving either a full picture of the context of the social interaction or a deeper understanding of the detailed process of the social interaction.

Scanning observation data may tell lies

The reliability of the data is a key question to the research.

In the case nursery, quite a number of social events were observed while children were not presented in the same space. They interacted with each other in a relatively long distance (for example, Locky and his friends played around the boat; Maria and her friends co-worked along the water-pipe wall; Maria and her friends poured grass all around the playground).

If we quickly scan the social scene moment here, we may just get a false image that these children were playing on their own with the equipment. But the truth is that this is a social moment, and children were enjoyed with each other with a relatively long distance.

Full picture of the context

In contrast, employing the ethnographic approach, we can tell what children were doing before and after the social interaction moment, and put the necessary patches back into the scene. This method can provide a full picture of the social interaction event.

Deep understanding in details

Comparing the data collected longitudinal or cross-sectional studies. The ethnographic approach can review the data more deeply in details. For example, in Osborn's event, without focused ethnographic analysis, we cannot see how Osborn perceived and used the environment to accomplish his threaten and aggressive actions towards the invaders.

8.3.2 Limitations of the research

Quality of case childcare centre

On the OFSTED inspection report taken in 2014, the case childcare centre reached the quality provision grade 2, which means it provides a good and effective service to the children in general. According to the standard, the case centre can be considered as a typical childcare environment in the UK. My study undertaken in the case centre shows the observed social interaction phenomenon, reflections and findings particularly related to this case environment. However, there are still many other childcare centres that provide outstanding or poor services. The environment in those centres may also vary. Future studies can be suggested for a comparison research purpose.

Participants

The majority of participant children in the case centre come from British ethnic background. Only a small amount of them are from Asia or the Middle East. Culture is one of the main influences in ethnographic research. The results and findings of this study may be limited in reflecting cross-culture comparisons.

More specifically, the ethnographic study is sensitive to different cases. Employing the focused ethnographic methodology, the fieldwork data can only be validated with the same group of children at their age when taking the research.

Data coverage

The fieldwork study took place during the summer time of the year. Children's activities in the environment during this time may differ from other seasons. The findings in this research are limited to the specific time. Weather conditions such as snowy and windy are not covered. Meanwhile, as summer is the holiday time, the number of participants in the childcare centre was not as high as in the term time. The density of participants may also have an impact on children's performance in the case childcare centre.

Moreover, it is important to mention that the video footage data gathered from the fieldwork could not cover every moment and everywhere in the centre.

Although children's behaviours were at the same time recorded by other means, for example, the fieldwork notes, sketches, and research diaries, some social interaction events may still not be captured in the data.

8.4 Suggestion for follow-up research topics

- **Children's awareness of spatial affordance for social interaction**

The observation provides an observation evidence of how children were actually making use the environment. However, the answer to the question why they choose to use the space in that way remains a mystery and is a very interesting topic to be studied in future.

- **Social interaction level comparison across places with different spatial feature**

With the understanding of social interaction level, it is now possible to suggest quantitative research proposals, to seek statistical evidence on the potential relationship between space features and social interaction level.

- **Spatial affordance for social interaction in newly designed childcare environment**

What kinds of spatial affordance are provided in newly designed childcare environment? How do architects accomplish their goals? Do children behave differently in a newly finished childcare centre compared to a typical victoria style childcare centre?

- **Children's cultural differences in using childcare settings for their social interaction**

At the very young age, do children behave differently according to their cultral background? This is an interesting topic to seek possible variables following the study of children's social interaction in the childcare centre.

- **Spatial affordance to support social interaction of children with special needs**

Following the study of sound children's social interaction in the childcare environment, I am quite interested in exploring how these spatial features could better support the social interaction of the people with special needs, for example, the autism children, the dementia people, or the people with physical disabilities.

8.5 Closing comment

In this study, I tried to look into a group of preschool children's daily social interactions in the particular case of childcare centre environment, in a way that ethnographers would do in a village they visited on another continent or an uncharted island. Indeed, the whole journey was much like an adventure on an unknown island, and even worse, it was covered with thick fog. Finding a way in the fog is not an easy task. As a newcomer to the country, when doing research in the case childcare centre, I had to deal with many unfamiliar circumstances that related to legal requirements, culture, customs, ethos, or social norms. However, I was lucky enough to have been accompanied by so many supportive professionals, lovely children and their parents, and inspiring academic peers. I am also very grateful to have learnt a lot from every individual along my journey, which not only contributed to the research project but also opened my mind and lit up my way in the thick fog. I may now be standing at some point, but it is also fair to say my study only brushed across the surface. Neither the picture of the island is fully completed, nor the way in the thick fog is fully cleared. There is still much to learn about the island.

Each social interaction event is a unique story that is embedded in a specific environmental context. Vice versa, each environment context generates its unique story with specific people interacting inside. There was once a time that modernism architects attempted to generalise standard spatial features in order to homogenise people's daily life and to achieve their utopianism design

solutions. However, it has later been overturned and proved to be not only boring but also unnecessary by post-modernism. From an ethnographer's perspective, homogenisation could even be impossible when it comes to individual level, as everyone is different and could generate different meanings of the environment while experiencing it. The environment can be the same, but the stories happen there are far different from case to case. Even though modernism movement has its roots in the economic principles and thus will probably still dominate the drives of future environmental development, it is always worth to read carefully about the actual stories that happen in the environment we design. By this way, we are no longer the isolated designers or arrogant architects, but more like the listeners who are going to spot the neglect issues in the society, respect users' underestimated needs, and potentially bring a better environment for our future generation.

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Appendix A: Fieldwork related documentation

A.1 Ethics Approval confirmation:



Mr. Junjie Huang
School of Architecture
University of Sheffield
The Arts Tower
Western Bank
Sheffield
S10 2TN

Monday, 16 July 2012

Stephen Walker

School of Architecture
The Arts Tower
Western Bank
Sheffield
S10 2TN

Telephone: +44 (0) 114 2220345

Fax: +44 (0) 114 279826

Email: s.j.walker@sheffield.ac.uk

Dear Junjie

PROJECT TITLE: On-Site Field Works Of Young Children's Social Interaction In Childcare Environment

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 16.07.12 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following document that you submitted for ethics review:

- University research ethics application form (26.06.12)
- Onsite Fieldwork Information Sheets and Consent Forms

We would suggest that you discuss with your supervisors the possible implications of carrying out the planned fieldwork in situations where significant numbers of children/carers withhold their consent, as this might distort the exercises you have planned.

If during the course of the project you need to deviate significantly from the above-approved document please inform me since written approval will be required. Please also inform me should you decide to terminate the project prematurely.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Stephen Walker'.

Stephen Walker
Ethics Administrator

A.2 Information sheet and consent form for childcare centre



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Research Project Information Sheet for Childcare Centre

Research Project Title:
Behaviour Recording of Young Children's Social Interaction in Childcare Environment
Invitation paragraph:
Your childcare centre is invited to take part in this research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.
What is the project's purpose?
This project is part of a PhD on-site study to investigate young children's behaviour and their thinking, and to explore the design of childcare environment. The major purpose of this project is to collect research data of participant children's social behaviour in their daily life in the childcare centre via scientific observation using digital video recording technology.
Why have I been chosen?
Via reviewing the OFSTED (Office for Standards in Education, Children's Services and Skills) report, your childcare centre has been chosen as a research case. The children aged between 3-5 years old in this centre are considered as potential participants.
Does our centre have to take part?
You can decide whether or not your childcare centre to take part in this project. If you do decide to take part you will be given this information sheet to keep, and asked to sign a consent form. You have the right to Withdraw At Any Time without any reason.
What will happen to participants if they take part?
<ul style="list-style-type: none"> ♦ The research will be undertaken by CRB (Criminal Records Bureau) checked researcher inside this childcare centre and during work time only. ♦ Prior to the project, the researcher will be working as a volunteer in the Lodge in order to become familiar and establish a stable and trusting relationship with all the children. ♦ Researcher will use a small digital video recorder to take recording data of participant children's behaviour in the childcare centre, either by fixing it at a specific place or following participant children's activity routes. Researcher will carry out a pilot study first to let them get familiar with the video recorder and ignore it as much as possible during the data collecting period. Researcher will also keep a reasonable distance from participant children while collecting the data so that it will not disturb any of their activities. ♦ After recording, researcher will invite participant children to view their video recordings, and make records of any responds they may produce to the video recordings.
What are the possible disadvantages and risks of taking part?
This social behaviour recording project needs to be set into nursery's daily work. It could potentially disturb some of nursery's regular routine and influent some caregiver staffs' work. To minimize the influence, researcher should discuss the project time schedule with nursery manager and participant caregivers before carrying out any actions.



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What are the possible benefits of taking part?
This research project will give a general understanding how participant children are interacting with others in the childcare environment, and give possibility for researcher to look into environmental impacts on children's social behaviour. It is also hoped that the whole PhD research can contribute to the knowledge of young children's social activity in childcare centres as well as the on-going development of appropriate childcare environment design.
What type of information will be sought from participants and why is the collection of this information relevant for achieving the research project's objectives?
The major data collected in this research will be several recording sections of participant children's continuing behaviour in the childcare centre and their verbal or non-verbal recordings to the video recordings. All participants will only need to behave as usual. The researcher will try not to disturb any of the activities that they enjoy. Each section will last no longer than one hour.
Will the research data collected from participants be kept confidential?
<ul style="list-style-type: none"> • All the collected research data will mainly be used for transcription and analysis. • Participants' names will not be shown in any of the transcriptions, replaced by designed ID numbers. None of them will be identifiable from any reports. • All the data will be kept securely by the researcher and used within this project only. Without participants' written permission, no other use will be made to the data, and no one outside the project will be allowed to access. • Some of the recording data will potentially be selected for academic presentations. In such occasion, participants' faces in the videos or pictures will be technically blurred to make sure they are not identifiable, unless they have agreed not to do so. • All of the original recordings will be destroyed after the research project finishes.
What will happen to the results of the research project?
The result of this research project will only be presented in academic fields, such as PhD thesis, conferences, or journal papers.
Who has ethically reviewed the project?
This project has been ethically approved via the University of Sheffield - School of Architecture's ethics review procedure. The University of Sheffield's Research Ethics Committee monitors the application and delivery of the University's Ethics Review Procedure across the University.

Contact for further information

Main Researcher	Mr. Junjie Huang Email: junjie.huang@shef.ac.uk Personal Tel: 07777690773		
Supervisors	<table border="1"> <tr> <td>Dr. Rosie Parnell (maternity leave) Email: r.parnell@shef.ac.uk</td> <td>Dr. Cristina Cerulli Email: c.cerulli@sheffield.ac.uk</td> </tr> </table>	Dr. Rosie Parnell (maternity leave) Email: r.parnell@shef.ac.uk	Dr. Cristina Cerulli Email: c.cerulli@sheffield.ac.uk
Dr. Rosie Parnell (maternity leave) Email: r.parnell@shef.ac.uk	Dr. Cristina Cerulli Email: c.cerulli@sheffield.ac.uk		
Telephone No	0114 222 0327		
Address	School of Architecture, Arts Tower, Western Bank, University of Sheffield, Sheffield, S10 2TN		



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Participant Consent Form for Childcare Centre

Research project information			
Project Title	Behaviour Recording Of Young Children's Social Interaction In Childcare Environment		
Research Method	Digital video recording technology	Date	
Participant Centre		ID No	
Please tick if you are agree with the following items			
<input type="checkbox"/>	1. I agree this centre to take part in the above research project. I give permission for the research team to have access to the research data.		
<input type="checkbox"/>	2. I confirm that I have read and understand the information sheet explaining the above research project and I have had the opportunity to ask questions about the project.		
<input type="checkbox"/>	3. I understand that the participation of this research project is voluntary and that participants are free to withdraw at any time without giving any reason.		
<input type="checkbox"/>	4. I understand that the research project team will do their best to protect the information collected from participants. I understand that none of the participants will be identifiable in any reports or presentations. I understand that research team will make sure that all the image or video regarding participants will be anonymous in reports or technically blurred in academic presentations according to participants' consents.		
<input type="checkbox"/>	5. I agree for the data collected from participants to be used in future research.		
	Name	Date	Signature
Participant childcare centre (or legal representative)			
Main researcher			
Person taking consent (if different from researcher)			
<i>To be signed and dated in presence of the participant</i>			
Contact for main researcher:			
Name	Mr. Junjie HUANG	Email	junjie.huang@shef.ac.uk
		Tel	07777 690 773 / 0114 222 0327
Address	School of Architecture, Arts Tower, University of Sheffield, Conduit Rd, Sheffield, S10 2TN		
Copies:			
Once this has been signed by all parties, the participant should receive a copy of the signed and dated participant consent form, the letter/pre-written script/information sheet and any other written information provided to the participants. A copy of the signed and dated consent form should be placed in the project's main record (e.g. a site file), which must be kept in a secure location.			

A.3 Information sheet and consent form for children and their parents



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Research Project Information Sheet for Parents

Research Project Title:
Behaviour Recording of Young Children's Social Interaction in Childcare Environment
Invitation paragraph:
Your child is being invited to take part in this research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.
What is the project's purpose?
This project is part of a PhD on-site study to investigate young children's behaviour and their thinking, and to explore the design of childcare environment. The major purpose of this project is to collect research data of participant children's social behaviour in their daily life in the childcare centre via scientific observation using digital video recording technology.
Why has my child been chosen?
Via reviewing the OFSTED (Office for Standards in Education, Children's Services and Skills) report, the childcare centre that your child attends is selected as one of the research cases. The children aged between 3-5 years old in this centre are considered as potential participants.
Does my child have to take part?
You can decide whether or not to let your child take part in this project. If you do decide to take part you will be given this information sheet to keep, and asked to sign a consent form. You have the right to Withdraw At Any Time without any reason.
What will happen to my child if he takes part?
<ul style="list-style-type: none"> ♦ The research will be undertaken by CRB (Criminal Records Bureau) checked researcher inside this childcare centre and during work time only. ♦ Prior to the project, the researcher will be working as a volunteer in the Lodge in order to become familiar and establish a stable and trusting relationship with all the children. ♦ Researcher will use a small digital video recorder to take recording data of your child's behaviour in the childcare centre, either by fixing it at a specific place or following your child's activity routes. Researcher will carry out a pilot study first to let your child get familiar with the video recorder and ignore it as much as possible during the data collecting period. Researcher will also keep a reasonable distance from your child while collecting the data so that it will not disturb any of your child's activity in the centre. ♦ After recording, researcher will invite participant children to view their video recordings, and make records of any responses your child may produce to the video recordings.
What are the possible disadvantages and risks of taking part?
This social behaviour recording project needs to be set into nursery's daily work. It could potentially disturb some of nursery's regular routine. To minimize the influence, researcher should discuss the project time schedule with nursery manager and your child's key person before taking out any data collecting action.



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<p>What are the possible benefits of taking part?</p> <p>This research project will give a general understanding how participant child is interacting with others in the childcare environment, and give possibility for researcher to look into environmental impacts on children's social behaviour. It is also hoped that the whole PhD research will contribute to the knowledge of young children's social activity in childcare centres as well as the on-going development of appropriate childcare environment design.</p>
<p>What type of information will be sought from my child and why is the collection of this information relevant for achieving the research project's objectives?</p> <p>The major data collected in this research will be several recording sections of your child's continuing behaviour in the childcare centre and their verbal or non-verbal recordings to the video recordings. Your child will only need to behave as usual. The researcher will try not to disturb any activities participants enjoy. Each section will last no longer than one hour. In addition, some basic information of your child, such as date of birth, gender, and ethnics group (Cultural Background), will also be collected. All these information are considered as potential factors to this study.</p>
<p>Will the research data collected from my child be kept confidential?</p> <ul style="list-style-type: none"> • All the collected research data will mainly be used for transcription and analysis. • Your child's names will not be shown in any of the transcriptions, replaced by designed ID numbers. None of the participant children will be able to be identified in any reports. • All the data will be kept securely by the researcher and used within this project only. Without participants' written permission, no other use will be made to the data, and no one outside the project will be allowed to access. • Some of the recording data will potentially be selected for academic presentations. In such occasion, your child's face in the videos or pictures will be technically blurred, so that your child will not be identifiable, unless you have agreed not to do so. • All of the original recordings will be destroyed after the research project finishes.
<p>What will happen to the results of the research project?</p> <p>The result of this research project will only be presented in academic fields, such as PhD thesis, conferences, or journal papers.</p>
<p>Who has ethically reviewed the project?</p> <p>This project has been ethically approved via the University of Sheffield - School of Architecture's ethics review procedure. The University of Sheffield's Research Ethics Committee monitors the application and delivery of the University's Ethics Review Procedure across the University.</p>

Contact for further information

Main Researcher	Mr. Junjie Huang Email: junjie.huang@shef.ac.uk Personal Tel: 07777690773		
Supervisors	<table border="1"> <tr> <td>Dr. Rosie Parnell (maternity leave) Email: r.parnell@shef.ac.uk</td> <td>Dr. Cristina Cerulli Email: c.cerulli@sheffield.ac.uk</td> </tr> </table>	Dr. Rosie Parnell (maternity leave) Email: r.parnell@shef.ac.uk	Dr. Cristina Cerulli Email: c.cerulli@sheffield.ac.uk
Dr. Rosie Parnell (maternity leave) Email: r.parnell@shef.ac.uk	Dr. Cristina Cerulli Email: c.cerulli@sheffield.ac.uk		
Telephone No	0114 222 0327		
Address	School of Architecture, Arts Tower, Western Bank, University of Sheffield, Sheffield, S10 2TN		



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Participant Consent Form for Parents

Research project information					
Project Title	Behaviour Recording Of Young Children's Social Interaction In Childcare Environment				
Research Method	Digital video recording technology			Date	
Participant child				ID No	
Please tick if you agree with the following items					
<input type="checkbox"/>	1. I give permission for my child to take part in the above research project. I give permission for the research team to have access to the research data.				
<input type="checkbox"/>	2. I confirm that I have read and understand the information sheet explaining the above research project and I have had the opportunity to ask questions about the project.				
<input type="checkbox"/>	3. I understand that the participation of this research project is voluntary and I understand that my child is free to withdraw at any time without giving any reason.				
<input type="checkbox"/>	4. I understand that the research project team will do their best to protect my child's personal information they collect. I understand all the information will be anonymous in any results from the above research project.				
<input type="checkbox"/>	5. I agree for the data collected from my child to be used in future research.				
In reports or presentations of this project, I wish my child's face in the pictures or video recordings:					
<input type="checkbox"/> not to be blurred / mosaic or <input type="checkbox"/> to be technically blurred / mosaic					
	Name	Date	Signature		
Participant Child <i>(if possible)</i>					
Participant child's Legal Guardian <i>(Parent)</i>					
Main Researcher					
Person Taking Consent <i>(if different from researcher)</i>					
Contact for main researcher					
Name	Mr. Junjie HUANG	Email	junjie.huang@shef.ac.uk	Tel	07777 690 773
Address	Sheffield School of Architecture, University of Sheffield, Arts Tower, Western Bank, S10 2TN				
Copies:					
Once this has been signed by all parties, the participant should receive a copy of the signed and dated participant consent form, the letter/pre-written script/information sheet and any other written information provided to the participants. A copy of the signed and dated consent form should be placed in the project's main record (e.g. a site file), which must be kept in a secure location.					



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If you agree your child to participate in this research, please could you fill some basic information of your child in the table below? (The information below is necessary to this research, but you have the right to fill in whatever you feel comfortable. Many Thanks):

Participant Child's Information			
Name		Date of Birth	
Siblings	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Gender Female <input type="checkbox"/> Male <input type="checkbox"/>
Ethnic Group	White British <input type="checkbox"/> White Irish <input type="checkbox"/> White Other <input type="checkbox"/>		
	Black Caribbean <input type="checkbox"/> Black African <input type="checkbox"/> Black Other <input type="checkbox"/>		
	Asian Indian <input type="checkbox"/> Asian Pakistani <input type="checkbox"/> Asian Bangladeshi <input type="checkbox"/> Chinese <input type="checkbox"/> Asian Other <input type="checkbox"/>		
	Mixed <input type="checkbox"/>		
	None of above <input type="checkbox"/>		
Home Language	English <input type="checkbox"/>	Other <input type="checkbox"/> (could you please specify _____)	
Nursery Experience	_____ months		

A.4 Information sheet and consent form for caregivers



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Research Project Information Sheet for Caregiver

Research Project Title:
Behaviour Recording of Young Children's Social Interaction in Childcare Environment
Invitation paragraph:
You are invited to take part in this research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.
What is the project's purpose?
This project is part of a PhD on-site study to investigate young children's behaviour and their thinking, and to explore the design of childcare environment. The major purpose of this project is to collect research data of participant children's social behaviour in their daily life in the childcare centre via scientific observation using digital video recording technology.
Why have I been chosen?
Via reviewing the OFSTED (Office for Standards in Education, Children's Services and Skills) report, your childcare centre has been chosen as a research case. The children aged between 3-5 years old in this centre are considered as potential participants. As you are the caregiver for the children in this year group, you may be potentially recorded in some of the video data.
Do I have to take part?
You can decide whether or not to take part in this project. If you do decide to take part you will be given this information sheet to keep, and asked to sign a consent form. You have the right to Withdraw At Any Time without any reason.
What will happen to the participants?
<ul style="list-style-type: none"> ♦ The research will be undertaken by CRB (Criminal Records Bureau) checked researcher inside this childcare centre and during work time only. ♦ Prior to the project, the researcher will be working as a volunteer in the Lodge in order to become familiar and establish a stable and trusting relationship with all the children. ♦ Researcher will use a small digital video recorder to take recording data of participant children's behaviour in the childcare centre, either by fixing it at a specific place or following participant children's activity routes. Researcher will carry out a pilot study first to let them get familiar with the video recorder and ignore it as much as possible during the data collecting period. Researcher will also keep a reasonable distance from participant children while collecting the data so that it will not disturb any of their activities. ♦ After recording, researcher will invite participant children to view their video recordings, and make records of any responds they may produce to the video recordings.
What are the possible disadvantages and risks of taking part?
This social behaviour recording project needs to be set into nursery's daily work. It could potentially disturb some of nursery's regular routine. To minimize the influence, researcher should discuss the project time schedule with nursery manager and you before carrying out any actions.



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<p>What are the possible benefits of taking part?</p> <p>This research project will give a general understanding how participant children are interacting with others in the childcare environment, and give possibility for researcher to look into environmental impacts on children's social behaviour. It is also hoped that the whole PhD research can contribute to the knowledge of young children's social activity in childcare centres as well as the on-going development of appropriate childcare environment design.</p>
<p>What type of information will be sought from participants and why is the collection of this information relevant for achieving the research project's objectives?</p> <p>The major data collected in this research will be several recording sections of participant children's continuing behaviour in the childcare centre and their verbal or non-verbal recordings to the video recordings. You will only need to behave as usual. The researcher will try not to disturb any of the activities that you and participant children enjoy. Each section will last no longer than one hour.</p>
<p>Will the research data collected from participants be kept confidential?</p> <ul style="list-style-type: none"> • All the collected research data will mainly be used for transcription and analysis. • You and participant children's names will not be shown in any of the transcriptions, replaced by designed ID numbers. You will not be identifiable from any reports. • All the data will be kept securely by the researcher and used within this project only. Without your written permission, no other use will be made to the data, and no one outside the project will be allowed to access. • Some of the recording data will potentially be selected for academic presentations. In such occasion, you face in the videos or pictures will be technically blurred to make sure you will not be identifiable, unless you have agreed not to do so. • All of the original recordings will be destroyed after the research project finishes.
<p>What will happen to the results of the research project?</p> <p>The result of this research project will only be presented in academic fields, such as PhD thesis, conferences, or journal papers.</p>
<p>Who has ethically reviewed the project?</p> <p>This project has been ethically approved via the University of Sheffield - School of Architecture's ethics review procedure. The University of Sheffield's Research Ethics Committee monitors the application and delivery of the University's Ethics Review Procedure across the University.</p>

Contact for further information

Main Researcher	Mr. Junjie Huang Email: junjie.huang@shef.ac.uk Personal Tel: 07777690773	
Supervisors	Dr. Rosie Parnell (maternity leave) Email: r.parnell@shef.ac.uk	Dr. Cristina Cerulli Email: c.cerulli@sheffield.ac.uk
Telephone No	0114 222 0327	
Address	School of Architecture, Arts Tower, Western Bank, University of Sheffield, Sheffield, S10 2TN	



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Participant Consent Form for Caregiver

Research project information			
Project Title	Behaviour Recording Of Young Children's Social Interaction In Childcare Environment		
Research Method	Digital video recording technology	Date	
Participant Centre		ID No	
Please tick if you are agree with the following items			
<input type="checkbox"/>	1. I agree to take part in the above research project. I give permission for the research team to have access to the research data.		
<input type="checkbox"/>	2. I confirm that I have read and understand the information sheet explaining the above research project and I have had the opportunity to ask questions about the project.		
<input type="checkbox"/>	3. I understand that the participation of this research project is voluntary and that I am free to withdraw at any time without giving any reason.		
<input type="checkbox"/>	4. I understand that the research project team will do their best to protect my personal information they collect. I understand all the information will be anonymous in any results from the above research project.		
<input type="checkbox"/>	5. I agree for the data collected from me to be used in future research.		
In reports or presentations of this project, I wish my face in the pictures or video recordings:			
<input type="checkbox"/>	not to be blurred / mosaic		or <input type="checkbox"/> to be technically blurred / mosaic
	Name	Date	Signature
Participant caregiver (or legal representative)			
Main researcher			
Person taking consent (if different from researcher)			
<i>To be signed and dated in presence of the participant</i>			
Contact for main researcher:			
Name	Mr. Junjie HUANG	Email	junjie.huang@shef.ac.uk
		Tel	07777 690 773 / 0114 222 0327
Address	School of Architecture, Arts Tower, University of Sheffield, Conduit Rd, Sheffield, S10 2TN		
Copies:			
<i>Once this has been signed by all parties, the participant should receive a copy of the signed and dated participant consent form, the letter/pre-written script/information sheet and any other written information provided to the participants. A copy of the signed and dated consent form should be placed in the project's main record (e.g. a site file), which must be kept in a secure location.</i>			

A.5 Code of conduct of students on placement:

Children's Services



Code of Conduct for Students on Placement

The aim of this policy is to provide guidelines for students to support children to achieve their full potential while fulfilling their own role and professional development.

General Contact with Children and their Family

- Greet children and their families when they arrive.
- Give a farewell on departure.
- Introduce yourself and your role to families if this has not already been done.
- Children should be referred to by their formal/familiar name unless a parent has requested otherwise.
- Engage in conversation with parents who are stopping in the room as part of their child's settling in process. Do not become involved with personal discussions that are not relevant to the child's welfare.
- Any messages given to you should be passed onto permanent staff in that room.

Interaction with Children

- Make sure you are at the child's level when speaking with them.
- You should listen and provide a child with your full attention when they are speaking to you.
- Do not speak over children.
- Respond and interact with all children. Our youngest children enjoy verbal and non verbal interactions. A smile will usually result in a smile back, even from a baby.
- Children and their actions should never be referred to as "naughty" "bad" etc.
- Children take pride in their art work so always give praise when they are showing you their creations.

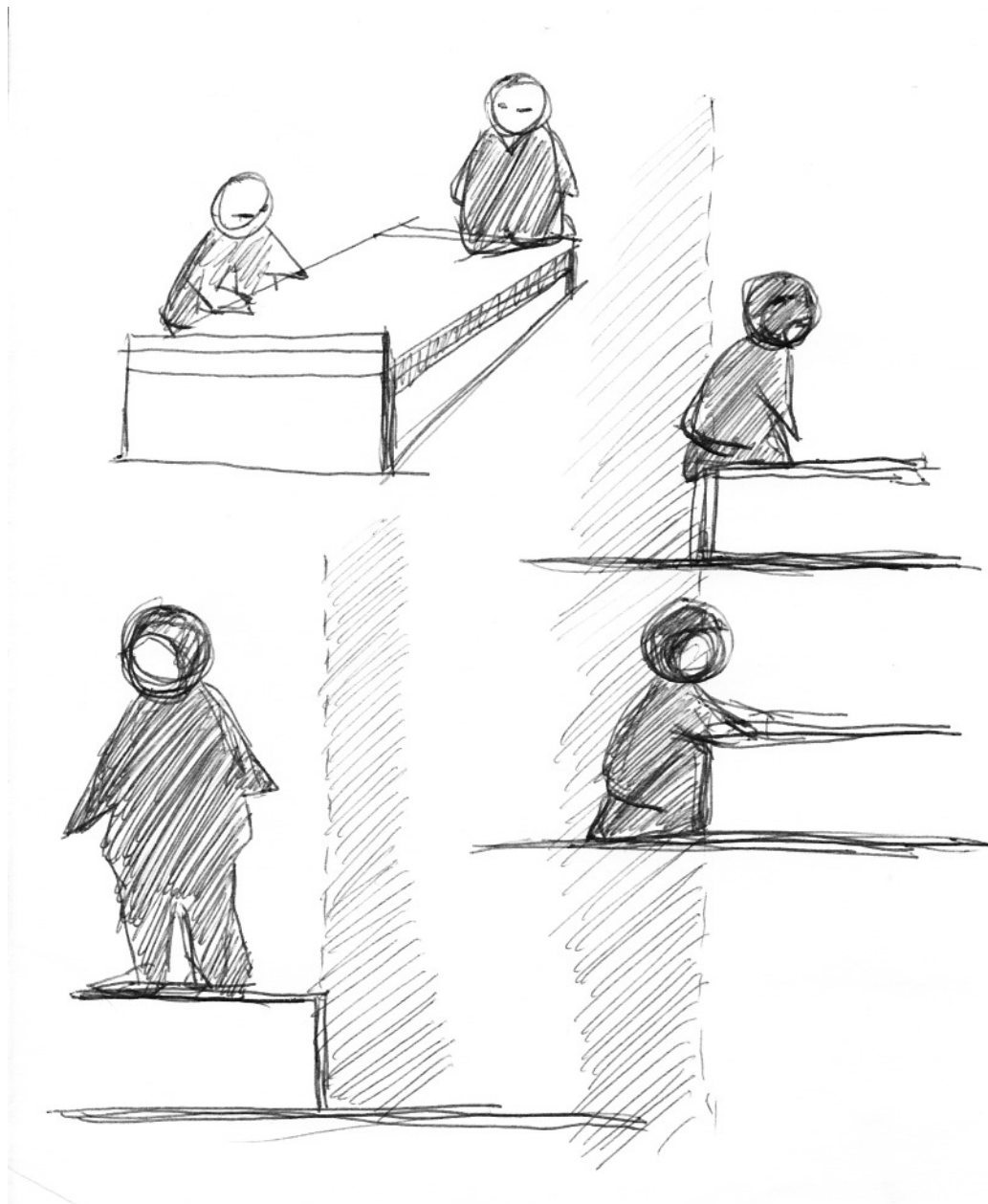
- When playing with or feeding children at the table sit with them at their level. Do not lean over or across them.
- All children are entitled to the same high standard of care and no child should be singled out as a favourite or belittled.
- Appropriate physical contact will be discussed during your induction.

General Health and Safety Considerations

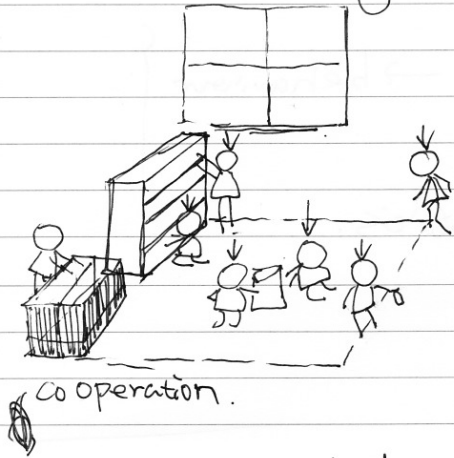
- Children should never be left alone in the room or outside.
- When changing a child's nappy do not leave them unattended on the changing table. If you have forgotten something take them off the changing table or ask for help.
- Only carry one child at a time.
- Children should only be given the food provided for them by nursery or their own from home.
- Room staff will explain any specific dietary or medical needs that you need to be aware of but if you are unsure ask.
- Be aware of your environment. Sandy floors or spillages should be cleaned to prevent accidents.
- Familiarise yourself with the fire procedure in each area of the nursery.
- Information that is shared regarding any child is confidential and should not be discussed with family, friends or other work colleagues either verbally or on social networking sites.
- Permanent staff will be responsible for answering the main door. You should never allow anyone entry into the nursery.
- Wash your hands before serving food and after taking children to the bathroom/changing a nappy.
- Mobile phones are not permitted in the rooms and should be stored in the staff room or lockers. They should be turned off except during lunch time when they can be used outside of the rooms.
- Please make sure you sign in/out each day.
- **Corporal punishment of any kind will not be tolerated in our nursery.**
- **Smoking is not permitted in nursery or the immediate area. We ask that you change out of your nursery t-shirt before smoking outside of the nursery.**

Appendix B: Samples of sketches, field notes, research diaries, and reflective journals

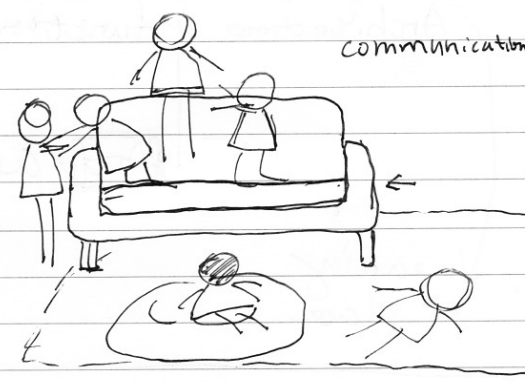
B.1 Samples of sketches



abstracting key environmental feature.

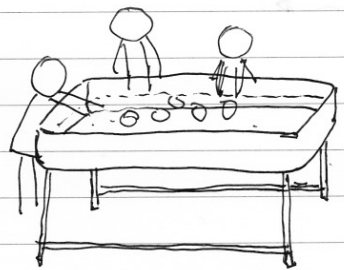
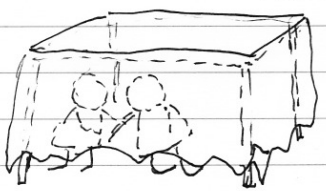


cooperation.



Parallel communication

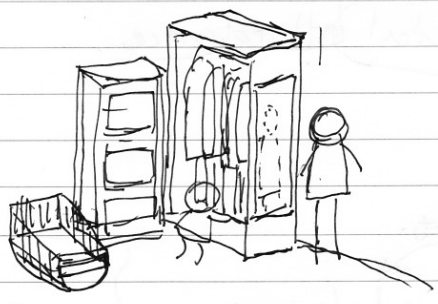
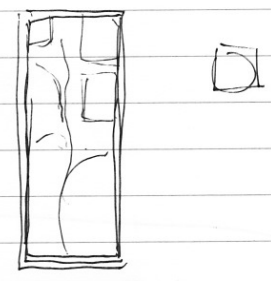
hide



Parallel Imagination



imagination roll-play.



Parallel.

What makes ~~the~~ sense. to design.?

B.2 Samples of field notes

environment
coding system

book shelf. afford. storing books

table. afford. working surface

Seat. afford. sitting

reading / working place

library

play on the floor
play on the table
play in the sink

behavior pattern.

Construction area

Spatial behavior settings

~~major~~ behavior settings

Social behavior settings

Children perceive differently

Chair. → sitting setting

table → working setting → sit and work

longer

carpet.

possession exchange sharing cooperation

dispute ~~claiming~~ agreement

movement

possession. conflict

exchange co

sharing. cooperation

copresently

co-presently exchanging. depart.

① ○ ○ co-present.

② ○ ↔ ○ exchange.

③ ○ → ○ depart. repel.

④ ○ → ○ approaching engage attract.

⑤ ○ → ○ follow.

⑥ ○ ↑ ○ co-movement.

vertical positioning

B.3 Samples of research diaries

affordance.
 The framework system.
 the environmental features ~~are~~ ^{supports} every ~~single~~ action of human behaviour. for example, the table surface ~~supports~~ ^{as a working platform} any ~~manipulative~~ work on it.
 we looked into the ~~environmental~~ ^{designs of} projects that particularly look ~~for~~ ^{for} ~~children's~~ people's specific behaviour.

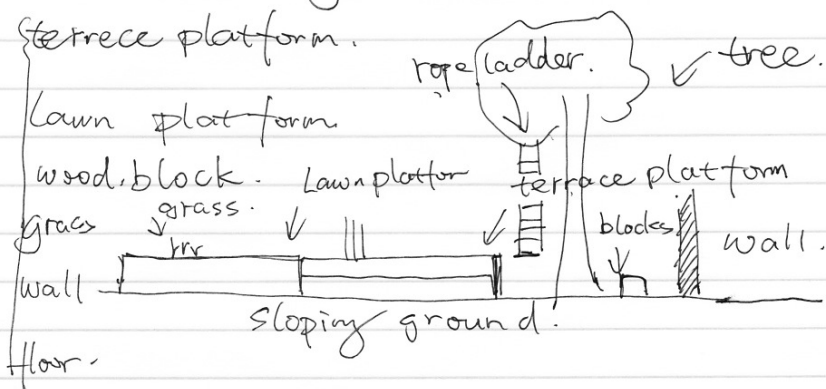
Case 2. The environmental feature and territory behaviour.

Case 2. the environmental feature in group disorder behaviour

Case 3. The environmental feature in parallel behaviour

Case 1. Territory.

The side yard, is a relatively closed area in the child care centre. it has only one entrance, and surrounded by the other three side. it is a rectangle area that contains various objects and settings. lets break it down into pieces.



onlooker behaviour
~~case 1~~ ~~observation study~~

spectator

case ①. children were attracted by caregiver's voice and gathered to the side yard. five children are sitting on the terrace platform. 10 minutes.

case ②. children were gathered together at the sand pavilion and sat on the stairs. 5 minutes

case ③. Children ~~were observing~~ ^{sit in the} wooden bed corner.

features: ① enough space.
 ② The terrace, platform, stairs, bed. (sitting place for children)
 ③ a focus area the presenter, or leader can present.

observer's

case ①. ~~children~~ were ~~playing~~ ^{observing} children ^{around the} ~~boat~~ ^{boat}. 30 seconds and watch others playing in the boat.

case ②. ~~went~~ ^{goes} to the water playing area. ~~it~~ ^{it} ~~seemed~~ ^{seemed} ~~to~~ ^{to} want to do some water play with the others. he did not join them at once. he stay behind and looked other for quite a while. before he went in to play. 30 seconds.

case ③. ~~stayed~~ ^{stayed} behind Jack and observing what they are doing. 2 minutes.

peaking.

case ①. ~~looked~~ ^{looked} through the slides to see it ~~was~~ ^{was} waiting there. 10 seconds.

case ②. ~~stayed~~ ^{stayed} behind the fence to watch

[Redacted]

B.4 Samples of reflective journal

~~Sketch~~. Observe a place.

↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓

O O
O

A - ② - ③ - □
B - ③
C - ③

A

~~construction corner.~~
~~work platform.~~
~~storage.~~
~~Vi barriers.~~
~~Ph barriers.~~

C1 container ①
C2 container 2
C3 container 3
P1 platform 1
P2 platform 2
S2 supporter 2
S1 supporter 1

Room 1
Ground.

Appendix C: Social interaction case event transcription samples

Event Case #1: Territory conflict

Participant: Osborn, Gaby, Maria, Tim, Luke, Teresa, Helen,

Footage ID: MB0807A-O

Time: 03:40~06:30

Location: Side yard

Event description and notes:

This event was taken in my record during Maria's morning outdoor play session.

Maria was riding a trike with a group of five peers. They queued up in front of the pathway before getting into the yard. Then Maria and Tim led the group going through the pathway. At that time, Osborn was already playing inside the yard with his friends Gaby. He saw Maria and her friends coming.

(E00M01: Osborn's perception of invasion, event initiation)

(Environmental support note: the surrounding walls and terrace platforms provide the clear boundary of the side yard area for territory area perception. The narrow opening that connects the pathway and the side yard is an obvious entry point to the territory area. Osborn notices other children's invasion into his territory via watching this opening.)

Osborn stood in front of Maria to block the group of children at the end of the pathway (also the side yard entrance point). Osborn requested them to get out of the side yard.

(E01M01: Osborn's voice and motor action towards blocking and occupation request)

(Proximate note: Osborn uses his position to stop the invasion.)

Maria neither moved nor left. Other children were also stopped by this incident.

(E01M02: Maria's neutral response)

Osborn stood in front of Maria, making an angry face.

(E01M03: Osborn's facial expression to claim his occupation request)

Maria seemed not understand why Osborn did not allow them to get into the side yard. Tim tried to move forward.

(E01M04: Tim's motor action response results in antagonistic deeper invasion)

Osborn jumped towards Tim with his angry face.

(E01M05: Osborn's motor action towards threatening in occupation request)

Suddenly, Osborn kicked on Tim's go-kart three times.

(E01M06: Osborn's motor action towards aggression in occupation request)

Tim patted Osborn's body to express his opinion that he did not want Osborn to do such thing.

(E01M07: Tim's motor action towards antagonistic response)

Osborn got angrier. He shouted loudly and walked around the side yard to express how angry he was.

(E01M08: Osborn's voice and motor action towards showing off power in occupation request)

Osborn stepped on a wood block on the floor and then jumped towards Maria again, making punch gesture towards Maria with the toy in his hand.

(E01M09: Osborn's motor action towards threatening and aggression in occupation request)

(Environmental support note: Osborn liked to stand higher than other children. In the event, the raised spot settings provide important environmental affordance for the territory possession claiming)

*(Proximate note: Osborn moved far from Maria first, and then rushed towards her with **high speed**. Speed is seldom mentioned in the research of proximate)*

Tim and Maria stayed where they were. They did not move.

(E01M10: Maria and Tim's neutral response)

Osborn climbed up the lawn terrace step and jumped down to show other children his possession of this side yard.

(E01M11: Osborn's motor action towards showing off power in occupation request)

Osborn and his friend Gaby scrambled a toy dropped on the floor.

(E01M12: Distraction)

Tim moved towards them and patted on Gaby's body. He tried to grab the toy from Gaby's hand. Gaby won, and he climbed up the terrace platform to keep a distance from Tim.

(E01M13: Tim and Gaby's interaction)

(Environmental support: Gaby may have perceived from the situation about losing his toy, so he tried to use the environment to keep a distance from Tim. The height position of the raised terrace platform provided the affordance of defence or security in such situation.)

Maria stayed at the place watching them.

(E01M14: Maria's neutral response)

Osborn stepped on a rock and shouted at Maria and her peers.

(E01M15: Osborn's voice and gesture action towards threatening in territory request)

Maria moved forward, tried to leave Osborn.

(E01M16: Maria's motor action towards antagonistic response)

(Proximate note: Maria enlarges the interpersonal distance, proximate perception)

Osborn moved to the next child Luke. He shouted at Luke, and then kicked on his trike as well.

(E01M17: Osborn's voice and motor action towards aggression in territory request)

Luke moved back a little bit.

(E01M18: Luke's motor action towards compromised response)

Osborn left Luke and jumped up the lawn terrace platform, standing beside Gaby.

(E01M19: Osborn's affiliation motor action towards showing off group identity in territory request)

(Environmental support note: height)

(Proximate note: stands with peers showing the group side)

Osborn jumped down the terrace and moved towards Maria again. He shouted loudly at Maria.

(E01M20: Osborn motor and voice action towards threatening in territory request)

(Environmental support note: height)

Maria pushed Osborn back. She did not want Osborn standing so close to her.

(E01M21: Maria's motor action towards antagonistic response)

(Proximate note: Maria tries to enlarge interpersonal distance by antagonising motor action response)

Osborn stepped on a wood block, and then returned to Maria. He stepped on Maria's trike so that she could not move forward.

(E01M22: Osborn's motor action towards blocking and controlling)

(Environmental support note: height)

Maria pushed him away again.

(E01M23: Maria's motor action towards antagonistic response)

(Proximate note: enlarge interpersonal distance)

Osborn walked around in the side yard, and shouted loudly towards the sky.

(E01M24: Osborn's motor and voice action towards showing off strength in territory request)

(Note: Osborn was the centre of the event. Other children were watching him.)

Gaby stood up and pointed towards Luke with the toy in his hand.

(E01M25: Gaby's gesture action towards interactive battle play)

Osborn walked around Gaby, and walked up the platform. Then he jumped down and stood besides Luke.

(E01M26: Osborn's affiliation to Gaby)

Luke sat in his trike without any action.

(E01M27: Luke's neutral response)

Osborn did not do anything to Luke. He walked to the terrace edge and sat down on the edge slab, watching other children.

(E01M28: Osborn's motor action towards resting)

(Environmental support note: the terrace platform edge is the seating point)

Helen felt uncomfortable at this place. She turned her trike back, and left. (When Helen passed by me, she said to me that they are annoying.)

(E01M29: Helen's compromised action)

At the same time, Maria left her trike. She came to the big tree. She wanted to play the swing rope that was tied to the branch of the tree.

(E01M30: Maria's antagonistic motor action)

(Environmental support note: during the territory conflict event, Maria tried to occupied the play resource)

Osborn stood up, and jumped to Maria to scramble the rope. As Maria first took the rope, and held it very tied in hand, Osborn could not get the rope. He held Maria with his arm, tried to pull her away from the rope.

(E01M31: Osborn's motor action towards scrambling action)

(Environmental support note: Osborn perceived Maria's possession of the resource, and reacted by scrambling conflict actions)

Maria struggled out of Osborn's arm, and hold the rope tied to protect herself. She made unhappy face and sound to show her dislike.

(E01M32: Maria's motor and voice response)

(Maria left her trike, and started to use the resource and setting in the environment, that was claimed in territory possession by Osborn. Maria's behaviour passed on a

meaning of “sharing” to the children in the side yard, which also had an initial intention of redirecting the conflict towards a pro-social solution. However, her attempt failed to obtain Osborn’s compromise)

Tim went deeper in the yard.

(E01M33: Tim’s motor action towards invasion.)

Gaby saw Tim. He chased Tim behind and made battle gesture with the toy in his hand.

(E01M33: Gaby’s motor action)

Osborn left Maria. He ran towards Tim to the deep of the yard.

(E01M34: Osborn’s motor action)

Before Osborn reached Tim, he turned back once and saw Maria was leaving the rope back to her trike. Osborn suddenly changed his direction towards Maria’s trike.

(E01M35: Osborn’s motor action towards possession scrambling)

(Research note: Osborn might realise that he could possess Maria’s trike as an exchange/replacement.)

Maria was leaving and saw Osborn’s intention as well. She went back to her trike as soon as she could, and sat down before Osborn reached it.

(E01M36: Maria’s motor action response towards scrambling)

Osborn failed to occupy Maria’s trike. He returned to Tim and attempts to get him out again. Osborn kicked on Tim’s go-kart heavily for three times, and requested them to get away from the yard. He shouted, “get away”, loudly, and pointed towards the entrance.

(E01M37: Osborn’s aggressive motor and voice action towards bully and control)

Tim stayed there, and looked at Osborn.

(E01M38: Tim’s neutral response)

Osborn left Tim, and walked around the side yard. He walked back to Maria, and said something to her. Then Osborn pushed/hit on Maria’s right shoulder heavily.

(E01M39: Osborn's motor action towards bully)

Maria seemed very uncomfortable. She stayed in her trike but dodged her body back to avoid being hit.

(E01M40: Maria's neutral response)

Osborn left Maria and played with Gaby using the toys in his hand. He walked around and talked with Gaby.

(E01M41: Osborn's motor and voice action towards imagination play)

Teresa was not being treated. She still wanted to move forward but found Maria blocked the way. She hit Maria's trike several times with the fore-wheel of her trike.

(E02M01: Teresa's motor action towards forcing Maria move forward to resolve the blocking way problem)

Maria moved her trike to the middle of the side yard with difficulty.

(E02M02: Maria's compliant motor action response)

Finally she decided to leave the place. She held it up in her arm. Then she walked straight back to the entrance of the side yard and sat back on the trike.

(E01M42: Maria's compromised motor action towards avoiding confrontation)

(Research note: the ongoing event in the side yard was very unpleasant. Maria left the place to protect herself.)

(Environmental support note: Maria perceived the difficulty of riding in the side yard.)

Teresa, Luke, and Tim saw Maria's leaving. They all turned back to the entrance.

(E01M43: Teresa, Luke and Tim's motor action towards following.)

Helen was waiting Maria in the pathway.

(E03M01: Helen's motor action towards waiting.)

Maria rode to Helen and left the side yard area with her.

(E03M02: Maria's motor action towards accompany)

Event Case #2: Running race

Participant: Reby, Immy

Footage ID: IH0813A-O

Time: 04:27~07:11

Location: Entrance pathway slope

Event description:

I was recording Immy's activity in the nursery's outdoor session. Immy was playing alone with a seesaw next to boat setting. Reby came to the boat with a ball. Immy watched Reby playing in the boat setting. When Reby tried to leave the boat. Immy soon stood up and followed behind Reby. They ran towards the top the entrance pathway.

But Immy did not follow Reby to the top. She stopped in the middle of the pathway and stood at the place watching Reby throwing the ball down from the top.

Reby then came to Immy and invited her to run together from the top as their start point. Reby explained how to play and forced Immy to the start point.

After getting Immy ready, Reby set off first. And Immy followed her running to the lower end of the pathway. Once reaching the end point, Reby turned back and ran towards the entrance right away. Then without any rest time, she ran down again when she reached the start point. They have run like this for about 6 times.

The 7th time, Reby ran pass the endpoint and turned back at the centre of the playground.

The 8th time, Reby did not turn back at any point. She led Immy to the sand pavilion and bouncing on the cover board with her.

Event case #3: Wheel riding race

Participant: Osborn, Toby, Gaby, Tim

Footage ID: OA0816P-0

Time: 09:49~15:27

Location: Entrance pathway slope

Event description: 09'49"~15'27"

It was an afternoon outdoor free play session. Osborn enjoyed his riding on a trike in the playground. Several minutes ago, he and other children played bubble blowing with caregivers. And he also reported to the caregiver about his friend Toby fighting with Gaby with big sticks in the side yard.

After that, He rode to the entrance pathway with his friend Gaby. Toby was riding on a double seat trike in the middle of the pathway. Gaby sat on the back seat of Toby's trike. Three children rode up the top of the pathway. They were going to ride together.

1st round: Osborn set off directly right after he put his trike on the start point, without notifying his friends about his start. Gaby soon left Toby and ran after Osborn. Toby did not follow them. He waited there.

2nd round: After riding around in the playground, Osborn returned to the start point with Gaby. This time, Toby and Gaby set off first, before Osborn set him ready on the start point. Osborn followed them behind. Soon he returned to the start point with Gaby, while Toby was still riding around in the playground with Tim sitting on the back seat.

3rd round: Osborn asked Gaby to be the starter man to give out the set off signal. Gaby did as Osborn said. And Osborn rode another round in the playground. He met Toby and Tim at the junction. Then they all returned to the start point. Osborn pushed Toby's trike behind, but Tim announced Osborn as the winner. Obviously, Toby could not agree with that. They then decided to have another real race.

4th round: This time, children were organizing themselves to have a formal race game. Toby and Osborn both set their trikes ready in a line at the start point. And Tim checked their trikes. Gaby shouted, "go". Osborn set off right away, but Toby did not notice about Gaby's start signal. Toby did not stay there this time. He

followed Osborn behind. Osborn turned back in the middle of the pathway. Before arriving the start point, Osborn let his trike slip back a little bit and waited until Toby reached him. Then Osborn started again and rode fast to the start point. He shouted, "I am winning!" Tim also announced, "the winner is Osborn!" Again, Toby did not agree.

5th round: Toby and Osborn quickly set up another ride. This time they did not wait for Gaby's starter shout. They rode out together. Osborn started a little behind Toby, but Osborn's trike was smaller and easier to control. So he soon passed Toby in the middle of the pathway. Toby turned back as soon as he saw Osborn was far beyond him. When Osborn looked back, Toby was already riding on his way back. Osborn felt very upset. He rode himself to a corner and refused to have any more riding.

Appendix D: Video footage analysis samples

D.1 Osborn – outdoor play

No	Time	Event	X	Y	Location	Affordance for activity	Affordance for social interaction	Research notes
01	00:00 - 00:03	Osborn was riding trike in the playground pathway slope. Jolin ran to him and blew bubbles around him	6	5	Playground, pathway slope	Riding, trap setting, imagination play	Talking, co-play	Jolin and Tobi used bubble generator to set trap for Osborn's riding.
02	00:03 - 00:07	Osborn left Jolin and kept on riding forward. Tobi came to blow bubbles around him and shouted, "bubble trap".	22	20	Playground, west side	Riding, trap setting, imagination play	Talking, co-play	
03	00:07 - 00:16	Osborn did not stop. He passed Tobi and kept on riding alone in the playground.	30	29	Playground, north side	Riding		
04	00:16 - 00:25	Osborn rode to the centre of the playground. Tobi and Jolin waited he there, and blew bubbles on him. Gaby and	36	27	Playground, centre	Riding, trap setting, imagination play	Talking, co-play, interactive play	Other children also join in the trap play. They seemed working

								affordance for the play.
05	00:25 - 01:50	Osborn rode to the bubble water tank placed on the headboard of the boat and started to play bubble blowing.	35	23	Boat	Bubble blowing, standing, watching, exploratory play	Talking, onlooker, parallel play	Bubble is the new affordance placed in the playground, attracted lost of children to gather together to do the same activity
06	01:50 - 02:07	Osborn stopped playing the bubble and drove away. He met Gaby in the entrance of summer house. Gaby blew bubbles on him.	25	16	Playground, south side	Riding, staying, trap setting, imagination play	Talking, onlooker, interactive play	
07	02:07 - 02:30	Gaby left. Osborn kept on riding to the middle of the pathway slope and stopped to catch bubbles in the air.	15	8	Playground, pathway slope	Riding, staying, exploratory play	Parallel play	
08	02:30 - 02:40	Osborn left his trike to chase bubbles, shouting "there...there...bubble..." and then returned after bubbles popped	12	4	Playground, corner	Walking, exploratory play	Parallel play, competition	Osborn left his trike because there is a thick wooden board placed on the ground, which defined an area physically. It brings wheel toys difficulty to get in the defined area.
09	02:40 - 06:40	Osborn rode around in the playground, chasing flying bubbles, or passing through a group of bubbles.			Playground	Riding, staying, watching, exploratory play, master play	Parallel play, onlooker	Osborn was riding alone in the playground and chasing bubbles by him self. He sometimes went after flying bubbles, sometimes went to the person blowing bubbles.

								He knew where to get more bubbles.
10	06:40 - 07:30	Tobi shouted and led his friends into back yard. Osborn followed him riding into the back yard. He stopped at the end of the pathway to the yard, and watched Tobi and Tim fighting with sticks.	54	33	Backyard, pathway end	Riding, staying, watching	Onlooker, following, stick fighting	Tobi and Tim started fighting. They picked sticks on the floor as their weapons.
11	07:30 - 07:40	Gaby left back yard and came back with a big stick in his hand. He walked through the narrow gap between playroom building and a short brick wall	49	33	Backyard, pathway	Riding	Onlooker, talking, hiding	Gaby wanted to join fighting secretly. He used the wall to hide himself from being seen by his friends in the back yard
12	07:40 - 09:25	Gaby fell on the ground and attracted Caregiver's attention. Osborn told Caregiver and then Caregiver came to investigate the stick fighting issue. During this period, other children played stick-picking games in the back yard.	56	33	Backyard, pathway end	Riding, staying	Onlooker, talking	Caregiver kept an eye on the back yard after the bully incidence. She started to investigate the boys' stick fighting play after Osborn report to her. Osborn mainly talked about Tobi broken sticks and hit on his face. Caregiver let children be aware of the potential danger and asked Tobi to say sorry to Osborn. Other children notice fighting was not allowed so they turned to play stick-picking games.

13	09:25 - 09:40	Tobi said sorry to Osborn and left the side yard. Osborn also reversed and rode back to the playground. He stopped at the head of the pathway and waited his friend Gaby.	43	33	Backyard, pathway head	Riding, staying,	Onlooker, talking	
14	09:40 - 10:20	Osborn and Gaby went towards playground entrance where Tobi already played a two-seat-trike there. They were going to have a race. Tobi asked Gaby to get on board. So Gaby sat on the back seat.	2	4	Playground, entrance	Riding, staying,	Parallel play, co-play, talking,	Two-seat trike is a toy designed for co-playing.
15	10:20 - 10:45	Before Tobi got ready for racing, Osborn set off already. Gaby got off Tobi's trike and followed behind Osborn. When they went back to the starting point. Gaby fell on the ground. Osborn stopped, but his trike started to reverse. Gaby saw and came to pull Osborn's trike.			Playground, pathway slope	Riding, slipping	Racing, competition, parallel play, co-play, talking, helping	Pathway slope is a very popular place for racing, as the gravity allows wheel toys to speed up. Slope is also difficult for controlling the wheel toys. So sometimes, helping behaviour can emerge. Children also talked a lot about rules while playing.
16	10:45 - 11:15	Tobi shouted, "jump on board". Gaby left Osborn and sat on the back seat of Tobi's trike. Osborn stood up and quickly moved his trike to the starting point. This time Tobi and Gaby set off before Osborn ready. Tobi was stuck by obstacle in the			Playground, pathway slope	Riding,	Racing, competition, talking, co-play	

		playground. Gaby left Tobi and followed Osborn back to the starting point.						
17	11:15 - 11:55	Osborn asked Gaby to be the starter and see him have another go. Gaby did the starter posture and shouted, "go"			Playground, pathway slope	Riding, staying	Racing, competition, talking, co-play	Gaby is acting as the starter for Osborn's race.
18	11:55 - 12:13	Osborn set off alone and met Tobi and Tim in the playground. Tim held a water sprinkler sitting on the back seat of Tobi's trike, and waved it to Osborn. Osborn shouted, "I need some oil". Tim used it as fuel pump and pretended filling fuel to Osborn's trike.	22	16	Playground,	Riding, staying, imagination play	Parallel play, co-play, talking, interactive play	Toys or objects are resources for imagination play, and initiate their play activities. In this case, sprinkler is the oil pump.
19	12:13 - 13:00	Tobi kept pulling Tim to the starting point. Osborn followed them behind. When they reached the starting point, Tim announced, "The winner is Osborn..." Tobi did not agree with that. Then Osborn and Tobi set their trikes ready again for another race.			Playground, pathway slope	Riding, staying	Racing, competition, talking, co-play	
20	13:00 - 14:40	Before they set off, Osborn said, "now I need some oil". Tim used the sprinkler to fill Osborn's "oil tank". Gaby acted as the starter again, he made the posture and shouted, "go!" Osborn went off. Tobi set off too slow. Osborn rode to the middle of the slope and then turned back. Tobi shouted, "stop!" then he got off his trike and turned it back and pushed it forward. Osborn stopped before he reach the top, and let his trike slip down a bit. When Tobi caught him up, he then rode fast and	2	6	Playground, pathway slope	Riding, staying	Racing, competition, talking, co-play	Four children were playing different roles here to make up their racing game. They did not actually discuss to decide their role. The major key is the item each of them is using. For example, Tim is the oilman with the sprinkler. Osborn and Tobi are the racer with

		said, "I am winning". Tim announced again, "the winner is Osborn" Tobi said, "no"						their trikes. Gaby is the starter with stick(viously).
21	13:40 - 14:15	Osborn and Tobi set their trike ready and raced again. This time Tobi turned back earlier than Osborn. Osborn was stuck by the wooden board at the middle of the slope. So Tobi reached the starting point first this time. He shouted, "I win." Tim announced Tobi the winner and gave him the sprinkler as the prize. Osborn felt sad and moved back slowly.			Playground, pathway slope	Riding, staying	Racing, competition, talking, co-play	The rules of their race are not clear enough. Tobi felt unfair and did not agree the result for many times. Tobi wanted their racing route to be farther. But he went back earlier than Osborn this time.
22	14:15 - 14:55	Osborn stopped, and turned his trike back and left them. He rode into the small corner between the summer house and the wall, back to others. Tobi came and pretended to fill oil for Osborn. Then Osborn reversed backwards but was blocked by Tobi's trike. He waited until Tobi left, and then get out of the corner.	25	8	Playground, pathway corner.	Riding, staying, imaginative play	Hide from others, talking	Osborn felt Tobi was cheating and got upset about this. So he left and found the corner to stay. Tobi wanted to get him back to play, so he came and interacted with Osborn via talking and pretending oil filling.
23	14:55 - 15:22	Osborn followed Tobi back to the starting point and hit on his trike strongly. Then they had an argument about the winning. Osborn shouted loudly to express his feeling.	4	7	Playground, pathway corner.	Riding, staying	Talking, conflict	Osborn hit Tobi's trike and shouted loudly when he felt not happy.
24	15:22 - 15:27	Osborn left his friends and rode alone in the playground.			Playground	Riding, staying	Keep a distance to his friends	

D.2 Maria – indoor play

No	Time	Event	X	Y	Location	Affordance for activity	Affordance for social interaction	Research notes
01	00:00 - 01:55	Maria was playing in the reception room with Helen and a little boy. They were sitting on the floor and picking up components then putting them back into a plastic box.	54	22	Reception room, floor	Sitting, watching, object play	Talking, parallel play, co-play, cooperation, sharing	The plastic box is the centre of children's activity. Children sit around the centre and play.
02	01:55 - 02:08	Maria suddenly stood up and ran out of the reception room. She stopped at the role-play corner looking for some costume.	82	29	Pathway, role-play area, reading area	Standing, watching	Onlooker	
03	02:08 - 02:23	Maria finally found her item on the floor of the reading area. She sat down on the floor and dressed herself up. Luke came and played a blue electronic toy.	79	22	Reading area, open space	Sitting, dressing up		When Maria dressed herself up, she likes to sit on the floor.
04	02:23 - 03:01	Maria attracted by a yellow electronic music toy. She stopped dressing, and pulled the toy over and played with it. Luke noticed Maria playing beside.	79	22	Reading area, open space,	Sitting, object play	Parallel play	Maria and Luke play in parallel. They notice each other, but they have little interaction.
05	03:01 - 03:07	Maria pushed his yellow toy to Luke and asked for his blue toy. Luke did not refuse. Maria took Luke's blue toy. Luke then played with the yellow one	78	23	Reading area, open space	Sitting, object play	Parallel play, talking, swapping toys, sharing, exchange	Maria and Luke swapped their toys after Maria requested. The behaviour related more to the item rather than the space. However, they must be able to see

								each other to initiate their demand.
06	03:07 - 03:23	Maria played with the blue electronic toy for a while, and then she put it down, and turned her body around.	79	22	Reading area, open space	Sitting, object play	Parallel play	
07	03:23 - 03:48	Maria started to dress up again.	79	22	Reading area, open space	Sitting, dressing up		
08	03:48 - 04:20	Maria stood up to continue dressing up her blouse. She also zipped up herself. When she finished, she picked up a hair hat on the floor, and put it on.	79	22	Reading area, open space	Standing, dressing up		
09	04:20 - 04:27	Maria walked to researcher who was sitting on sofa. She seemed quite satisfied with her dress.	82	25	Reading area, sofa	Sitting, walking	Talking, showing	Maria is willing to show others her dress when she finishes.
10	04:27 - 05:12	Maria walked back to her blue electronic toy. She played it again for a while.	79	22	Reading area, open space	Sitting, object play	Parallel play	
11	05:12 - 05:21	Maria put down the blue toy and stood up. She walked to the bookshelf and tried to find something there.	78	20	Reading area, bookshelf	Standing, watching		
12	05:21 - 06:32	Luke saw Maria left then he crawled to Maria's place to play the blue toy. At the same time, Maria left bookshelf and saw Luke left his position, so she walked there and sit down to play the yellow toy again.	78	23	Reading area, open space	Sitting, walking, watching, object play	Parallel play	The exchange of their position does not happen according to their direct demand. No communication was made at the same time.

13	06:32 - 06:48	Maria stopped playing and stood up. She walked around in the room to show her dress to other children.			Pathway,	Walking, watching	Showing, onlooker	Maria stopped because a caregiver's voice drew her attention. Two children were playing on the wooden bed with hobbyhorse. Maria tried to show them her dress.
14	06:48 - 07:03	Helen came to Maria. Maria talked to her about her dress. Helen nodded her head. Luke also came and watched them	75	26	Pathway	Standing, staying, walking	Talking, showing, onlooker	
15	07:03 - 07:13	Maria picked another nurse hat on the floor and asked Helen which is better. Helen did not reply. Maria dropped the nurse hat on the floor and left.	78	28	Pathway	Standing, walking, picking up	Talking, onlooker	Maria discussed which hat is better with Helen.
16	07:13 - 07:33	Maria left Helen and put on her hair hat. She then walked alone around in the room, doing some dance posture			Pathway,	Walking, imagination play		No children around Maria, she made posture on her own. She might imagine herself as some figure.
17	07:33 - 07:47	Maria saw a drum toy on the floor. She sat down to play the drum.	79	25	Reading area, open space	Sitting, object play		
18	07:47 - 07:55	Helen saw Maria playing the drum. She came to Maria and sat down beside her and watched.	79	25	Reading area, open space	Sitting, object play	Onlooker	
19	07:55 -	Maria stood up and tied the drum on her belly. Then she walked around the open space patting on the drum at the same			Reading area, open space	Walking, object play, watching	Showing, onlooker	

	08:21	time. She was also interested in other children's play in the open space.						
20	08:21 - 08:45	Maria dropped the drum on the floor of role-play area, and picked up another wired car toy's controller. She pulled the car out and placed it on the pathway floor. She tried to make the car move by pressing the button but it did not work.	82	29	Role-play area, pathway	Standing, picking up, object play		Children like to drop toys or things on the floor without concern of broken them.
21	08:45 - 09:00	Maria dropped the controller, and walked into the quiet room. She watched children playing inside for a while, and then left.	84	28	Quiet room, door	Standing, staying, watching	Onlooker	She stayed at the door of the quiet room and watch. She might not really decide to get into the room.
22	09:00 - 09:29	She saw herself in the mirror on the costume wardrobe. She adjusted her dress in front of the mirror and made some posture there.	83	29	Role-play area, pathway	Standing, looking mirror		Mirror provides a very important function for children to see and be conscious of them selves. The position of the mirror is not very appropriate, as children will occupy the pathway while they look at the mirror.
23	09:29 - 09:50	When Maria finished looking mirror, she stood by the door of quiet room again and watched other children playing.	84	27	Quiet room, door	Standing, watching, staying	Onlooker	
24	09:50 - 10:15	Maria asked researcher some question regarding playing in the quiet room. Researcher suggested her to ask	82	29	Pathway	Standing	Talking, querying	

		caregivers, as he was not very sure.						
25	10:15 - 10:22	Maria left researcher and sit on the sofa. Helen stood beside her.	82	26	Reading area, sofa	Sitting, thinking	Accompany	Children sometimes sit on sofa and did nothing only think.
26	10:22 - 10:54	Maria got some idea, and went to the costume wardrobe to find the item she wanted. She also discussed her idea with Helen at the mean time. Maria found a doll and would like to imagine it as her baby. She put it over her belly inside her blouse dress.	82	30	Role-play area, costume wardrobe	Staying, searching, imagination play	Talking, discussing	Maria got her idea of play during discussion. She wanted to play as a pregnant mother with the doll.
27	10:54 - 11:12	Maria went to the sleeping area. She sat on the bedside and took off her shoes. She also asked Helen to take off shoes and play with her.	77	21	Sleeping area, bedside	Sitting	Talking	
28	11:12 - 13:23	Maria went into the bed and lied down. She called, "I got pregnant..." to draw her friend's attention. Helen took off her shoes and got in the bed as well. They played inside for a while.	74	21	Sleeping area, bed	Lying, imagination play, role-play	Co-play, role-play, talking	Sleeping area is the place Maria wants to use for her pregnant mother role-play, as the space contains the features of the pregnant scene, such as bed, duvet, and curtain.
29	13:23 - 13:35	Maria stood up. She held the doll baby and walked out of the sleeping area.			Sleeping area, reading area	Walking	Talking	
30	13:35 -	Maria sat down on the floor at reading area and asked Luke for the yellow	79	22	Reading area, open space	Sitting, object playing, singing,	Talking, sharing, onlooker	

	13:55	electronic toy. Luke handed the toy to her. Maria held the doll baby and started playing singing with it.				watching		
31	13:55 - 15:13	Helen sat on the floor and moved her body to Maria. She watched Maria playing the toy without any conversation and interaction.	79	22	Reading area, open space	Sitting, watching, object playing, singing	Onlooker, accompany	Helen is a quiet girl, talked little and interacted little.
32	15:13 - 15:50	Luke came to Maria and sat down on her right side. He held the blue electronic toy. He watched and listened for a while and then started to play the blue toy. He shook his body to attract others' attention.	79	22	Reading area, open space	Sitting, watching, object playing, singing	Onlooker, accompany, parallel play, showing	Not like Helen, Luke kept on shaking his body while play next to Maria.
33	15:50 - 16:01	Tim came over as well. He watched Maria playing singing, and then co-played with Luke on the blue electronic toy. Maria stopped singing and watched them	79	22	Reading area, open space	Sitting, watching, object playing	Onlooker, accompany, parallel play, co-play, talking	Tim and Luke's interaction attracted Maria's attention.
34	16:01 - 16:24	Teresa came over to the group. She joined Luke and Tim and watched them playing together.	79	22	Reading area, open space	Sitting, watching, object playing	Onlooker, accompany, parallel play, co-play, talking	
35	16:24 - 16:51	Teresa walked to Maria and squatted in front of Maria. She watched Maria playing. Helen also sat closer to them.	79	22	Reading area, open space	Sitting, squatting, watching, object playing	Onlooker, accompany, parallel play, co-play, talking	Helen sat closer, as more children came and she got more interested with Maria's play.
36	16:51 - 17:01	Teresa asked, "can I have a go?" So Maria stopped playing and picked up her doll baby from the floor. She stood up and showed Teresa her baby. But Teresa was	78	22	Reading area, open space	Sitting, watching, object playing	Onlooker, talking, accompany, parallel play, co-play, showing	

		not interested, as she wanted to play the toy. So Maria left. Helen stood up and left as well.						
37	17:01 - 17:14	Maria left the childre. She held her doll baby, and walking around alone in the reading area.			Reading area, open space	Walking, object playing		Maria left as Teresa was not interested with her baby and no interaction was there.

D.3 Rebyy – indoor play

No	Time	Event	X	Y	Location	Affordance for activity	Affordance for social interaction	Research notes
01	0:00-0:25	Rebyy and Locky sat on the floor at the open space, playing train. Rebyy was sitting back to Locky. Locky talked a lot to create story. Rebyy looked back to talk with Locky.	60	22	Open space	Sitting, toy playing, imagination play	Parallel playing, talking	Talking interaction, no actually play on each other's toy. No boundary can be defined for each child's occupation. Rebyy uses her back to create privacy of the space.
02	0:25-0:45	Locky lied down on the floor and created some event for his toy figure to play. "I am on the wrong train... the little baby... mummy..." Locky's sound attracted Rebyy's attention, she looked back.	60	22	Open space	Lying down, toy playing, imagination play	Parallel playing, talking	
03	0:45-1:00	Locky sat up and kept making crying sound. Rebyy looked back again and laughed.	60	22	Open space	Sitting, toy playing, imagination play	Parallel playing, talking	
04	1:00-1:25	Locky started to move his figure close to Rebyy. Locky talked about the identification of his toy figure "This is not a mummy... this is a girl..." Rebyy did not make many responds to Locky.	60	22	Open space	Sitting, toy playing, imagination play	Parallel playing, talking	
05	1:25-1:30	Rebyy kept playing her own toys. Locky crept around her, tried to get more	60	22	Open space	Creeping, toy playing, imagination play	Parallel playing, talking, approaching	

		responds.						
06	1:30-1:55	Locky said, "mummy, mummy, I want a friend... I want a friend for this little baby..." Rebbly replied, "I am your friend..." and started to play together on Locky's train to make story.	61	22	Open space ground	Creeping, toy playing, imagination play	Co-playing, talking, interactive playing	Creating imaginative stories from the toy resources can be very talkful and interactive.
07	1:55-2:30	Rebbly took her figures back to her own train. Locky came to her again, and tried to bring new ideas to the story, "now I've gotten a big brother..." Rebbly picked up the conversation with him.	60	22	Open space ground	Sitting, creeping, toy playing, imagination play	Co-playing, talking	Creating stories during imagination play can reflect children's understanding of the world.
08	2:30-2:50	Rebbly pulled her own train around fast and all the passengers falling off. So she looked around to get other toys to fulfil her train. Locky play by himself.	60	22	Open space ground	Sitting, toy playing, imagination play, searching	Parallel play, talking	
09	2:50-3:05	Rebbly stopped and watched Locky playing.	60	22	Open space ground	Sitting, watching	Onlooker, talking	
10	3:05-4:00	Rebbly looked for her toy, and claimed Locky took her figure. They have conversation about this and Locky found her some other figure instead. Rebbly agreed to take it. But she need to comfort her foot first as it is sore.	60	22	Open space ground	Sitting, searching	Exchange, talking	Exchange happens here: Locky does not want to return Rebbly's figure. Rebbly agrees with Locky's suggestion.
11	4:00-4:30	Rebbly finished comforting her foot. She wanted to get the figure as agreed. But Locky put his finger on the figure hardly and did not let go. They started to scramble for the figure. The figure	61	22	Open space ground	Sitting, creeping, scrambling	Talking, scrambling	Locky changed his mind when Rebbly comforting her foot. And the exchange behaviour turned out to be

		dropped, Locky got it. Rebby said, "I want to have it now", Locky replied, "no, you can't..." Rebby explain, "ok, but I really need two... I need two passengers, 'cause he wants to get on the train..."						scrambling conflict.
12	4:30-5:00	Rebby picked other four figures on the floor and put them in a line in front of her train. She said, "all these persons need to get on (the train)..." Locky kept silent and watched Rebby play.	61	23	Open space ground	Sitting, picking up, toy imaginative play	Talking, onlooker	Locky became silent now, as he may perceive the unfairness of his behaviour.
13	5:00-5:58	Rebby started to count the figures, as she wanted to have 5 passengers. Locky came to count together with her. They counted for five times.	61	23	Open space ground	Sitting, counting, toy imaginative play	Talking, co-playing	They discuss about how to count correctly.
14	5:58-6:14	Rebby felt sick (she put both hands on her head) and wiped a figure down on the floor. Locky then wiped all other figures and train coaches. Rebby complained about this.	61	23	Open space ground	Sitting, toy imaginative play	Talking, imitation	Locky followed Rebby's action, but Rebby does not want so.
15	6:14-6:30	After a while silence, Rebby suggested, "let's go and work on the circus, aren't we?" Locky did not want to leave at the moment. So Rebby went by herself.	61	23	Open space ground	Standing, walking, watching	Onlooker	Some other children are working on circus things, Rebby want to join them. Locky thought his train is the circus.

16	6:30-7:04	Rebby stopped at sofa area and watched for a while, and then she walked around from the open space to the role-play corner then back to the open space. Locky came to her as well.			Open space role-play area	Standing, walking, watching	Onlooker	Rebby kept a distance and watched first. She did not rush into the role-play corner directly.
17	7:04-7:34	Rebby walked to the sofa, climbed on it and then sat down. She watched other children getting dressed. Locky did not climb up sofa, but stood beside and watched as well.	83	26	Sofa	Climbing, sitting, watching	Onlooker	
18	7:34-7:44	Rebby leaned on the arm of the sofa and kept on watching. Tobi came to her and had a talk with her and Locky.	83	26	Sofa arm	Leaning, watching	Onlooker, talking	Comparing to sitting, the leaning gesture allows Rebby to put her head out of sofa area, and attract other children's attention, or even encourage a conversation interaction.
19	7:44-8:06	Locky talked to Rebby. He asked if he could have the toy in Rebby's hand. Rebby finally gave the toy to him, but only agreed for a while. So Locky returned it shortly.	83	26	Sofa arm	Leaning, watching, sharing	Onlooker, talking, sharing	
20	8:06-8:34	Locky left and watched other children dressing. Rebby got off the sofa and walked around. She walked to the table and then watched two girls near role-play area. Finally, she returned to the sofa.			Open space Pathway	Walking, squatting, watching	Onlooker	

21	8:34-8:52	Rebby climbed up the sofa again, leaning on the backrest and watched the wall. Locky followed her up and lean on the backrest next to her.	83	25	Sofa backrest	Climbing up/down, leaning on, watching	Talking, accompany, associate paly	They use the space as they want.
22	8:52-9:00	Locky turned his body and leaned on the arm. He also shook his body on the arm. Rebby patted on his back, but Locky did not stop.	83	25	Sofa arm	Leaning on, watching, Shaking body	Talking, parallel play onlooker	
23	9:00-10:00	Rebby stood up on the sofa and sat on the backrest, and then she started to bounce on the sofa. She was watching other children while bouncing. She was not just bouncing at a place. She was bouncing from one position to the other. Alice and a girl playing next to the sofa. They used a long tube to make phone call. The voice inside the tube sounds quite interesting to them.	83	25	Sofa backrest	Sitting, standing, bouncing, watching	Onlooker	Bouncing on the sofa. Using tube to make telephone call.

D.4 Jim - outdoor play

No	Time	Event	X	Y	Location	Affordance for activity	Affordance for social interaction	Research notes
01	0:00-0:33	Jim was riding a trike in the playground for a while. But the seat is too wet, and Jim felt not comfortable, so he got off.			Playground, open space, trike	Riding, standing	Parallel play	
02	0:33-00:36	Luke came and tried to ride on it. But he saw the water on the seat as well and gave up.	25	32	Playground, open space	Standing, riding	Sharing, parallel play, talking, onlooker	
03	00:36 - 01:17	Jim stood there for a while and then rode on the trike again. He rode towards the pathway slope.			Playground,	Riding,		
04	01:17 - 01:36	Jim was riding up the pathway slope, while Maria was riding down towards him. Maria fell on the ground. Jim stopped and watched her.	13	10	Playground, pathway slope	Riding, staying, watching, falling	Onlooker, talking, encounter, conflict, parallel play	Maria fell as she tried to avoid hitting on Jim. Jim did not give any help to Maria. But he stopped to watch.
05	01:36 - 01:50	Jim reversed his trike back a little bit to give way to Maria so that she could pass.	15	11	Playground, pathway slope	Riding, staying, watching	Onlooker, parallel play	Jim knew he block Maria's way down. So he reversed to solve the issue.
06	01:50 - 02:11	Then he kept riding up the slope and then turned back and rode down into the playground. He slowed down when a little girl riding towards him.			Playground, pathway slope	Riding		

07	02:11 - 02:15	Jim stopped at the junction of the pathway and then passed through slowly.	19	14	Playground, junction	Riding, staying, watching	Onlooker, encounter, parallel play	Jim and the little girl did not speak to each other. But they both act carefully.
08	02:15 - 02:43	Jim rode into the playground. He followed the scattered water puddles in the playground.			Playground	Riding, water playing		
09	02:43 - 02:51	Jim saw Caregiver C standing by the stair of the playground. He stopped and waved to her. Then he started again.	23	28	Playground,	Riding, watching, staying	Onlooker, communicating	Jim waved to caregiver to start communication. He did not wave to children very often.
10	02:51 - 03:03	Jim kept on riding in the playground.			Playground,	Riding		
11	03:03 - 03:10	Jim stopped at a water puddle and played the water.	40	33	Playground, junction water puddle	Staying, water playing		
12	03:10 - 03:31	Jim left the water puddle and rode to the pathway slope.			Playground,	Riding		
13	03:31 - 03:36	Jim saw Osborn in the middle of the slope. He stopped. Osborn talked to Jim.	13	9	Playground, pathway slope	Riding, staying, watching	Talking, onlooker	
14	03:36 - 04:34	Osborn left Jim. Jim carried on riding to the top of the slope. He turned several rounds to set his trike at the starting position. Then he set off and rode in the			Playground,	Riding		Jim turned his trike twice to get a satisfied position. No big difference between two

		playground.						movements.
15	04:34 - 04:44	Jim stopped at the water paddle again. He used the wheel of the trike to print on the water. Hanna also played water there with brush.	40	33	Playground, junction water puddle	Riding, staying, water playing	Talking, onlooker, parallel play	Jim and Hanna are both playing water, but they used different tools.
16	04:44 - 05:10	Jim left the water paddle and rode in the playground. He watched caregivers talking during riding, and rode bypass a barrier on the ground.			Playground, open space barrier	Riding, watching		
17	05:10 - 05:16	Jim met Alfie riding a big trike in front of summer house. Jim stopped and communicated with Alfie	21	17	Playground, junction	Riding, watching, staying	Onlooker, communicate	
18	05:16 - 05:28	The boy left, so Jim carried on riding up the pathway slope. A girl and a boy were playing in the middle of the slope.			Playground,	Riding		
19	05:28 - 05:31	Jim rode towards the two children and hit on the girl's car. The girl was reversing at that time and was stuck by Jim's trike.	11	6	Playground, pathway slope	Riding, watching, hitting	Onlooker, communicate, parallel play, interaction	Why Jim hit on the girl's car?
20	05:31 - 06:08	Jim reversed back and let the girl go back. He then left them, riding in the playground. He met Osborn at the back pathway. They managed to ride over each other.			Playground,	Riding, watching	Traffic encounter, parallel play	
21	06:08 - 06:21	Jim played water.	40	33	Playground, water puddle	Water playing, staying	Parallel play	

22	06:21 - 06:26	Jim left the water.			Playground	Riding		
23	06:26 - 06:31	Jim was stuck by the slide. Jacobs came to help him. He pulled Jim's trike backwards.	34	30	Playground, slide	Stuck, staying	Helping	Jacobs came to help without Jim's request. But Jim did not want to be controlled by him.
24	06:31 - 06:56	Jim wanted Jacobs to let go. And then he moved forward by watching his back wheel all the time.			Playground,	Riding	Communication	
25	06:56 - 06:58	Jim stopped to watching caregiver and children play.	21	27	Playground,	Riding, staying	Onlooker	
26	06:58 - 07:03	Jim let his trike to slip backwards by gravity.			Playground, slightly slope	Exploring, riding		
27	07:03 - 07:10	Jim rode towards the pathway slope			Playground,	Riding		
28	07:10 - 07:12	Jim stopped as a boy riding down.	19	16	Playground, junction,	Riding, staying	Encounter	
29	07:12 - 07:31	Jim started to reverse. He tried to let the trike slip backwards. Then He rode forward.			Playground,	Exploring, riding		

30	07:31 - 08:01	Jim's trike was blocked by the wooden slope of the summer house and not able to rode up. He spoke to researcher about this issue.	23	14	Playground, Summer house, wooden slope	Exploring, riding	Talking	Jim likes to interact with adults, including caregivers and researcher.
31	08:01 - 08:23	Jim left wooden slope and rode up the pathway slope. Where many children were racing there.			Playground, pathway slope	Riding	Racing, parallel play	
32	08:23 - 09:08	Alice and Lena were on their mark for racing. Alice asked Jim to join them. Jim agreed. Alice set off first, but hit on the curb in the middle of the pathway. She returned to the start point and set off the second time. Lena and Jim followed her set off as well. They ran into the playground.	2	6	Playground, Pathway slope	Riding, staying	Racing, talking, co-play, racing	
33	09:08 - 09:28	Alice and Lena stopped besides Caregiver N and talked to her. Jim decided to keep on riding, so he went on and rode around in the playground.			Playground, pathway slope	Riding	Talking, parallel play	
34	09:28 - 09:31	Jim came to the space between slide and pathway to side yard, when Hanna wanted to pass as well. Jim stopped and let Hanna go first.	39	31	Playground,	Riding, running	Encounter, talking	
35	09:31 - 09:38	Jim turned his direction and rode back.			Playground,	Riding		
36	09:38 -	Jim hit on Katie's trike. Katie pulled her trike away. Jim hit on Katie's trike again.	34	27	Playground,	Riding, hitting others	Conflict, encounter	Jim hit on purpose.

	09:46	Caregiver C said no to Jim. Jim stopped and then carried on riding.			open space			
37	09:46 - 10:09	Jim returned to the water puddle and played alone there.	40	33	Playground, water puddle	Staying, water playing		
38	10:09 - 10:15	Alfie and Osborn came up to the place. Jim blocked their way. Alfie and Osborn stopped in a line. Jim looked back and saw they were waiting. So Jim left.	40	33	Playground, water puddle	Staying, occupying	Traffic encounter, conflict.	
39	10:15 - 11:15	Jim rode alone in the playground. He hit the curb under the north wall, and hit an empty car in the centre of the playground.			Playground,	Riding, hitting	Parallel play	
40	11:15 - 11:20	Jim rode into two caregivers standing besides the boat, and hit on the boat heavily.	33	24	Playground.	Riding, hitting	Parallel play, showing	Jim hit on objects and produced loud sounds. He might want to attract others' attention.
41	11:20 - 11:44	Jim left the boat and rode to the centre of the playground. Jim stopped to adjust his trike.	34	28	Playground,	Riding, staying		
42	11:44 - 12:12	Jim got off the trike, and walked around to look for his friend. He went into the side yard.			Playground,	Walking, searching		
43	12:12 - 12:14	Jim stopped to see Maria playing with a rope tied on the big tree. Maria stood on the lawn platform slab and raised her leg. Jim was stunned by Maria's action, and	59	37	Side yard, lawn platform	Walking	Onlooker	Maria is playing with her friends. They use the rope tied on the tree branch to hang and

		soon left the place.						swing.
44	12:14 - 12:18	Jim walked to the small tree where Katie was sitting on.			Side yard,	Walking		
45	12:18 - 12:45	Jim talked to Katie.	70	38	Side yard, small tree	Sitting, standing	Talking	
46	12:45 - 13:15	Kate climbed down the small tree and left side yard. Jim followed her and ran into the playground. They found two empty cars at the northwest corner.			Side yard, playground	Walking, running	Following	
47	13:15 - 13:35	Katie picked one car and rode on it. Jim rode the other one. They rode the cars together in the playground. Katie stopped at a plastic bucket and picked it up. Jim passed her and called her to catch him up. Katie put down the bucket and followed Jim.			Playground	Riding	Parallel play, talking, company play	
48	13:35 - 13:42	Jim rode up the pathway slope. Osborn and other children were racing down towards him. A girl jumped aside to avoid accident. Osborn did not turn other direction. He hit on Jim's car and stopped. Osborn waited until Jim reversed back and rode aside then he carried on riding.	17	13	Playground, pathway slope	Riding, staying	Traffic encounter, conflict, compromise, racing, talking	
49	13:42 - 13:55	Jim stayed in the middle of the pathway slope, and checked his leg that was hit by Osborn. Katie came up and watched him.	16	11	Pathway slope	Riding, staying	Company, onlooker, parallel play	

50	13:55 - 14:40	Jim stopped checking and rode to the top of the pathway slope. Katie followed him. Alfie was standing at the top already. They set themselves on the starting point for a race. Osborn came up as well. Osborn did not want to race with them. He placed his trike in front of others, and set off first. Alfie followed. Jim and Katie then started to ride together. Jim was too slow and left behind. Osborn, Alfie, and Katie stopped at the centre of the playground. They talked there. Jim rode to them and stopped to listen.			Pathway slope	Riding, staying, talking	Parallel play, race, company	It is not a real race. Jim and Katie just wanted to ride together. Osborn seems not very interested in racing together with younger ones.
51	14:40 - 14:45	Osborn wanted to leave. Jim was staying in his way. Osborn did not choose other way, but hit on Jim's car slightly. Jim reversed back and let Osborn pass, then he returned to his place next to Katie.	28	23	Playground, open space, centre	Riding, staying	Talking, parallel play, company, conflict, traffic blocking	Jim gave way to Osborn.
52	14:45 - 15:05	Katie continued to ride again. Jim followed her around. Katie stopped at the exit of the slide.			Playground, open space, centre	Riding	Parallel play, company, following	
53	15:05 - 15:25	Jim did not stop at the slide exit. He went past Katie to the water puddle again. He played alone there, using wheel to touch the water.	40	33	Playground, water puddle	Riding, exploring, water playing		Jim enjoys play water puddle.
54	15:25 - 15:44	Jim left the water puddle and tried to redirect his car. Hanna and Immy came down from the slide and walked to him. They had a conversation. Then Hanna and Immy left and ran in the playground.	37	31	Playground	Riding, staying, running	Talking, following	

		Jim followed them behind.						
55	15:44 - 15:58	Jim wanted to catch Hanna and Immy up. So he moved fast and fell forward. Jim stayed there and checked. Hanna and Immy ran to see him.	34	18	Playground, south wall	Riding, staying,	Talking, caring, helping	Hanna came to check Jim, but did not offer help to him.
56	15:58 - 16:10	Hanna and Immy ran in the playground again. Jim restarted riding and followed them behind.			Playground,	Riding,	Following, parallel play	

Appendix E: Illustrations of children's spatial needs in individual and social activities



personal required space



supporter



supporter



supporter

Appendix E: Illustrations of children's spatial needs in individual and social activities



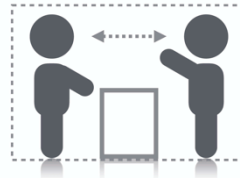
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Inter-personal space



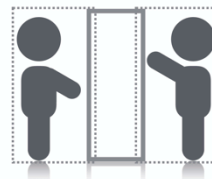
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Platform

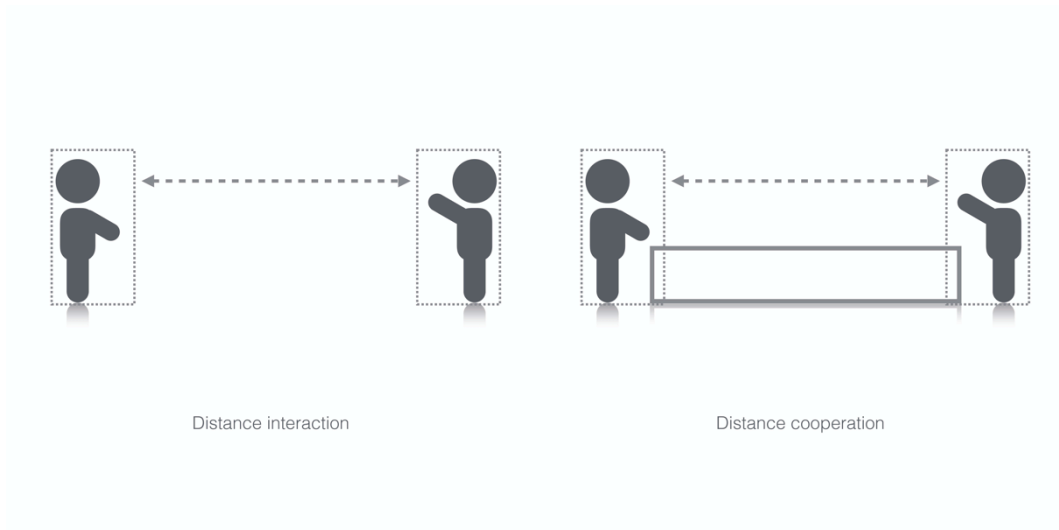


manipulative platform

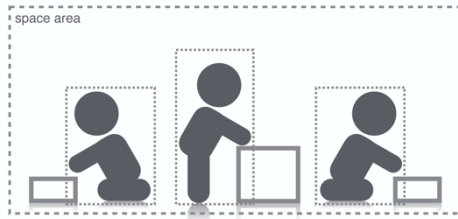


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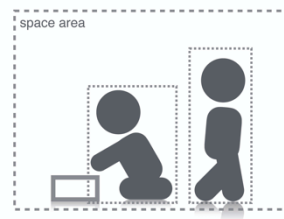
Appendix E: Illustrations of children's spatial needs in individual and social activities



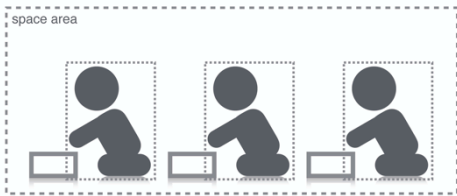
Appendix E: Illustrations of children's spatial needs in individual and social activities



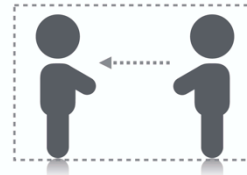
collective co-present activity



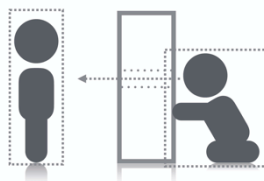
passing-by activity



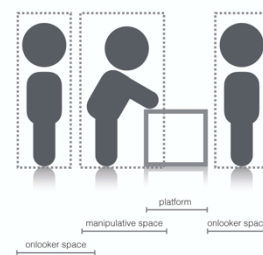
collective parallel activity



mimicking activity



peeping activity



onlooker activity