Fact, Fiction or Belief?

Generating, reporting and distinguishing real and fabricated memories

Lucy Victoria Justice

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The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

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Abstract

This thesis investigated intentionally fabricated autobiographical memories (IFAMs), memories deliberately created to be false. The first aim of the thesis was to understand the processes underlying IFAM generation. Secondly, the thesis examined beliefs held by the public about autobiographical memory (AM) and about lying, in an attempt to clarify current levels of knowledge. The third aim was to understand how AMs and IFAMs of staged events were reported, and to identify characteristics that could distinguish AMs from IFAMs. In particular, the work aimed to understand if *entirely* fabricated everyday memories differed from *partially* fabricated *everyday* and *emotional* memories. Finally, this thesis examined the effect that repeatedly providing an IFAM of an experienced event had on the ability to subsequently recall the original AM. AMs and IFAMs were elicited using cue word and staged event techniques. Participants were either asked to type their memories into a computer or were interviewed using structured questioning. Data regarding beliefs about memory and lying were gathered using questionnaires. Results revealed that IFAMs are frequently generated by firstly recalling a truthful AM which is then 'edited' to create a novel mental representation. The generation of an IFAM was therefore found to be reliably more cognitively effortful than the generation of an AM. Results also identified a number of erroneous and inconsistent beliefs about the nature of memory and of lying. Additionally, results showed that a number of characteristics could reliably identify AMs and *entire* IFAMs of everyday events. However, the number of characteristics was reliably reduced when AMs and *partial* IFAMs of everyday events were compared. Most strikingly, no characteristics were found that could reliably distinguish AMs from IFAMs of *emotional* events. Finally, results revealed that repeatedly providing an IFAM of a staged event reliably impaired the individual's ability to then recall the original AM.

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Abbreviations

AM	Autobiographical Memory
ANOVA	Analysis of Variance
ACID	Assessment Criteria Indicative of Deception
CBCA	Content Based Criteria Analysis
CI	Cognitive Interview
DRM	Deese/Roediger-McDermott Paradigm
EM	Episodic Memory
IFAM	Intentionally Fabricated Autobiographical Memory
LIWC	Linguistic Inquiry and Word Count
MAP	Memory Assessment Procedure
MCQ	Memory Characteristics Questionnaire
PEACE	Preparation & Planning, Engage & Explain, Account, Closure, Evaluate
RI	Reality Interview
RM	Reality Monitoring
SMS	Self-Memory System
SVA	Statement Validity Analysis

Chapter One

1 Literature Review

The purpose of this work is to investigate truthful and intentionally fabricated autobiographical memories (AMs and IFAMs). In particular, this work aims to understand the processes and beliefs that underlie the construction of these memories. Additionally, it aims to identify characteristics that may allow AMs and IFAMs to be distinguished from one another. Particularly, the work aims to contrast entirely and partially fabricated memories of both neutral and more emotional events to see if distinguishable characteristics remain consistent across memory types. Finally, the work aims to investigate the affect providing an IFAM has on the subsequent ability to recall the original AM. Memories will be elicited using both cue word and staged event methodologies. Gaining an insight into both these memories will provide additional theoretical knowledge to an under-researched area of autobiographical memory. Further, it is hoped that this work will feed into more applied situations in which an understanding of fabricated memory is essential, such as police interviews and testimony in court where often, memory is the only evidence.

This chapter will provide a background to both truthful and fabricated autobiographical memory, exploring empirical and theoretical work. It will begin by detailing autobiographical memory, its definition, its purpose, how it is stored and retrieved and its characteristics. It will then discuss varieties of false memories, and identify ways in which truthful autobiographical memories can become, unknowingly, distorted and altered. Finally, it will discuss a further variety of false memory, intentionally fabricated memories, those central to this thesis. These will be defined, compared and contrasted with other types of deception, and tools that have

attempted to distinguish truthful from deceptive memories will be evaluated. Previous research, although limited, will be also discussed.

1.1 Autobiographical memory

Autobiographical memory is a system that contains memories of past personal experiences. These memories are mental representations of an original sensory experience and contain sensory-perceptual-conceptual-affective information (Conway, 2009) of the original event and through evaluation of this information come concepts and beliefs regarding others, the self and the external world. The system works to fulfil short- and long-term personal goals and together, provides the individual with a sense of self and a personal life narrative. Therefore, inherent to the process of remembering is a remembering self: an individual must possess the ability to distinguish autobiographical knowledge from other forms of mental representations insofar that autobiographical knowledge relates to the rememberer's personal past.

In addition to an ability to recognise our personal past as our own, what is also required for autobiographical remembering is a sense of self. The self is a construct that represents our goals, achievements, self-beliefs and self-images (Conway, 2005) and evolves over the lifetime (McAdams, 2001). It also has a reciprocal relationship with memory as it both constructs and constrains the recall process (Conway, 2005). For example, primary information that is encoded, stored and retrieved is done so to satisfy the current sense of self, in other words, material is only remembered and recalled if it is consistent with the self at the time. Further, beliefs and knowledge concerning the self exist within the autobiographical system (Conway, 2005). Autobiographical memory is therefore unique when considering other forms of memory as it is inherently related to the self (Tulving, 2002).

The necessity of the self in autobiographical memory can be seen clearly within three dimensions provided by Brewer (1986). These dimensions serve to distinguish autobiographical remembering from other forms of mental representations: *memory acquisition*: single or multiple instances; *category of mental representation*: visual or non-visual and *content*: self or depersonalised. An autobiographical memory is an image-based mental representation of a singly experienced event regarding the self, for example "going for a jog this morning". The non-visual counterpart of this memory, knowing that I went for a jog this morning, is considered the autobiographical fact. Further, a memory may contain visual images, but form a representation of multiple instances of an event occurring, for example, my general memory of going for a jog in the morning. The non-visual counterpart of this memory type represents more general personal knowledge, for example, "I like to keep healthy and hence go for a jog each morning." Here the integration of the self into the memory representation of a singly experienced event can be seen as a necessary component to autobiographical remembering.

1.1.1 Functions

Having provided an outline of what constitutes an autobiographical memory, it is now important to ask what function does it serve? What use does recalling, reflecting and sharing our memories provide? Bluck and Alea (2002) suggest three broad functions of autobiographical memory: directive, self-representative and communicative. A fourth category, adaptive functioning, has been proposed by Williams, Conway and Cohen (2008).

Directive functioning allows us to access the past to solve problems and predict future events (Baddeley, 1987, Lockhart, 1989). Positive and negative aspects of past personal memories can be used to create schematic models of behaviour, which can then be applied to present or future situations to provide a way of dealing with a

challenge or problem (Pillemer, 2003). The self-representative function of autobiographical memory allows a coherent sense of self to be created over time (Barclay, 1996; Conway, 1996). The past can be reflected upon, and its evaluation can be built into the self-image (Bluck, Alea, Habermas, & Rubin, 2005). Autobiographical memory is also said to serve a social function insofar that reminiscing provides material for conversation and in turn facilitates social interaction (Cohen, 1998). Sharing autobiographical memories may provide a platform for interpersonal integration, allowing listeners and speakers to engage, understand and empathise with each other (Cohen, 1998). Pillemer (2003) suggests this function is particularly strengthened when listeners respond with a memory of a similar experience. Social bonding can be further facilitated by sharing memories with an individual who was not present at an original event, by the providing of details about an event and the self (Fivush, Haden, & Reese, 1996). Indeed, Bluck et al. (2005) proposed that the social function of autobiographical memory contains two broad sub-functions: to develop new and nurture existing relationships. Finally, autobiographical memory is said to have an adaptive function in that it allows us to maintain favourable and modify unfavourable moods (Williams et al., 2008) through the recall of positive memories. This regulation of emotion is thought to create a coping mechanism to help deal with negative emotions and in turn, increase resilience (Williams et al., 2008).

1.1.2 Storage and construction

The above discussion has provided an understanding of what defines an autobiographical memory and what components are necessary for one to exist. Next, it is important to understand how autobiographical memories are stored and constructed. The prevailing theory of the construction of autobiographical memory is the Self-Memory System (SMS) (Conway & Pleydell-Pearce, 2000; Conway, 2005).

The SMS is an amalgamation of theoretical considerations from a number of areas of psychology, including cognitive, clinical and neuropsychological autobiographical memory research (Conway & Pleydell-Pearce, 2000) and is primarily concerned with the experiencing rather than the remembering self (Conway, 2005). Broadly, the SMS comprises two main components: the working self and the autobiographical knowledge base. The former consists of goals arranged hierarchically, and serves to represent the self in the past, the future and the present. The latter contains general autobiographical information. This too is arranged hierarchically, with information ranging from general knowledge and themes about one's life, for example knowing where one was born or what high school was attended to more specific information such as people involved with particular life themes. The autobiographical knowledge base allows for one further level of specificity as it also stores sensory-perceptual-conceptual-affective knowledge. It is important to note here that for Conway, episodic memories (discussed in section 1.1.3) are somewhat reconsidered as reflecting episodic content of autobiographical memory. Therefore, for Conway, it is within the highly specific realm of the autobiographical knowledge base that episodic knowledge is stored.

The system works through an interaction between the autobiographical knowledge base and the working self insofar that the working self mediates access to the autobiographical knowledge base, allowing access only to mental representations relevant to the current sense of self (Conway, 2005). Retrieval is then commenced, as it accesses life themes, general event knowledge and probes sensory-perceptual-conceptual-affective knowledge until a temporary representation is generated in working memory (Conway, 1996). If a satisfactory representation is not generated, a new cycle of retrieval will begin. In this way then retrieval is considered cyclical. It is because of cyclical retrieval that autobiographical memories are considered dynamic

and transitory (Conway & Pleydell-Pearce, 2000), being constructed anew each time the working self probes the autobiographical knowledge base.

Due to the interaction between autobiographical knowledge base and the working self, the cyclical nature of consciously accessing and recalling memories is relatively effortful, as compared to the relatively instantaneous access of semantic knowledge (Conway & Pleydell-Pearce, 2000; Haque & Conway, 2001).

1.1.3 Episodic Memory

This review will now turn to describing episodic memories (EMs), which, as shown in the above description of the SMS, are thought to reflect specific sensory-perceptual-conceptual-affective knowledge within the autobiographical knowledge base (Conway, 2009). EMs are distinct from other forms of mental representation since they allow the individual to access highly specific memories from a particular time frame (Conway, 2009).

Table 1.1. Nine properties of episodic memory (Conway, 2009)

Properties of episodic memory
Contain summary records of sensory-perceptual-conceptual-affective processing.
Retain patterns of activation/inhibition over long periods.
Often represented in the form of (visual) images.
Always have a perspective (field or observer).
Represent short time slices of experience.
Are represented on a temporal dimension roughly in order of occurrence.
Are subject to rapid forgetting.
Make autobiographical remembering specific.
Are recollectively experienced when accessed.

Conway (2009) proposed nine features (see Table 1.1), that, when occurring collectively, define and distinguish EMs. This review will briefly discuss each of these properties.

1.1.3.1 Summary Records

As previously discussed, EMs are records of sensory-perceptual-conceptual-affective processing that renders them dynamic representations of an experienced event. However, this understanding must be viewed with caution. Firstly, the EM may not accurately reflect an experience insofar that we may make errors regarding the details of the event. For example, we may incorrectly recall the colour of a blue car as green. However, Conway (2009) suggests that in fact, many of the sensory-perceptual-conceptual-affective details may in fact closely correspond with actual experience. These detailed, dynamic features can cause EMs to appear extremely vivid, allowing an individual to mentally relive an experience (Conway, 2009). However, a second caution should be taken here since EM can contain highly specific detail which did not in fact occur or which have migrated from another mental representation, in the case of false memories (Hyman & Pentland, 1996; see also section 1.2 for review of false memories).

1.1.3.2 Activation and Inhibition

This feature refers to the process whereby detail in EM can be accessed differently through conceptual, non-episodic recall (Conway, 2009). For example, an item can be inhibited when an attempt at access is made through normal EM retrieval. However this same detail, when an attempt at access is made through more general processes of retrieval, is successfully recalled. This unusual pattern of activation is referred to as episodic inhibition and is thought the mediate EM content, allowing it to provide the rememberer with a representation of an event, rather than a literal copy in order

to satisfy the primary need of the working memory: goal processing (Williams, Conway, Baddeley, 2008).

1.1.3.3 Visual imagery and visual perspective

As discussed in section 1.1.5, memories are often accompanied by recollective qualities (Brewer, 1996) including visual imagery, which is in turn always viewed through a particular perspective – either a field (whereby a memory is experienced as representing its original viewpoint, through one's own eyes) or observer perspective (whereby the individual sees themselves acting in the memory) (Nigro & Neisser, 1983). For Conway (2009) both visual imagery and the perspective from which it is viewed are essential features for the classification and definition of EM.

1.1.3.4 Short Time Slices

EMs are represented in short time frames. Research suggests that these time frames begin with information regarding actions and end with facts and details regarding these actions (Williams, et al., 2008). However, little is known about what constitutes these episodic boundaries. Despite a lack of knowledge regarding the definitive formulation of episodic boundaries, it has been proposed that EMs are structured in such short time frames to again promote the goal driven autobiographical memory system (Conway, 2009; Tulving, 2002).

1.1.3.5 Temporal Order

Conway (2009) suggests that EMs are usually represented in the same temporal order as when they were originally experienced. This temporal order places the EM within a time system that allows it to be anticipated (prior to its occurrence) and reflected upon (following its occurrence). Although the standard representation of an EM is in experience-corresponding temporal order, EMs can be consciously recalled in a number of temporal orders (backwards, starting from a mid-point). Indeed, this ability to alter the temporality of an EM has been utilised both by those attempting to increase the amount of (accurate) detail of a remembered event, in the Cognitive

Interview, for instance (Fisher & Geiselman, 2010) and for those attempting to detect deceit (Vrij, Granhag, Mann & Leal, 2006), since it is assumed that conscious altering of the temporal order will require an increased cognitive effort.

Further, the temporal nature of EMs allows the individual to project themselves both into the future, in order to anticipate and plan for future events, and into the past, allowing for evaluation and rumination of an alternative history. This ability, described by Tulving (2002) as "mental time travel", has received much attention in recent years, with particular focus falling on our ability to conceive the future (Addis, Wong, & Schacter, 2007; D'Argembeau & Van der Linden, 2004; Newby-Clark & Ross, 2003; Schacter & Addis, 2009; Szpunar & McDermott, 2008). However, only a handful of studies have investigated our ability to create fictitious past events (Conway, Pleydell-Pearce, Whitecross & Sharpe, 2003). Mental time travel is considered in more detail in section 1.1.4 below.

1.1.3.6 Endurance

Research has shown that as retention intervals increase, so does the difficulty in accessing many EMs (Nigro & Neisser, 1983; Piolino, Desgranges, Benali, & Eustache, 2002). However, this is not to suggest that EM is entirely forgotten after a period of retention. Indeed, many life-logging studies have shown that after recognition tests (often using images of daily events taken from a camera worn around the neck) that many EMs, otherwise considered forgotten, can be retrieved (Hodges et al., 2006; Sellen et al., 2007). In this way then EMs may be reconsidered as enduring mental representations, whose recall is often dependent on external recollective measures (Conway, 2009).

1.1.3.7 Specifying Autobiographical Memory

EMs lie at the foundation of the autobiographical knowledge base, providing the most specific detail when specific autobiographical memories are accessed. Thus,

they allow detail to be accessed in the retrieval cycle of autobiographical memory. This specificity attributed to EMs is again assumed to help promote and facilitate the goal-oriented working self (Conway, 2009). Specific episodic information allows for an adaptive system that draws on previous experience to influence and inform goal-driven decisions and actions in both the present and the future (Conway, 2009).

1.1.3.8 Recollective Experience

It is the specific sensory-perceptual-conceptual-affective knowledge within EM that allow a past experience to be mentally relived. These details may give rise to a highly specific and detailed memory, allowing the individual to recall what was seen, who was present, what emotions were felt etc. (D'Argembeau & Van der Linden, 2008). These details are essential to EM as they allow the rememberer to have a sense of past self (Klein, 2001) and provide a means of distinction from other forms of mental representations such as dreams and beliefs (see section 1.3.9.1) (Johnson, Hashtroudi & Lindsay, 1993). Essentially then, these details allow us to mentally relive the event (Tulving & Kim, 2007).

1.1.4 Mental Time Travel

As discussed above, an essential mechanism involved with episodic remembering is temporality. Not only does this ability allow the individual to place the specific memory in time, allowing for its anticipation and evaluation within the memory system (Schacter, 1999; 2009), but also allows an individual to imagine feasible future scenarios – termed "mental time travel" (Tulving, 2002). Indeed, the connection between memory and imagination has been shown to be so strong, that the memory system has been somewhat reconceptualised as a *remembering-imagining system* (Conway, 2009).

Tulving (1985, 2002) originally suggested that the ability to imagine the future was necessarily dependent on access to information in long-term memory. This

hypothesis has been rigorously and dynamically investigated within a number of disciplines. Studies of brain-injured patients (Hassabis, Kumaran, Vann & Maguire, 2007; Tulving, 1985) showed that damage to brain regions involved with episodic memory generation (medial temporal, frontal lobes, hippocampus) rendered individuals unable to imagine future events and recall past events. Further, more recent neuroimaging research has revealed that imagining both future and past events activates a large number of common neural regions, regions which have previously found to be associated with mediating memory retrieval (Addis, Wong, & Schacter, 2007; Hassabis, Kumaran & Maguire, 2007, Conway et al., 2003). Memory of past events and fictitious future events has also been found to be related in many of their recollective qualities (D'Argembeau & Van der Linden, 2004; Szpunar & McDermott, 2008).

1.1.5 Phenomenology of Memory

Now that a definition, an outline and understanding of the construction processes and varieties of autobiographical memories have been provided, it is important to understand how memories are distinguished from other forms of mental representations, such as imagining or dreaming. Essentially, the feelings associated with recall allow us to make distinctions between ourselves in the past and in the present – our remembering and experiencing selves (Tulving, 2002; Windhorst, 2008). Despite many researchers now investigating the phenomenology of memory (D'Argembeau & Van der Linden, 2004, 2008; Marche, Brainerd & Reyna, 2010, Tulving, 2002) the behaviourist turn in psychology rendered introspection and other unobservable forms of measurement redundant for investigation.

However, phenomenological enquiry has a rich background with its foundations rooted within philosophy. For philosophers, qualia represent the experiences or felt nature of mental states (Larsen, 1998), with famous examples including the

perception of the redness of red (Brentano, 1995) and subjective experiences of pain (Wittgenstein, 1953). However, philosophers reserve particular qualia for the act of remembering. Indeed, early introspection studies (Boring, Langfield and Weld, 1939) considered memory to be less detailed, less stable, less clear, less intense and less vivid than perception (Larsen, 1998). Initial experimental work on the subject within psychology (Brewer, 1988; Johnson, Foley, Suengas & Raye, 1988) supported philosophical thought and introspection studies by showing that mental imagery frequently accompanied memories, indeed, Brewer (1996) showed that close to 100% of memories are associated with mental imagery. Due to this reciprocal relationship between memory and image, researchers (e.g. Brewer, 1996) have strongly advocated the tandem study of memory performance in terms of its behavioural functioning and its associated recollective experience, or autonoesis (Tulving, 2002).

Due to the ubiquitous nature of mental imagery, it has undergone strategic investigation. For example, Freud (1915) first identified that memories may not always represent a copy of an original experience since they were often viewed through a third person perspective and hence edited in some way that did not reflect their original viewpoint. This observation has been replicated repeatedly in psychology, leading to categorisation of “field” and “observer” memories (Nigro & Neisser, 1983). Field perspective represents that memory imagery viewed as the event would have been experienced initially – through one’s own eyes; often referred to as “shoulder camera” perspective (Vrij et al., 2010). Observer memories however represent a “third person” perspective, with this perspective often including the rememberer in the image. Interestingly, perspective has shown to influence further the recollective experience associated with a memory, for example (Libby & Eibach, 2002) showed that field perspective memories usually carried more vivid mental imagery and (Robinson & Swanson, 1993) found that older memories were recalled

less frequently with a field perspective. Further, Libby, Eibach & Gilovich, (2005) noted that an observer perspective is often taken when a memory is incompatible with a current self-image. It may be then that those memories of our pasts represent dissonance between past and present selves, which is in turn represented visually.

In addition to the perspective through which the mental imagery of a memory is viewed, Brewer (1996) also noted how recollective images also contain superfluous information that was not necessarily pertinent to the remembered event, such as the clothes one was wearing (if they were not central to the remembered event). He termed this information irrelevant detail. Initially, this irrelevant detail was assumed to be an feature of remembering relevant only to flashbulb memories – a subset of memories once believed to be highly accurate, vivid and particularly resistant to forgetting (Brown & Kulik, 1977). However, this finding has been refuted through work on ordinary or "everyday" memories which were also found to contain many irrelevant details, with much work now assessing detail in accounts (Levine et al., 2002; Palladino & De Beni, 2003).

Further, it has been noted that in addition to visual imagery, thought as being central to memory by philosophers, memory also contains "occurrent thoughts and felt affects" (Brewer, 1986, p. 34). The argument proposed by Brewer here is that emotions may not be successfully represented in image form and may therefore require supplementary analysis. This has indeed been the case with emotions accompanying memory receiving a great deal of attention over the past few decades (Christianson & Safer, 1996; Holland & Kensinger, 2010; Porter & Birt, 2001). However, it is important to note here that although emotion associated with a memory may be qualitatively different from emotion associated with experience, it is unlikely to remain constant over time, particularly as our comprehension of ourselves in the past changes (Windhorst, 2008). Therefore, unlike visual imagery that can be

considered as representing the memory itself, emotion can be thought to arise from the evaluation of the content of the memory, rather than being an attribute to which it is fixed (Windhorst, 2008).

Therefore, investigation regarding the nature of phenomenology associated with memory leads to two clear conclusions: firstly, that accompanying visual imagery should be investigated in a multi-faceted way – allowing all features such as perspective and detail to be examined. Secondly, that emotion associated with recall should be investigated with caution since it may represent present feelings about the self in the past, rather than the actual feelings experienced at the time of encoding.

Although research shows that mental images are pervasive when remembering, it is important to understand whether mental images are necessary for remembering to occur. Is it possible to remember without mental imagery? Tulving (2002) claimed "no autonoesis, no mental time travel". For Tulving (1985) then, autonoesis was essential to memory to allow distinction from other forms of awareness including thinking, imagining and dreaming. Conway (2009) considers sensory-perceptual-conceptual-affective processing to be fundamental for the classification of episodic memory. It seems then that this mental imagery is not simply an artefact of an experienced event, but is functional in that it allows cognitive distinctions to be made regarding the experiencing and remembering self (Windhorst, 2008).

The question however can be reversed: can recollective qualities exist without an original sensory experience? As was shown earlier in section 1.1.5, a memory can exist without any causal link to the original sensory experience insofar that a memory can consist solely of phenomenological representations of an original event (Windhorst, 2008). In addition, recollective experience has been shown to occur when an original experience is entirely lacking (Windhorst, 2008) – i.e. in the case of

false memory (Hyman & Pentland, 1996; Marche et al., 2010) and when projecting oneself into the future (D'Argembeau & Van der Linden, 2004, 2008; McGinnis & Roberts, 1996).

1.2 Varieties of False Memories

The current view of memory represents a system that is constructive in nature; memories are not verbatim reproductions of an experienced event but are instead the recombination of information from various sources (e.g. perceptual, contextual, episodic). Essentially then, memories are created anew each time they are recalled and represent the amalgamation of disparate information sources (Addis et al., 2007; Conway, 2005). A consequence of this reproductive system is that it renders memories particularly susceptible to errors and distortions (Bell & Loftus, 1989; Brainerd & Reyna, 2005; Hyman & Pentland, 1996; Loftus, 1993; Roediger & Mcdermott, 1995; Schacter, 1999; 2009).

1.2.1 Coherence and Correspondence

Memory errors can occur in a variety of ways, from internal processes such as forgetting information in the long-term store, to processes that involve some kind of external influence, such as leading or suggestive questioning (Schacter, 1999; 2009). For Conway (2005) all memories fall between the two dimensions of correspondence (with a fact) and coherence (of propositions). Coherence refers to the way in which memories are altered, both in terms of their accessibility and content, to make them more consistent with current goals, self-images and beliefs. Therefore, the self and the memory system form a cohesive unit that serves to propagate current self-views by accessing specific confirmatory memories. For example, Krans, Näring, Becker, & Holmes (2009) found that intrusive trauma memories failed to be incorporated into the autobiographical knowledge base due to necessary altering of goal structures. Changes to these structures come at high emotional and cognitive costs and are

avoided to protect current self-coherence (Krans et al., 2009). Indeed, as noted in section 1.1.1, a key feature of autobiographical remembering is to provide a coherent sense of self over time (Bluck et al., 2005). Therefore, the memory system will favour memories that confirm the current self-image.

Alternatively, on the converse end of the spectrum lies correspondence. Correspondence posits that memory should accurately reflect an experienced event. However, a memory system that corresponded literally with experience would contain overwhelming detail, posing problems for both storage and retrieval (Conway, 2005). Therefore, the memory system must fulfil not only the need to provide an accurate record, but also a sufficient, but not superfluous, amount of detail. Conway, Meares, & Standart (2004) suggest that the memory system achieves this through "adaptive coherence", a suitable level of detail retention. For many memories what may be recalled is the "gist" of an experience (Bartlett, 1932; Koriat, Goldsmith, & Pansky, 2000). Indeed, individuals are able to recall some events without any recollection of original details at all, as is evidenced in Brewer's (1986) classification of autobiographical memory (see section 1.1). Conway (2005) argues that all memories lie somewhere between the reaches of correspondence and coherence. Therefore, the view taken in this thesis is that for a rememberer, a true memory may not necessarily be one that corresponds with experience but what is important is that is it *believed* to be true insofar that is it coherent with existing self-representations (Conway, 2005).

1.2.2 **Distortion of Memories**

Further, specific memory errors may occur during the processes of encoding, storage and retrieval that will ultimately determine a memory's place along the correspondence-coherence spectrum. Schacter (1999; 2001) and Schacter, Chiao, & Mitchell (2003) categorise all memory errors into three broad groups: errors of

forgetting, distortion and persistence. Here, we are interested in those errors of distortion (misattribution, suggestibility and bias) – whereby memories are recalled i.e. not forgotten, but may be recalled incorrectly – in other words, those errors that place memories between correspondence and coherence.

1.2.3 Errors of Misattribution

Source judgements represent an attempt by an individual to understand the origins of a memory (Johnson et al., 1993), with errors of source monitoring occurring when an individual misattributes information not grounded in memory to their own personal experience (Johnson & Raye, 1981).

Two general errors are thought to occur: external errors that refer to errors in attribution i.e. misremembering where an individual was when her/she saw an event occur and errors of internal judgements that represent an inability to differentiate between experience and imagination – also known as reality monitoring errors (Schacter, 1999; 2009). Johnson & Raye (1981) proposed a metamemory framework that showed how the process of identifying real and false memories occurs. Broadly, these decisions are governed by two strategies: heuristic strategies that involve assessment of content and appearance of a memory – including its recollective characteristics and comparative strategies that evaluate the information with regards to other memories, logical rules and general knowledge (Larsen, 1998).

Although these judgements allow for an introspective evaluation of memory, they do not necessarily give rise to accurate judgements. Indeed, failure to adequately assess the content of a memory would place the resulting false memory under the error of coherence – the memory fails to cohere to the experienced event. Importantly though, assessing source and reality monitoring judgments allows the researcher to delve into the subjective assessment of individual mental processes that lie behind the act of remembering, which without such categorisation, would remain unseen.

1.2.4 Errors of Suggestibility

1.2.4.1 External Post-Event Information

Another memory error that also results in an error of coherence is that of suggestibility. For Schacter et al. (2003) this refers to the fact that some memories may be entirely of partially implanted, often through leading or suggestive questioning; these kinds of errors can be considered as being generated from external post-event information (Pezdek, Lam, & Sperry, 2009). For example, a neutral question may ask: "what did you see?", or more specifically "did you see any knives?", however a leading question may ask "you saw the knives, didn't you?" with a suggestive question asking "how many knives did you see?" These types of non-neutral questions can lead an individual to incorporate detail and events into their memory that were not part of the original experience and may be posed in formal interview settings, but also may occur when discussing memories informally.

The issue of suggestibility has been made particularly prominent through recent series of "recovered childhood memories", whereby childhood abuse (usually sexual) is recovered by an adult rememberer. These types of memories are often recovered in therapy, however many researchers suggest that the likelihood of such memories having actually occurred is low, suggesting that vulnerable people often come to believe such memories through suggestive therapy (Williams et al., 2008).

Indeed, to show the ease at which the memories can come to be believed, highly emotional memories have been implanted within laboratory settings. Classic studies by Loftus (Loftus, 1997) see approximately a third of participants coming to believe, by recalling and embellishing memories of childhood events that never in fact occurred. Memories that have been implanted range from being lost in a shopping centre, to a violent dog attack (Loftus & Pickrell, 1995). However, limits do exist on the amount of information individuals can come to believe (Polage, 2004). For

example, Pezdek & Roe (1994) showed that children would not come to believe that they had been abused when they had not and conversely, that they would not believe that they had not been abused when indeed they had. Further, obvious changes in details made in studies by Loftus (1979) were frequently rejected. Therefore, although memories can be altered and affected by externally generated information, often individuals are able to reject and are subsequently resistant to incorporating, in particular highly unusual, externally generated information into memory.

1.2.4.2 Internal Post-Event Information

In addition to externally derived post-event information, errors in memory can also occur from what can be considered internally-, or self -generated (Pezdek et al., 2009) post-event information. Information that can be considered self-generated can include guessing (Hastie, Landsman, & Loftus, 1978), invited speculation (Schreiber, Wentura, & Bilsky, 2001), forced confabulation (Pezdek et al., 2009; Zaragoza, Payment, Ackil, Drivdahl, & Beck, 2001), and forced fabrication (Chrobak & Zaragoza, 2008). Results from all above studies have shown that internally generated post-event information can have negative consequences for memory, including incorporation of false details into memory, causing a failure in reality monitoring – whereby the self-generated information is mistakenly attributed to original experience (Johnson & Raye, 1981). Reality monitoring describes a process whereby an individual is able to reject non-experienced information as false using discrimination processes involving assessment of spatial, temporal, etc. information (see 1.3.9.1). Those memories that have originated from experience contain more of these details and can therefore be categorised upon assessment of their inclusion in the memory image/description (Johnson & Raye, 1981). However, when individuals are encouraged to imagine or confabulate spatial, temporal etc. details, classification

of experienced and imagined memories can prove particularly difficult (Johnson et al., 1993; Polage, 2004).

However, self-generated information is generally incorporated into memory to a lesser extent than that of externally- or other- generated post-event information (Gombos, Pezdek, & Haymond, 2012; Pezdek et al., 2009). It is suggested that self-generated information is less likely to be incorporated into memory than externally-generated information due to a process of recollect-to-reject (Brainerd, Reyna, Wright & Mojardin, 2003; Pezdek et al., 2009). This process suggests that internally generated items are successfully rejected as they are remembered as being deliberately generated, and thus are reasoned not to have originated in experience. Despite the lower rate of information incorporated from internally- rather than externally – generated post-event information, guessing, speculation, confabulation and forced fabrication can still negatively impact upon memories, causing distortion of truth and resulting in the generation of false memories (or at least true memories containing false details). This is a particularly important issue for police interviews whereby interviewees may be encouraged to answer all questions posed to them, or for when individuals are urged to imagine traumatic or stressful events (Pezdek et al., 2009).

However, a further type of self-generated post-event information that has received little interest in the literature is that of deliberately fabricated information. To my knowledge, only a very small number of studies have investigated the effects of lying on memory. Maio & Olson (1995) showed that expressing false attitudes or feigning to hold attitudes one knows not to be true strengthens the corresponding truthful attitude (Polage, 2004). This is thought to occur since the truthful belief is initially accessed and subsequently denied, and in turn, is reinforced. More recently, Polage (2004) investigated how lying about a childhood event could affect the belief that the

event actually occurred. Participants rated events on the Life Events Inventory (LEI) e.g. “were you caught sneaking out of the house”, from very unlikely to extremely likely to have occurred in their life. Two weeks later, participants who rated at least two items as low on the likelihood scale were asked to give false information, through an interview about one of the events they previously rated as unlikely to have occurred in their life. Either immediately, two weeks or five weeks later, participants completed the LEI again, truthfully re-rating their belief in the likelihood of all events having occurred. Results showed that in all delay conditions, for the majority of participants, lying about an event decreased the subsequent likelihood rating – after lying participants became more convinced that the event had never occurred. Polage (2004) termed this effect ‘fabrication deflation’. However, a small minority (10-16%) of participants increased their likelihood rating so much, that they now indicated a complete belief in the occurrence of the lied about event. Polage (2004) suggests lies are successfully distinguished as non-experienced through a tightened reality monitoring process – tightened when there is source confusion (Johnson et al., 1993). Further, lies are posited to be rejected using process of recollect-to-reject (Brainerd et al., 2003; Pezdek et al., 2009), in the same way that other forms of internally generated post-event information are classified as non-experienced – participants recalled that the information they gave was fabricated and that they were required to fabricate and can therefore distinguish the information from that which was gained from experience (Polage, 2004).

A number of theories exist explaining why, 10-16% of participants came to rate their lied about events as more likely to have happened. Firstly, it is suggested that clear mental imagery may prevent correct categorisation of information, by leading participants to believe that the event actually occurred because of this clear imagery (Hyman & Pentland, 1996). Polage (2004) suggests that when being interviewed,

participants may have created such a clear visual image, that it was difficult to refute when it was later evaluated. Further, these interviews may have allowed for spatial, temporal, emotional etc information to enter into the memory description, rendering it particularly hard to identify using criteria such as those posited by reality monitoring (Johnson & Raye, 1981). Further, lying about an event may actually act as a 'reminder' for previously forgotten, experienced events (Hyman & Pentland, 1996; Polage, 2004) which may explain their increased ratings. However, it may also be the case that this study was sampling autobiographical facts. It might be that long-standing autobiographical facts of childhood events are stable and resistant to distortion – when asked if I was caught sneaking out of the house when I was a child, my answer is no, as for me this is an autobiographical fact, I know that this never happened, so subsequently creating a fabricated account of this is likely to bolster my existing knowledge that it never occurred. I do not recall a time I was not caught sneaking out of the house, deny this and then continue to produce a lie that generates an image of me leaving the house, which could lead to source confusion.

A distinct way of assessing the effect of lying on memory would be to ask participants to lie about a recently experienced episodic memory, for example one's whereabouts last Thursday, rather than deny autobiographical facts. In this case an individual would have to recall a memory of his/her whereabouts, deny this and then subsequently alter the memory. It may be in this case the source confusion would become more apparent. However, no work has, of yet, investigated this avenue of research.

It seems then that internally generated post-event information (except that of deliberate fabrication) can have negative impact upon memory, although this impact has been found to be less than externally generated information (Pezdek et al., 2009). Lying on the other hand has received little attention, yet work that has investigated

its effects on memory suggests that, for the most part, lying can in fact bolster pre-existing beliefs and memories. However, the effects of lying about a recently experienced event (as opposed to a childhood event or autobiographical facts) have yet to be investigated.

1.2.5 Errors of Bias

As suggested by those memories that fall under the correspondence category, our memories can be altered by our current attitudes and beliefs (Schacter, 1999; Wilson & Ross, 2003). Schacter (2001) refines this error into five distinct bias-type errors: *consistency bias* – past attitudes are distorted to match current attitudes, *change bias* – after an effortful investment in improving performance, for example, the past performance will be remembered as more difficult than it actually was, *stereotypical bias* – memories are altered to match with stereotypical judgements, *hindsight bias* – current knowledge renders past events as predictable and finally, the *egocentric bias* - memories are distorted to enhance the self, for example, having an inflated belief about one's abilities in school. A number of studies have confirmed the existence of such biases (Ross, 1989, Williams et al., 2008) and indeed, they have been found to bias a range of beliefs from attitudes, the memory of pain and of romantic relationships (Schacter, 1999; 2009).

1.2.6 Time-Slice Errors

The above review has shown how memories can become to be a completely or partially inaccurate representation of an experienced event. The errors can be produced by internal or external factors and can lead to errors in coherence, correspondence, or some amalgamation of the two. However, memories that reflect an experienced event accurately may also contain errors. One such inaccuracy is that of temporality, or 'time-slice errors' (Brewer, 1988). Time-slice errors refer to inaccuracies regarding the time a particular memory was experienced. In particular,

it refers to an individual providing the incorrect memory for a specific time frame. These inaccuracies are particularly transparent within flashbulb memory literature whereby participants provided more than one location where they recalled hearing shocking or surprising news (Belli & Loftus, 1996). Belli & Loftus (1996) suggest that in fact both versions of events are correct insofar that they both occurred, yet one represents a time-slice error, whereby the incorrect memory for a particular temporal location was provided. These memory errors show then that accurate memories can be retrieved, but errors may occur regarding the time frame from which they occurred.

1.2.7 **Measuring Accuracy**

Since accuracy of memory has been reviewed theoretically, it is also important to understand how it might be measured objectively. As per the Ebbinghaus tradition, accuracy of memory was firstly assessed in terms of the *quantity* of information that could be recalled, particularly through the use of list-learning paradigms. However, following the work of Bartlett (1932), came a reconsideration of memory accuracy. Bartlett's (1932) work was significant in that it investigated memory with regards to its workings in the real-world and reconceptualised memory as a representation or reconstruction of the past (Koriat et al., 2000). For Koriat et al. (2000), assessing the *correspondence* that memory has with experience should determine its accuracy, not the quantity of details able to be recalled. For example, memories are intrinsically bound at their initial level of encoding: if we never witness the gorilla beating its chest whilst we watched players pass a ball to each other it will forever remain elusive in our account. In other words, quantity of detail recounted is necessarily dependent on encoding. Here then, what should initially be questioned is our perception of reality, not our memory ability.

1.3 Intentionally Fabricated Autobiographical Memories

A further variety of false memory, one that features centrally in this work is that of a memory created to be intentionally false (IFAMs). The view taken here is that a fabricated memory differs from a truthful memory in that it includes details (ranging from few details to entire fabricated events) that do not correspond with an experienced event. In contrast to false memories, these details are explicitly known to be false and are portrayed as if they are believed to be true. IFAMs are created in order to provide a deliberately false account of the past, usually with the overreaching intention of deception. Additionally, recollective qualities have also been shown to occur alongside deliberately fabricated memories (Porter, Peace, & Emmett, 2007) and will therefore be considered and investigated within this body of work.

It is however important to note that fabricated and false memories may not represent discrete memory types. Indeed, particularly in laboratory settings, the initial stages of false and fabricated memory generation most probably involve similar processes of editing a truthful memory. What is important is the outcome, or motivation for the editing. For a fabricated memory, the intention is to create a non-factual account that is known to be untrue. For false memories, the intention is to create a non-factual account that is believed to be true. In this line of thought, it is possible that a fabricated memory will become a false memory following explicit rehearsal and elaboration over time (Polage, 2004). It may be more appropriate therefore to consider fabricated memories as part of the memory distortions continuum, allowing memory research to inform their study.

1.3.1 Intentionally Fabricated Memories and Deception

Deception permeates many aspects of daily life. It includes “practical jokes, forgery, imposture, conjuring, confidence games, consumer and health fraud, military and

strategic deception, white lies, feints and ploys in games and sport, gambling scams, psychic hoaxes and much more" (Hyman, 1989, p. 133). Deception plays an important role in social interaction, with research showing that people lie a number of times every day (Depaulo et al., 1996; Serota, Levine, & Boster, 2010). Reasons cited for lying have been categorised into five broad groups: to impress others or to avoid shame or embarrassment; to gain advantages; to avoid negative consequences; to benefit others and to help facilitate relationships (Kapardis, 2010). Lying has also been categorised broadly into 'white lies' which simply aid social functioning, and more serious lies which carry significant emotional costs, often leaving the liar with feelings of guilt and anxiety (DePaulo, Ansfield, Kirkendol, & Boden, 2004). In this thesis, the focus will predominately turn towards serious lies.

The term deception covers a multitude of behaviours from concealment, omission, distortion and misrepresentation, all which carry the aim of misleading another (Porter, 1998; Vrij, 2000). A lie can be written, spoken but can also be communicated without verbal communication. Vrij (2000) considers the athlete who feigns an injury or the taxpayer who does not report all earnings. Further, Barnes (1994) notes how deception can arise from not saying anything in conversation, though omission or 'pregnant pauses' (p. 17). For the purposes of this review however, deception is considered a behaviour between two or more people. It does not discuss or refer to self-deception. Here, specifically the interest is focussed upon those lies that represent fictitious memories – entirely or partially fabricated past events, rather than other types of deception such as holding false propositions and beliefs or deceiving through omission.

Further, Ekman (1996) distinguished different types of lie: opinion lies, emotional lies and factual lies. Although considerable overlap exists between the three categories, in particular we are interested in those lies of fact. Therefore, in this thesis an IFAM

can be seen as an entirely or partially fabricated memory, consisting primarily, but not exclusively, of false facts.

IFAMs may arise in forensic contexts, and become particularly pivotal in instances when memory is the only form of evidence available. The sorts of memories that are the only evidence include, what in the UK are termed cases of 'historic' sexual abuse (typically memories dating to childhood recalled by an adult complainant), or memories that feature in accident assessments, war, torture and plagiarism. However, little research has been conducted within this area and therefore the percentage of adults providing fabricated memory-based evidence is unknown yet fabricated memories are a common feature of forensic interviews and interrogations (Porter & Yuille, 1996; Porter, Yuille, & Lehman, 1999a). A number of instances of deliberate fabrication have however been highlighted in the media including the Clinton inquiry where President Clinton provided a deliberately fabricated statement and the more recent case of Shannon Matthews whose parents launched a large-scale manhunt for the alleged missing girl, despite holding her captive the entire time. Further, various of reasons and motivations for deliberately fabricating memories may exist including revenge, control and monetary gain (Yuille et al., 1995).

Surprisingly, despite the importance of understanding the mechanisms underlying such fabricated memories, particularly when the legal system is often focussed on assessing memory reports (Porter, 1998), the vast majority of forensic memory research has concentrated on assessing eyewitness ability (Saks, 1986). Only more recently has research begun addressing the need to distinguish true from false memories. Indeed Porter (1998) suggests, "courts need to employ rationally-based criteria in evaluating memories for events, in order to approach the realization of its fact-finding agenda" (p. 155). Attempts have been made at providing the court with such guidelines, see Guidelines on Memory and the Law, (British Psychological Society

Research Board, 2008), yet the notion surrounding the classification of fabricated witness reports was only brought to attention in the early 1950's following work and ideas from German psychologists such as Undeutsch. Indeed, Judges still rule that 'common sense' should prevail in memory assessments, for instance, in R. v. Adams, D.J. (1997, as cited in Lynch & McNally, 2003) jurors were instructed "to evaluate evidence and reach a conclusion not by means of a formula, mathematical or otherwise, but by the joint application of their individual common sense and knowledge of the world to the evidence before them". More recently, in the case of R v Weller (2010), it was stated that, "if one tries to question science purely by reference to published papers and without the practical day-to-day experience upon which others have reached a judgment that attack is likely to fail…". However, little is known about such 'common sense' judgements, and although a few studies have examined the beliefs that the general public (Desmarais & Don Read, 2011), psychologists (Magnussen & Melinder, 2011) and judges (Wise & Safer, 2004) hold regarding, specifically, eyewitness memory (Magnussen et al., 2006; Simons & Chabris, 2011), no studies have explicitly investigated beliefs about autobiographical memory. Further, little is known about judgements of cues to deception, with one study finding that judges and other legal professionals held beliefs about lying that were inaccurate (Porter & ten Brinke, 2009) and another showing that both lay people and police officers often judged the truthfulness of an individual based on subjective, stereotypical beliefs about lying (Akehurst, Kohnken, & Bull, 1996).

However, a small body of work has begun investigating IFAMs, with particular focus falling on systematic differences between real and fabricated memories (Conway et al., 2003; Merckelbach, 2004; Porter et al., 1999; Porter et al., 2007). As noted previously, this interest was particularly sparked by work of Undeutsch, who originally proposed what has become to be known as the Undeutsch Hypothesis, which claims

that statements that are the product of experience will differ from those statements that are the product of imagination (Undeutsch, 1967). However, prior to this thesis, no work has investigated the processes underlying IFAM construction, or beliefs the public hold regarding truthful and fabricated autobiographical memory.

1.3.2 Methods of Studying Intentionally Fabricated Memories

A number of paradigms have been employed to study fabricated memories. One methodology seen frequently in other areas of autobiographical memory study is that of the Crovitz technique, employed in an IFAM study by Conway et al., (2003). This presents participants with cue words or phrases of activities, such as "holiday" or "lying on the beach" and a participant is asked to search for a memory (and in the present work, generate a fabricated memory) that matches the cue and record it, usually by typing or speaking it aloud. The technique allows methodological parameters to be strictly controlled, and provides a homogenised experiment for all participants. Further, memory retrieval and image generation times can be collected along with a verbal or typed narrative of the memory and other phenomenological measures can be recorded. This approach however does not include any measures of accuracy – unless corroboration from a family member or friend occurs, the account cannot be checked for accuracy (at least insofar as the memory corresponds to external facts).

A methodology similar to the Crovitz technique is that of the autobiographical paradigm, employed in studies by Porter et al., (1999). In such methodologies, participants are asked to provide a variety of memories (truthful and fabricated in this case) from predefined cues, but these cues have been externally verified, usually by family members, prior to the study. Cues may therefore differ between participants. Such studies are particularly insightful as they allow for accuracy scoring to take place, yet still capture a long-term memory. Topic of memory is not as tightly

controlled as the Crovitz technique, however, which may affect the presentation of a memory. A slight variation of this method involves simply asking participants to recall any truthful memory (however, usually a specific type of memory, such as one which is highly traumatic) and then fabricate a similar type of memory. Again, this is beneficial as personal memories are recalled, but with no external verification, it is difficult to establish if these memories are accurate representations of an event.

A different approach to the study of fabricated memories has been the use of staged events or mock crimes, seen in studies by Vrij et al., (2010). In such a methodology, participants witness an event or mock crime and are subsequently interrogated about the event (this can range from hours to weeks later). Participants are required to act as honest or deceptive witnesses, providing truthful or fabricated recall as necessary. This procedure has high internal validity, as the event, time between witnessing and interrogation, and the interrogation itself can be highly controlled. Accuracy can also be strictly measured. However, it lacks any of the naturalistic factors seen in real-world crime scenarios failing to address reasons for providing the lie and motivation not to be detected.

Field studies have provided a further insight into fabricated memories. These methodologies investigate real-world accounts of fictitious memories in cases where the falsehood has been revealed. Studies by Porter & Yuille (1996) and Porter & Brinke (2010) have investigated the language and behaviour of Eichmann and Clinton respectively during parts of testimony that are considered to be fabricated. Although this offers a methodology with high external validity, problems arise over classifying fabricated testimony (unless explicitly known) and the methodology lacks any determinable parameters.

Although a number of methodologies have been employed when investigating fabricated memories, it seems that for a research area in its infancy, the preferred methodologies should be those that allow strict parameters to be set, allowing memories to be studied systematically. Once groundwork in theory has been completed, then findings from the laboratory should start to tackle real-world problems. Therefore, work in this thesis will employ the Crovitz cue-based technique and the staged event methodologies to set the foundations for future work on intentionally fabricated memories.

1.3.3 Detecting Fabricated Memories

Of the limited literature available regarding IFAMs, the vast majority has dedicated itself to attempting to identify reliable differences between truthful and fabricated memories with the overarching aim of assisting law enforcement. These ventures have had some success, indeed, a number of assessment tools have been developed and subsequently used as evidence in courtrooms for or against the veracity of a memory. This review will detail the history of fabricated memory detection along with its successes and pit falls.

1.3.4 Physiological Correlates of Fabricated Memories

The first scientific venture into detecting fabricated memory accounts was taken by Lombroso in 1895 (Bunn, 2012). Lombroso proposed that deceit could be detected using physiological indicators such as heart rate and breathing rate, following the proposition that fabricating was more physiologically arousing than truth telling, possibly due to nervousness or additional effort associated with lying. Following Lombroso's hypothesis, in 1921 Larson developed a rudimentary polygraph (although many individuals have claimed to be the inventor of the polygraph since) – a device used to measure physiological changes in the body (heart rate, breathing rate, galvanic skin response) elicited by particular questions (Fiedler, Schmid, & Stahl,

2010). The polygraph advanced and has gone on to become a deception detection device, validated and used as evidence by some states in North America (Vrij, 2005). However, its credibility has been widely criticised, with indicators of nervousness (i.e. raised heart rate) often giving rise to false positives – whereby truthful witness were identified as liars (Porter, 1998). Additionally, simple countermeasures e.g. foot tapping and backwards counting have shown to reduce physiological signs thought to be associated with deception, producing false positive results and essentially allowing shrewd individuals to 'beat the test' (Fiedler et al., 2010). Further, most questioning techniques employed by the polygraph (e.g. the Control Question Test) tend to use yes/no interrogatives, or at least, reduce answering to one or two words. Since memories are usually reported in narrative form (Fivush, 2011), reducing answering in such a manner may be removing potential cues to identify real from fabricated accounts.

1.3.5 Non-Verbal Cues to Fabricated Memories

Following the criticisms of the polygraph and the lack of an assessable memory narrative, focus turned to attempting to utilise non-verbal cues to identify fictitious memories (Granhag & Stromwall, 2002; Porter & Yuille, 1996; Sporer, 1997). This method of detection rests on the same assumption as that which underlines the physiological approach – that lying elicits a stronger physiological response (Vrij, 2008) than truth telling does. However, few patterns of non-verbal behaviours have been found to be reliably associated with deception, indeed, (Vrij et al., 2008) suggest that "Pinocchio's nose" does not exist.

A possible explanation for the failure of these detection techniques are their underlying assumptions that lying is more anxiety inducing that truth telling. Anxiety may also be associated with truth telling, indeed Bond & Fahey (1987) suggest that the process of being interviewed may cause much anxiety for the truth teller, which

in turn may lead the truth teller to appear to be fabricating. That being said, one cue widely cited as being a reliable indicator of deceit is that of the reduced use of the illustrator (DePaulo et al., 2003), a gesture used to literally illustrate a spoken word, such as pointing or highlighting something with the finger. This cue has however been shown to be problematic and does not translate easily from those results produced by students in the laboratory to high stake, real world lies (Vrij, 2005). For example, Porter & Yuille (1996) showed how Adolph Eichmann considerably increased illustrator use during his trial, similarly, Bill Clinton was also found to increase illustrators whilst being questioned regarding the Lewinsky investigation (Porter & Brinke, 2010). A similar problem has been found regarding eye movements. Liars tended to avert their gaze whilst lying, but only when the lie was considered to be high-stake (DePaulo et al., 2003).

1.3.6 **Linguistic Cues to Fabricated Memories**

Researchers continued to attempt to identify other possible areas that would yield cues that could reliably identify real from deceitful memories. One such area is that of linguistic analysis. Indeed, it has been suggested that verbal cues may represent what might prove to be a superior tool for identifying truthful from fabricated memories (Vrij et al., 2008; Zuckerman, DePaulo, & Rosenthal, 1981). This line of investigation assesses what is said and how it is said and is again based the assumption that differences in physiological arousal will cause differences in verbal outputs between memory types, but more recently research has attributed measurable variance in linguistic output between memory types to differences in cognitive processes involved with the generation of truthful and fabricated memories (Newman, Pennebaker, Berry, & Richards, 2010). This method also seems all the more useful when it is considered that the majority of suspect and witness interviews are audio recorded (Porter, 1998), meaning that assessment can be non-intrusive and

conducted post-interview (Porter, 1998). Indeed, interview techniques allow for the facilitation of this process, as techniques such as the Cognitive Interview advocate a period of uninterrupted narrative or 'free recall', provided before questioning commences and is standard practice for both witnesses and suspects. Of course, in a number of cases, such memory narratives comprise the only evidence.

This venture has proved relatively successful, with a number of linguistic constructs found to be associated with fabricated memories, such as a decrease in pronoun use, an increase in words associated with motion (e.g. walk, go) and the inclusion of fewer details (Newman et al., 2010; Porter et al., 2007; Bond & Lee, 2005; Dilmon, 2009; Sporer, 1997; Burgoon, 2006; DePaulo et al., 2003). It is also noteworthy that those linguistic constructs that have proven useful in distinguishing memory types are all attributed to differences in cognitive processes rather than changes in physiological arousal.

Computerised linguistic analysis programs such as Linguistic Inquiry and Word Count (LIWC; Pennebaker, Francis & Booth, 2001) have become invaluable tools for researchers assessing linguistic constructs within an account, with LIWC providing fast, reliable counts of a variety of linguistic constructs within an account.

1.3.7 **Phenomenological Cues to Deception**

A further area of research based on the hypothesis that differences in cognitive processes result in observable differences between real and fabricated memory is that of phenomenology. This posits that the way in which a memory is experienced will be affected by whether it originates in experience or imagination. Similar to linguistic approaches, this venture has proved relatively successful with fabricated memories being reported as less vivid, less coherent (Porter at al., 1999), taking longer to generate (Walczyk, Roper, Seemann, & Humphrey, 2003) and requiring more cognitive effort to generate (Vrij et al., 2008) than truthful memories.

1.3.8 Neurological Correlates of Fabricated Memories

With advances in technology, the most recent area of psychology that has attempted to distinguish truth from fallacy is that of brain imaging technology. Electroencephalogram (EEG) and functional magnetic resonance imaging (fMRI) have been the two primary techniques implemented to classify neurological outputs of truthful and deceptive responding and follow in-line with the notion that differences between truth and deception can be identified because of differences in cognitive processes that occur when lying and truth telling. However, as with much previous work investigating this area, deception is generally classified as holding untrue or counter factual propositions or denying knowledge (Carrión, Keenan, & Sebanz, 2010) rather than creating an alternative untrue past.

Pioneering work by Spence, Farrow, Herford, Wilkinson, Zheng & Woodruff (2001) initially found that deception was associated with increased activity in the ventrolateral prefrontal cortex. This finding was supported by Langleben, Schroeder, Maldjian, Gur, McDonald, Ragland, O'Brien & Childress (2002), who additionally found an increase in the superior frontal gyrus and anterior cingulate cortex to be associated with deceptive responses. Further work by Ganis, Kosslyn, Stose, Thompson & Yurgelun-Todd (2003) has confirmed such findings, showing increased activation in the frontal pole during 'general' deception. Following these first studies came a plethora of research investigating the neural correlates of deception (Abe, Suzuki, Tsukiura, Mori, Yamaguchi, Itoh, et al., 2006; Gamer, Bauermann, Stoeter & Vossel, 2007; Lee, Liu, Chan, Ng, Fox & Gao, 2005; Lee, Au, Liu, Ting, Huang & Chan, 2009; Spence, Kaylor-Hughes, Farrow, Wilkinson, 2008) which despite consisting of a number of different methodologies, consistently found the frontal executive system to be active whilst deceiving (Abe, 2011). This neural region has been associated with various cognitive functions including working memory (Owen, 1997), cognitive

control (Miller, 2000), and task switching (Dove, Pollmann, Schubert, Wiggins, & Yves von Cramon, 2000).

Despite the substantial amount of research investigating the neural correlates of deception, little work has studied the neural correlates of intentionally fabricated memories. However, some methodologies have incorporated memory into their work. For example, research by Lee et al. (2002) investigated neural activation during feigned memory impairments, finding activity in frontal, parietal and temporal cortices. To my knowledge, however, only one study has systematically investigated neural regions associated with IFAMs, that of Conway et al. (2003). This study contrasted the construction and retention of AMs and IFAMs whilst changes in slow cortical potentials were measured using an electroencephologram (EEG). No differences in activation were found between AMs and IFAMs during the construction phase of the memory, with both memory types showing substantial activation in left frontal regions, as per previous work investigating AM generation (Conway et al., 2001). However, when both AMs and IFAMs were held-in-mind for a period of 10 seconds, IFAMs showed an increase in right frontal activation. The authors concluded that although AMs and IFAMs may share neural regions associated with their construction, they differ in their content as AMs were considered to contain episodic information stored in the occipital networks whereas IFAMs were considered to contain more generic imagery (Conway et al., 2003).

Despite a wealth of literature investigating deception, work utilising neural regions to investigate the construction processes involved with IFAM generation and the subsequent differences between IFAMs and AMs is extremely limited, although work by Conway et al. (2003) offers a fruitful first step, more work needs to be done to replicate such findings and investigate further the neural differences between AMs and IFAMs.

1.3.9 **Memory & Statement Assessment Tools**

A number of techniques have been constructed that aim to quantify subjective and objective indicators of memories not originating in reality by operationalising hypotheses regarding truthful and fabricated memories. These include Reality Monitoring (RM) Johnson & Raye, (1981), Statement Validity Analysis (SVA), Köhnken & Steller (1988), the Memory Assessment Procedure (MAP), Porter et al., (1999) and Assessment Criteria Indicative of Deception (ACID), Colwell, Hiscock-Anisman, Memon, Taylor, & Prewett (2007).

1.3.9.1 Reality Monitoring

Proposed by Johnson & Raye (1981), reality monitoring (RM) addresses how memories of actual experience can be distinguished from those originating in imagination (these internally generated memories are generally believed, by the rememberer, to have originated in experience). It consists of a set of processes that are concerned with distinguishing the origin of events. In short, the model suggests that memories based on real external experience are associated with higher levels of sensorial information e.g. “it was a warm bright sunny day” (Porter & Yuille, 1995), spatial information e.g. “the field was square and large”, temporal information e.g. “it was mid-morning” and contain more details in general than those memories originating internally. These internally generated memories, for example those produced through imagination or dreams, are thought to be derived from cognitive processes (Johnson et al., 1993) and are therefore, according to RM, associated with more cognitive evaluations and subjective information e.g. “I remember seeing the field and thinking that it looked pleasant.” These descriptions can be used to determine the origins of a memory – a memory containing sensory, spatial and temporal detail with little reference to cognitive processes would be judged by the rememberer as being more likely to have originated from reality (Johnson et al., 1988).

Additionally, Johnson & Raye (1981) suggest that an individual may partake in reality monitoring reasoning using information and knowledge about memory. For example, a memory of a conversation with a person unknown to the rememberer may be attributed to fantasy or imagination since the memory itself could not have occurred (Johnson et al., 1988). Knowledge of the way in which memory works may also act as a discriminatory tool. Johnson, Foley, Suengas, & Raye (1988) suggest two ways in which a mental representation may be evaluated: a memory may be uncharacteristic of its category e.g. a memory may be particularly vague, or reasoning may be based upon beliefs about those memories originating in reality and those originating internally.

RM theory has been operationalised in the form of the Memory Characteristics Questionnaire (MCQ) (Johnson et al., 1988). This questionnaire systematically evaluates thirty-nine subjective qualities of real and imagined memories, particularly focussing on their descriptions of features, such as the memory's visual representation, temporal details and emotion. The questions are self-rated, primarily on seven-point rating scales i.e. 1 very vague – 7 very clear.

The MCQ has gained much empirical support in both laboratory (Schooler, Gerhard, & Loftus, 1986) and more naturalistic or staged contexts (Leippe, Manion, & Romanczyk, 1992). Real memories have been found to correspond with the RM theory, containing higher self-reported ratings of perceptual and contextual details. These details were amplified for more recent memories (Poter, 1998). Additionally, when the rememberer was asked to determine the source of numerous autobiographical events, perceptual and contextual details were mainly drawn upon to categorise real memories, whereas reasoning strategies were used to determine imagined events (Porter, 1998).

RM has certainly proven to yield positive results for distinguishing real from imagined or internally generated memories, but can the tool be used to distinguish real accounts from those accounts that are intentionally fabricated? Research has attempted to answer this question but has provided mixed results. Joffe (1992), Porter & Yuille (1996) and Ost, Vrij, Costall & Bull (2002) found that most criteria from the MCQ were unable to distinguish real memories from fabricated, or 'impossible' memories, with real and fabricated memories receiving similar scores across MCQ criteria. However, work by (Sporer & Küpper, 1995) has showed that MCQ criteria could reliably distinguish real and fabricated memories, yet many differences were only noticeable after a delay of at least one week from the original event (Porter, 1998).

1.3.9.2 Statement Validity Analysis

Statement Validity Analysis (SVA) is a tool for assessing the veracity of a statement – whether it is a product of truth or if it contains fabrications, information from an incorrect source (a source other than the one in question), distorted information from others through means such as suggestion, or if is it a product of imagination (Brown, 2010, in Brown & Campbell, 2010). Originally developed as a tool for systematically assessing child memory reports, SVA has proved to be particularly useful for cases such as child abuse when memory is frequently the only available evidence (Vrij, 2005). However, the technique has also been used successfully in the assessment of adult testimony (Porter & Yuille, 1995; Gödert, Gamer, Rill, & Vossel, 2005). SVA has been used widely in Germany since the 1950's (Vrij, 2005; Porter, 1998) and is also accepted as evidence in a number of American (Ruby & Brigham, 1997) and Swedish (Gumpert, Lindblad, & Johansson, 1999) courts. Indeed, a German Supreme Court issued a requirement that all cases of uncorroborated child testimony

should be assessed using SVA (Joffe, 1992). Further, Honts (1994) claimed that the SVA was highly valid and argued for its widespread use.

SVA arose from work by Undeutsch (1982, cited in Vrij, 2005) who claimed, "truthful, reality-based accounts differ significantly and noticeably from unfounded, falsified, or distorted stories" (p. 44). Undeutsch (1982) also stated that other external factors should be considered when assessing the validity of a memory report, including its consistency with other sources (Vrij, 2005). These hypotheses were operationalised by Köhnken & Steller (1988) based on beliefs about cognitive and motivational factors for providing fabricated information (Maass & Köhnken, 1989) and the criteria were integrated into a formal procedure – termed Statement Validity Analysis (Vrij, 2005). SVA consists of three major components: a semi-structured interview, Content-Based Criteria Analysis (CBCA) and a review and evaluation of the CBCA outcomes. However, before any interviewing is undertaken, background research into the case is conducted wherever possible (Brown, 2010, in Brown & Campbell, 2010). Particular emphasis is placed upon gathering information regarding the witness, the event itself, assessing previous statements and checking for inconsistencies with case file data (Köhnken, 2004; Vrij, 2005).

Semi-Structured Interview

This interview allows the interviewee to provide uninterrupted free recall of remembered events, with techniques that maximise information given, such as asking the interviewee to elaborate a particular point, permitted. Specific questioning is then conducted to clarify any outstanding queries. Interviews are audio recorded and transcribed (Vrij, 2005).

Content-Based Criteria Analysis

Table 1.2. CBCA Criteria

Account Characteristics
General Characteristics
Logical Structure
Unstructured Production
Quantity of Detail
Specific Contents
Contextual Embedding
Description of Interactions
Reproduction of Conversations
Unexpected Complications
Peculiarities of Content
Unusual Detail
Superfluous Detail
Accurately Reported Details Misunderstood
Related External Associations
Accounts of Subjective Mental States
Attributions of Perpetrator's Mental State
Motivation-Related Content
Spontaneous Correction
Admitting Lack of Memory
Raising Doubts on Own Memory
Self-Deprecation
Pardoning Perpetrator
Offense Specific Characteristics

The transcriptions from the semi-structured interview are taken forward to CBCA. Trained judges determine the existence or absence of nineteen predetermined criteria (see Table 1.2) (Vrij, 2005). The existence of a criterion serves to highlight the Undeutsch hypothesis - that an account is a result of direct experience. Essentially

then, CBCA aims to identify criteria of a truthful statement; fabricated accounts are not thought to contain such criteria (Vrij, 2005).

For example, criteria 1 – 13 are assumed to reflect cognitive factors and it is suggested that such cognitive factors are difficult to fabricate and as such would only appear in truthful narratives (Köhnken, 1989, 1996).

According to CBCA, truthful accounts are therefore coherent (*logical structure*), do not follow a chronological sequence (*unstructured production*) and are rich in detail (*quantity of detail*). These details should represent the time and location of an event (*contextual embedding*), any notable conversation (*description of interactions*) and this should be provided in something like its original form (*reproduction of conversations*). Details should also explain any unexpected or unforeseen events (*unexpected complications* & *unusual detail*) and need not necessarily focus solely on the event (*superfluous detail*). Further, an interviewee may also describe events that are beyond current comprehension, this is particularly applicable if a child attempts to explain adult sexual behaviour, (*accurately reported details misunderstood*). Additionally, truthfulness is indicated by incorporation of information, related to but not directly pertaining to the incident (*related external associations*). Thoughts, feelings and emotions surrounding the incident of both the individual (*accounts of subjective mental states*) and the perpetrator (*attributions of perpetrators' mental state*) are considered criteria of truthfulness.

Criteria 14 – 18, according to CBCA are based on motivational factors (Köhnken, 1989, 1996) insofar as the deceiver is thought to be more concerned with impression management than the truth teller (Vrij, 2005). As such, deceivers are thought to make a more effortful attempt at appearing truthful than truth tellers. The result of this is that truthful statements contain detail that is then seen as stereotypically

inconsistent with truthful narratives, whereas deceptive narrative are more likely to fit this truthful stereotype (Ruby & Brigham, 1997; Vrij, 2005). Those details seen in the truthful account that are inconsistent with the truthful stereotype include changing given information without interviewer intervention (*spontaneous correction*), awareness and concern that parts of the given narrative may be incorrect (*admitting lack of memory*), acknowledging possible objections and distrust in narrative (*raising doubts on own memory*), personally incriminating or negative information (*self-deprecation*) and showing sympathy or providing excuses for the perpetrator (*pardoning perpetrator*). Criterion 19 (*details characteristic of the offence*) refers to specific feelings and emotions that typically exist for the crime under investigation (*format taken from Vrij, 2005*).

Table 1.3. Validity Checklist

Validity Characteristics
Psychological Characteristics
Cognitive emotional limitations
Incident specific language / knowledge
Incongruous affect during interview
Susceptibility to suggestion
Interview Characteristics
Interview appropriateness
Interview contamination
Motivation
Motivation to report
Questionable context of disclosure
Pressure to report
Investigative Questions
Lack of realism
Inconsistent statements
Inconsistency in other evidence
Offence-specific element
Lacking offence specific characteristics

Following the assessment of criteria using CBCA, a further procedure is undertaken. Added by Raskin & Esplin (1991), the Validity Checklist considers additional external factors that might impact upon the credibility of a witness, such as lack of metacognitive reasoning and verbal skills required for effective communication (see Table 1.3) (Vrij, 2005). These factors are assessed and considered alongside the CBCA criteria. The methods by which the criteria from both the CBCA and Validity checklists are scored have given rise to debate within SVA practitioners (Vrij, 2005). Questions have been raised regarding the necessary number of criteria present and if particular criteria are more crucial than others to detect a truthful or fabricated account (Brown, 2010, in Brown & Campbell, 2010). Parker & Brown (2000) suggest a

dichotomised scoring scale whereby the criterion is either present or absent. An account with more than eight instances of a single criterion would be viewed as credible, six to seven moderate, and less than five non-credible or unusual. Köhnken (2004) however suggests that a more flexible scale rating of zero (absent from report) through to five (strongly present) for each criterion is a more suitable and sensitive method of scoring.

Laboratory studies employing SVA as a means of distinguishing real and fabricated accounts have had limited success, with some criteria gaining no, or very limited support from the literature (in particular criteria of self-deprecation and accurately reported details misunderstood) (Vrij, 2005). However, when support existed for the criteria, it was usually in the expected direction. SVA has been applied to real-world cases of deception with mixed success. Esplin, Boychuk, & Raskin (1988), cited in Raskin & Esplin (1991), applied CBCA to forty child abuse cases and found that CBCA could reliably differentiate reports, finding that most to all of the criteria existed in truthful reports. However, these results have failed to be replicated, at least to such a strong degree (Boychuk, 1991; Craig, Scheibe, Raskin, Kircher, & Dodd, 1999; Lamb et al., 1997) and have been met with heavy criticism (Wells & Loftus, 1991) regarding issues such as the use of a single-rater and unconsidered reliable age differences between truthful and fabricated groups.

1.3.9.3 Memory Assessment Procedure

The Memory Assessment Procedure (MAP), devised by Porter et al. (1999) was developed to provide a framework for distinguishing real memories, false memories (inaccurate memories believed to be true) and fabricated memories – those based on events that had never been witnessed. The MAP is essentially a hybrid, comprising of theoretical backgrounds of both SVA (that fabricated accounts will be less coherent than truthful accounts, for example) and the MCQ (fabricated memories consist of

more subjective, cognitive reasoning whereas truthful memories contain more contextual and sensory detail).

Table 1.4. MAP Criteria

Qualitative and Quantitative Details in the MAP
Subjective Features
Vividness/Clarity (self-rated)
Stress (self-rated)
Sensory Components (self-rated)
Confidence (self-rated)
Re-experiencing Mental Experience
Experiencing Lack of Memory / Memory Failures
Perspective (self-rated)
Presentation-Specific Details
Amount of Detail
Relevancy
Repeated Details
Providing Reasons for Lack of Memory
Coherence

In the MAP, memory reports are rated on twelve factors (see Table 1.4), five of which are self-rated and seven of which are rated by independent, trained coders. Most criteria are scored on a one through to seven scale, e.g. 1 not at all confident – 7 extremely confident, with other criteria marked for their frequency e.g. number of details. No specific technique is used to elicit statements for the MAP, but work investigating accounts using MAP (Porter et al., 1999) has used semi-structured interviews which entail a free recall phase followed by general and specific questioning (Yuille, Hunter, Joffe, & Zaparniuk, 1993).

The MAP has been empirically evaluated in a number of studies, for example Porter et al. (1999) asked participants to provide one real memory report, one false memory

report, generated in the laboratory using guided imagery techniques (the memory's non-existence was corroborated by relatives) and one created, or fabricated memory (it is important to note here that these memory reports were of emotional, traumatic, childhood events). Results showed the MAP to be a successful tool for distinguishing memory types – real memories were vivid, detailed and clear. Participants were also willing to express a failure of memory. False events were rated as coherent but were less vivid than truthful events and known by the rememberer to be unstable, as participants reported having low confidence that the memory actually occurred. Finally, fabricated memories were described as having an exaggerated 'over-the-top' quality (Ost, Vrij, Costall, & Bull, 2002). Subsequently, they were rated as most vivid, and received the highest ratings for clarity. They were also rated as being highly emotional and contained a number of repeated details (Porter et al., 1999).

The MAP has also been applied to the categorisation of only truthful and fabricated memory accounts, in this case fabricated accounts of victimisation (Peace, 2006). Again, the MAP was found to be a successful detection tool, as truthful accounts contained more overall detail, contextual detail and were rated as more emotional and plausible than fabricated accounts. Fabricated accounts were again presented in an exaggerated manner and were not as consistent over time (after three and six month intervals) as their truthful counterparts (Peace, 2006).

1.3.9.4 Assessment Criteria Indicative of Deception

The Assessment Criteria Indicative of Deception (ACID) (Colwell et al., 2007) is a technique for distinguishing truthful from fabricated statements. It combines methods and theory of CBCA, particularly criteria of spontaneous reproduction and sufficient detail, as these have been shown to be reliable indicators of deception in previous work (Colwell et al., 2007). These criteria therefore suggest that a truthful

account should contain more detail and have a less structured narrative than a fabricated account. Additionally, ACID derives some of its criteria from RM, which posits that the amount and nature of detail in a report is central to the distinction of memory types. Those criteria taken forward to ACID from RM include assessing contextual, perceptual and internal details. Truthful accounts have been shown to contain more of these types of detail than fabricated accounts (Leippe et al., 1992; Schooler et al., 1986). A further criterion taken forward from RM is that of vividness – truthful accounts are thought to be experienced as more vivid than fabricated accounts. However, when we consider narratives of trauma or highly emotional events (Peace, 2006, Porter et al., 1999), truthful accounts are rated as less vivid than fabricated ones. Clearly, topic of memory is a confounding factor, whereby a fabricated emotionally salient memory will be recalled differently and contain different characteristics to that of an everyday memory, see 1.3.9.3.

ACID combines a third set of criteria, this time taken from work surrounding impression management. Impression management theories posit that deceptive respondents are continually concerned with the presentation of their narrative, this subsequently makes their memory accounts highly controlled and in turn, causes deceptive responding to be a more cognitively effortful task than truth telling, which is inherently less effortful since less concern is attributed to impression management (Suckle-Nelson et al., 2010).

Table 1.5. ACID Criteria

Details Measured by ACID
Measured in Free Recall
Response Length
External Detail
Internal Detail
Contextual Detail
Measured in Mnemonic Sections of Recall
Response Length
New External Detail
New Internal Detail
New Contextual Detail
Measured Throughout
Admitting Lack of Memory

In ACID, a statement is elicited using the Reality Interview (RI) (Colwell et al., 2007), which is a variant of the Cognitive Interview (CI). The CI is characterised by four main mnemonic techniques designed to increase both the quantity and accuracy of recall. An interviewee is firstly asked to place themselves back into the location of the event (mental reinstatement), then asked to report all details that can be remembered in an uninterrupted narrative (recall everything) which is then followed by general and specific questions if necessary. The interviewee is then asked to recall the narrative in a number of different temporal orders and then to recall the narrative from a variety of perspectives (Fisher & Geiselman, 2010). The RI utilises this interview technique to place additional load on the interviewee with the aim of facilitating truthful recall and hindering fabricated recall (Colwell et al., 2007) (due to the increased load already thought to be attached to fabricated memory creation). The RI also includes additional recall tasks that are designed to prevent the use of schema-based recall. These tasks include additional forced-choice unexpected

questions and require deeper processing and therefore a detailed search of the given memory account (Colwell et al., 2007). Proponents of the RI suggest that these additional tasks provide further recall cues for the truth teller but make fabricated recall more challenging. Therefore, the RI serves to amplify existing differences between real and fabricated accounts, and categorises accounts by assessing quantity and type of detail in statements (see Table 1.5) (Colwell et al., 2007).

Results have been promising: in a laboratory study whereby students either stole or replaced an exam paper and then provided either a truthful or fabricated account one week later (Colwell et al., 2007), it was found that seven out of the nine criteria could reliably detect fabricated accounts. The criteria of external and contextual details in the free recall section were found to yield non-reliable results. Honest reports were found to be longer in length, more detailed and included more details from the mnemonic components of the RI than fabricated accounts. Additionally, participants providing truthful accounts were more likely to admit memory errors than those providing fabricated accounts, two-thirds of truthful recallers admitted being unable to recall some aspects of their account, whereas only one-third of fabricated recallers admitted a lack of memory. Discriminant function analyses revealed that ACID correctly classified 87% of truthful and fabricated accounts, compared to untrained raters who only achieved classification of 56% (Colwell et al., 2007).

1.3.10 Evaluation of Memory Assessment Tools

Although all assessment tools have received some support from research, a number of theoretical problems pertain to their usage. Firstly, the premise of such tools rests on the assumption that an account is either entirely truthful or entirely fabricated. The procedures do not consider that fictitious detail may exist alongside truthful detail (Vrij, 2005). This issue is particularly critical when considering that IFAM generation is generally thought to incorporate at least some truthful propositions

(see 1.3.11). Indeed, Sapir (1987) suggests that up to 90% of a fabricated statement may be truthful with only a small number of propositions deliberately omitted, distorted or falsified. A more appropriate approach may be to identify which propositions within a statement are fabricated or appear uncharacteristic of a truthful memory, allowing subsequent analysis to be undertaken on these propositions alone. Relatedly, the tools are only able to differentiate truthful from fabricated accounts comparatively and do not serve as indices for positively identifying fabricated or indeed truthful memories.

Further, the tools do not consider issues of source monitoring. Both children and adults have difficulty in distinguishing between imagination and reality (Vrij, 2005) and many 'truthful' memories are products of distortion and may contain wholly false detail, unbeknownst to the rememberer (see 1.2.1) (Conway, 2005). Indeed, Barclay & Wellman (1986) state "autobiographical memories are true but inaccurate" (p. 97) and studies have shown how false memories can be experienced as detailed and coherent (Porter et al., 1999), which would lead a memory containing inaccurate details, to be judged as credible by such techniques. This is likely to be extremely detrimental for legal cases whereby all details of a remembered event are particularly costly.

However, despite methodological concerns regarding the assessment tools, an amalgamation of empirical results show that a number of characteristics allow various types of memories to be reliably distinguished. However, some findings were reversed such as when assessing memory for trauma (Porter at al., 1999). It seems then that the event on which the memory is based should be considered when assessing the veracity of a memory since as shown clearly here, a very different pattern of findings emerge for neutral and traumatic fabricated memories.

1.3.11 Generating an Intentionally Fabricated Autobiographical Memory

Surprisingly, little is known about the way in which IFAMs are constructed. It has been suggested that an IFAM is created by means of a 'lie script' (Colwell, Hiscock-Anisman, & Memon, 2002). According to this view a remembered set of events is used to create a script and this is used in place a specific memory of a single event. A process that has been termed 'superficial encoding' (Porter & Yuille, 1994). This theory has had some support, as Granhag & Strömwall (1999) and Granhag, Strömwall, & Jonsson (2003) also consider truth tellers to create their account through reconstruction, whereas liars are considered to attempt to accurately repeat a previously rehearsed script. According to this theory, it is these differences in processing and storage that are responsible for systematic and measureable differences in truthful and fabricated memory accounts (Colwell et al., 2007).

Porter (1998) further suggests that verbal ideas and images may play a vital role in IFAM generation, suggesting that fabricated memories are "imaginative constructions". He continues to suggest that fabricated memories may not be entirely imaginative in nature, but like false memories (untrue memories that, unlike fabricated memories, are unknown to be false), may incorporate elements of an experienced event with the purpose of enhancing the credibility of an account. In a rather similar and related way it has been suggested that the process of lying involves firstly accessing true beliefs followed by denial and/or distortion of these beliefs (Polage, 2004).

The generation or construction of AMs involves the effortful, iterative, access of autobiographical memory knowledge structures and the gradual establishment of patterns of activation/inhibition across distributed neural networks that come to form an AM in an act of remembering (Cabeza & Jacques 2007; Conway, et al., 2003, 2005; Conway & Pleydell-Pearce, 2000). It seems that the construction of IFAMs may

involve similar processes, not least because the generation of IFAMs may feature the recall of AMs. It is difficult to conceive of a process of IFAM generation that did not feature, to a least some extent, access of autobiographical knowledge and possibly the generation of specific AMs. It seems likely therefore that IFAM creation involves initially accessing information in long-term memory, followed by a conscious "editing" phase. In other words, an AM is activated and then consciously edited to produce an IFAM.

This constructive process is likely to affect the way in which an IFAM is presented, and is possibly responsible for the notable linguistic and content differences between a true, or at least believed to be true, memory. For example, the additional editing phase of IFAM generation may result in a less detailed, vague mental representation. It is also likely to add considerable cognitive effort to the generation process. The cognitive effort is also likely to arise from the necessity of holding in mind and repeatedly accessing a novel mental representation.

1.4 Conclusions

This thesis's focus on IFAMs arises primarily to help embellish an extremely important yet understudied area of autobiographical memory. It aims both to understand the theoretical underpinnings of IFAMs and to replicate and expand upon findings from both deception detection studies and statement analysis techniques. It is hoped that this work will provide the groundwork for future research with the overarching aim of identifying those providing deliberately false testimony, and providing a fairer assessment for those who claim to be victims of false allegations (Porter, 1998).

Chapter Two

2 Generating Truthful and Fabricated Memories

2.1 Introduction

Despite the large body of research investigating our ability to place ourselves in the future, relatively little research has investigated the ability to create an alternate past, termed here *intentionally fabricated autobiographical memories* (IFAMs). The small body of research that has previously investigated IFAMs has primarily focused on identifying the differences between real and fabricated memories, with only one previous study (Conway, Pleydell-Pearce, Whitecross, & Sharpe, 2003) exploring the construction processes of IFAM generation.

As was noted in Chapter One, it has been suggested that creating an IFAM may involve generating a 'lie script' - a remembered set of events are generated to create a generic script which is used in place of a specific memory of a single event (Colwell, Hiscock-Anisman & Memon, 2002). This theory has received support (Granhag & Strömwall, 1999; Granhag, Strömwall, & Jonsson, 2003) and posits that the differences in storage and retrieval of truthful and fabricated memories result in measurable linguistic, cognitive and phenomenological differences.

Porter (1998) furthered these original theories, suggesting that fabricated memories may incorporate some elements of truthful memories in order to heighten the believability of the fabricated account. Indeed, this notion was repeated in work by Polage (2004) who suggested that the process of lying involves firstly accessing true beliefs followed by denial and/or distortion of these beliefs.

Despite this work, to my knowledge, no empirical research has explicitly addressed the construction processes involved with IFAM construction (with the exception of Conway et al., 2003). Therefore, the primary aim of the research presented in this chapter is to understand the way in which IFAMs are constructed within the autobiographical memory system and if this process is notably different from the construction of truthful autobiographical recall. By investigating this process, it is hoped that a better understanding of IFAM storage, rehearsal and recall will be gained with the overreaching aim of aiding in the detection of fabricated from truthful memories.

It is suggested here that creating an IFAM would involve similar processes as those involved with future imagination insofar as information from long-term memory, or specific autobiographical memories are initially accessed to form the basis of an IFAM. Following this, it is suggested that the information retrieved is consciously 'edited' to produce a novel mental representation.

2.1.1 **Predictions**

Because of the differences in IFAM and AM construction processes, and due to the proposed additional effort required to maintain a novel fabricated representation, IFAMs should reliably differ from AMs in some of their recollective qualities. For example, memories not based on real experience may be associated with less vivid mental imagery (Johnson & Raye, 1981), may be placed further back in the past (although, to my knowledge, this has not previous been investigated) to demonstrate a stable, long-held memory, and may be recalled more frequently through an observer perspective, since an observer perspective has been shown to occur following distortion (Freud, 1915; Nigro & Neisser, 1983). Further, AMs may require less cognitive effort to generate (Vrij, et al., 2008) due to the lack of an editing phase, which in turn will allow for faster generation time (Walczyk, Mahoney, Doverspike, &

Griffith-Ross, 2009). I therefore expect to find linguistic constructs within accounts of IFAMs that are indicators of cognitive effort, for example fewer complex words e.g. those over six letters in length (as defined by Pennebaker, Francis, & Booth, 2001), and a higher rate of non-fluencies, e.g. “erm”, “umm”, particularly for spoken accounts. Further, it is expected that IFAMs will contain more motion words, e.g. walk, go, run. Motion words have been found to be a characteristic of increased cognitive effort, used by a rememberer to reduce the complexity of an account by referring to simple actions rather than expressions of emotions or other metacognitive reasoning (Newman, Pennebaker, Berry, & Richards, 2003). Finally, IFAMs may be shorter in length than AMs to avoid unnecessary discussion of detail (Peace & Porter, 2011; Porter, Yuille, & Lehman, 1999a)

Additional linguistic differences such as an increase in negative emotion words, fewer exclusive and sensation words in IFAMs have been shown by Newman et al. (2003), however I did not expect to find these linguistic differences since the study was concerned with investigating fabricated memories rather than fabricated opinions and denials (Newman et al., 2003) which are more likely to be emotionally charged, resulting in different linguistic manifestations. In summary then, four recollective qualities, vividness, memory / image generation times, retention interval, and perspective and four linguistic constructs: complex words, non-fluencies, account length and motion words, all assumed to reflect cognitive effort and / or an editing process, were investigated. Accounts of the memories were recorded by either typing or by tape recording while they were spoken[1].

[1] Previous research has asked participants to both speak and type memories – it is important to ascertain whether these results can be collapsed and assessed together or whether modality may affect cues to deception. Further, as witnesses usually speak their memories aloud it was thought that the two modalities should be contrasted.

2.1.2 Stimuli Generation

For the following two studies, the Crovitz technique was used to elicit specific autobiographical memories (see 1.3.1). In this technique, participants are cued with a word or phrase and then asked to recall a specific memory associated with the given word (Crovitz & Quina-Holland, 1976). Twenty neutral everyday events were to be used as cues for memory / imagination generation in the typed condition, ten cues were to be used in the spoken condition to ensure testing time did not exceed one hour (see Appendix I for cues). These were taken from Bower, Black & Turner, (1979); Trafimow & Wyer, (1993) and Reiser, Black and Abelson, (1985). Cues were chosen that were consistent with British culture, e.g. cues such as "taking the subway" were not used.

To ensure the cues were suitable for both memory and imagination generation, the cues were rated for their ease in eliciting true memories, or at least memories believed to be true, and their ease in eliciting deliberately fabricated, or imagined 'memories'.

2.1.2.1 Method

Three hundred and fifty six respondents from the University of Leeds were recruited to evaluate the cues proposed for use in the study. A questionnaire was created which listed the twenty everyday events selected for use in the study. Participants were asked to rate on a scale of 1 through 5 (1 being very difficult, 3 being neither difficult nor easy and 5 being very easy) how able they would be to recall and to imagine carrying out the twenty everyday events.

2.1.2.2 Findings

The majority of respondents rated each cue as either 'very easy' or 'easy' to both recall and imagine, therefore, all cues were accepted for use within the studies. See Appendix II, for cue ratings. The ten cues that received the highest ratings for both ease of recall and to imagine were selected for use within the spoken condition.

2.2 General Method

2.2.1 Participants

Sixty-six participants were recruited for the study (52 females and 14 males). Their ages ranged from 18 - 57 years, with a mean age of 21. Forty-eight participants took part in the study for course credits as part of their undergraduate studies at The University of Leeds, and the remaining 18 participants received small payment.

2.2.2 Materials and Procedure

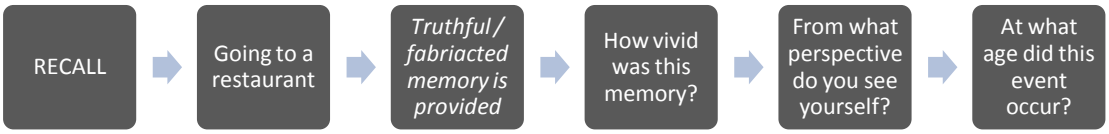

Figure 2.1. Trial Presentation Order

Figure 2.1 shows the presentation order of the memory cue and subsequent recollective quality ratings for each trial of the study. Participants were tested individually and all testing was completed using a computer. Participants completed the experiment using software designed for running psychological studies, E-Prime. Participants were presented with a computer screen displaying "RECALL" or "IMAGINE.". Following this a cue was displayed, e.g. going to a restaurant. There were 20 cues naming common everyday activities (only 10 were used for participants in the 'spoken' condition), (taken from Bower, Black, & Turner, 1979; Trafimow & Wyer, 1993; Reiser, Black, & Abelson, 1985), see Appendix I for cue lists. Cues were counterbalanced across participants and conditions, ensuring that all cues were used to generate both IFAMs and AMs. One block of 10 cues (5 cues for those in the spoken condition) instructed the participant to recall, the other, to imagine. There was a short 2-minute pause between blocks while the instructions for the next block, which notified the participant of the final condition (AM or IFAM), were reviewed.

Participants were instructed to generate either a truthful memory or imagine an event that had never occurred from the given cue. They were then instructed to press the space bar once they had brought clearly to mind a memory or imagined a fabricated past event, there was no upper or lower time limit on memory retrieval / image generation. Participants were instructed to ensure that they imagined all fabricated events being in the past and to describe them as if they were trying to convince another person that the event had actually been experienced. For AMs they were instructed to bring to mind a memory of an event which they had directly experienced that had lasted for minutes or hours but no longer than one day. Both types of memory could be recalled or located at any point in their own personal past, they were not limited to specific time periods. Participants were instructed to construct memories as quickly as they could but to ensure they were specific.

Memory retrieval and image generation times were recorded in milliseconds from cue on-screen to space bar press. Participants were randomly assigned to conditions and half typed a description of the memory into the computer and the other half spoke their memory into a Dictaphone. After a memory had been provided, participants rated the vividness of AMs and IFAMs using 7-point scales (1=low, 7=high). Participants also indicated the perspective or point-of-view in their memory: they were instructed to judge a memory as having an 'observer' perspective if they saw themselves in the memory and to judge a 'field' perspective if they had something approximating to their original perspective or what would have been their original perspective for an IFAM. Finally, participants were asked to judge the approximate age at which the memory had occurred. They were instructed to plausibly fabricate this for IFAMs. Lastly participants took part in short post-experimental interviews in which they were asked how they had created their IFAMs.

2.3 Results

Table 2.1. Means and standard deviations of recollective experience qualities made by participants for real and fabricated memories

Memory Feature	AM	IFAM
Vividness (1-7) **	5.3(.8)	4.5(0.9)
Retention Interval (years) **	1.9(1.6)	3.0(2.2)
Memory / Imagine Generation Time	9968 (2713)	10702 (3114)
Motion Words *	2.5(0.7)	2.9(1.1)
Non-Fluencies (typed)	0.0 (0.0)	0.1 (0.1)
Non-Fluencies (spoken) **	1.7 (2.2)	3.3 (2.0)
Complex Words	14.1 (3.3)	13.1 (1.9)
Account Length (Word Count)	698 (414)	687 (518)

**p<0.001, *p<0.005

2.3.1 Recollective Qualities

2 x 2 mixed model ANOVAs, with two levels of memory reporting (typed vs spoken) and two memory types (AM vs IFAM) were conducted for three separate recollective qualities (vividness, memory retrieval / image generation time and retention interval). A main effect of memory type was found for vividness, $F(1, 64) = 27.2$, $MSe = 0.6$, $p < 0.001$, $\eta^2 = 0.3$ and retention interval, $F(1, 64) = 16.6$, $MSe = 2.1$, $p < 0.001$, $\eta^2 = 0.2$, indicating that AMs were reliably more vivid and had a reliably shorter retention interval, i.e. were more recent than IFAMs. Modality was not found to produce reliable differences. Table 2.1 shows the means and standard deviations (in parentheses). No other reliable differences or correlations were found.

Table 2.2. Correlation matrix – Pearson's correlations for retention interval and vividness ratings of real and fabricated memories

	AM Vividness Rating	IFAM Vividness Rating
Real Memory Retention Interval *	r = -0.4 p < 0.005	-
Fabricated Memory Retention Interval	-	r = 0.0 p > 0.05

*p<0.005

However, vividness and retention interval were investigated further since previous research has suggested that episodic memories degrade over time, such that older episodic memories may be recalled as less vivid than more recent episodic memories (Nigro & Neisser, 1983; Piolino, Desgranges, Benali, & Eustache, 2002). Indeed, it has been proposed that an episodic memory becomes 'semanticised' over time (Cermak, 1984) in that the event is recalled as a fact rather than an episodic memory, leading to a degradation of richness when remembering. Therefore, since fabricated memories were reliably rated as occurring further in the past than truthful memories, it is important to understand whether their lowered vividness rating is caused by temporal placement of the memory on which the fabricated memory is based. Conversely, for truthful memories, it is important to understand whether their higher vividness rating is related to their more recent occurrence. To investigate this association between vividness and retention interval, separate correlation analyses of these variables were conducted; see Table 2.2 for correlation matrix. Results showed that for AMs, age was reliably positively correlated with vividness ($r=0.4$, $p<0.005$), such that the more recent the memory, the more vivid it was experienced. However, a reliable correlation was not found for fabricated memories, such that the temporal distance of the memory was not associated with its rated vividness.

Table 2.3. Number of memories recalled with field and observer perspectives

	Perspective	
	Field	*Observer*
Memory Type		
AM	425	135
IFAM	267	293

Memory perspective was investigated using Chi-Square, see Table 2.3. It was found that 76% of AMs had a field perspective (the participant sees the memory through their own eyes) and the remaining 24% had an observer perspective (the participant sees himself/herself in the memory). For IFAMs 48% of imagined events had an observer perspective with 52% a field perspective. These differences in perspective between AMs and IFAMs were found to be reliable, $\chi^2(1) = 94.4$, $p<0.001$).

2.3.2 **Content Analysis**

Memory accounts were analysed for four predefined linguistic constructs: motion words, complex words, non-fluencies and account length for both AMs and IFAMs. The counts were made using the Linguistic Inquiry and Word Count, LIWC, program (Pennebaker, Francis, & Booth, 2001) and the totals for each memory in each of the IFAM and AM conditions were entered into separate 2 (memory reporting) x 2 (memory type) ANOVAs. A main effect of memory type was found for motion words ($F(1, 63) = 10.7$, $MSe = 0.6$, $p < 0.005$, $\eta^2 = 0.1$) and an interaction effect was found for non-fluencies ($F(1, 64) = 15.0$, $MSe = 1.1$, $p < 0.001$, $\eta2 = 0.2$). The means (see Table 2.1) indicated that accounts of IFAMs featured reliably more motion words than AMs and reliably more non-fluencies than AMs but only when the memory was spoken. No other reliable differences were found.

Finally, in the post-experimental interview, when asked how to describe how they had generated the fabricated memories, all participants stated that they had created

their IFAMs by either recalling specific memories and editing them, or by recalling an item of autobiographical knowledge and constructing a fabricated memory around it. Both strategies were common and most participants used both.

2.4 Discussion

The central findings of this study (Table 2.1 and Table 2.3) showed that there were systematic differences between IFAMs and truthful autobiographical memories despite the fact that IFAMs are based on existing autobiographical knowledge or specific autobiographical memories. These differences are likely generated due to the additional processes involved with creating an IFAM, namely that of 'editing' a truthful memory in order to generate a novel mental representation.

In particular, IFAMs were found to be less vivid and have a longer retention interval than real autobiographical memories. According to Johnson, Foley, Suengas, & Raye (1988), recollective qualities such as vividness help the rememberer to distinguish memories of experienced event from other forms of mental imagery such as, in this case, imagining. Therefore, the heightened vividness ratings for the truthful memories may serve as an index for classification of memory source. Additionally, it may be believed that an older memory is more likely to be considered true, as it represents an embedded memory. Also, it may be believed that an older memory will suffer from the natural, and therefore irrefutable, process of forgetting than an event in the near past, allowing for it to be a less accurate and therefore less vivid mental representation. It may be beliefs such as these that mediated the decisions to place IFAMs further back in time than truthful memories.

However, it was found that vividness correlated with retention interval, insofar that more recent memories were more rated as more vivid, for real autobiographical memories only. It appears that some interesting beliefs regarding the nature of memory underlie these constructs (see chapter four for a discussion of beliefs about

autobiographical memory), for example, it may be the case that the public are unaware of the degradation of vividness over retention interval and therefore, it did not influence their judgments and ratings of their IFAMs.

Linguistic analysis showed that IFAMs contained more motion words ("go", "walk") and more non-fluencies (however, this was only observed when the memory was spoken) than real memories (Newman et al, 2003). Both motion words and non-fluencies are thought to reflect increased cognitive effort (Bond & Lee, 2005; Newman et al., 2003). It is suggested that an increase in cognitive effort arises from two novel processes within IFAM production. Firstly, it is assumed that consciously editing a memory will increase the cognitive effort associated with remembering. The responses from the post-experimental interview suggested that editing often occurs through a process of deletion-substitution: for instance, the memory "Going the new Italian restaurant with X, Y, and Z, last Saturday" might be edited to "Going the usual restaurant with X, Y, and Z, last Saturday". This process is likely to be considerably more complex and effortful than memory retrieval. Secondly, the effort associated with holding a novel mental representation in mind and subsequently describing it is likely to be higher than when retaining and describing a more permanent mental image. Holding this image in mind may require constant refreshing to maintain the altered or substituted detail (Kossyln, 1983). These two processes are likely to inflate cognitive effort associated with IFAM construction and are therefore subsequently reflected in the linguistic content of the IFAM description.

Finally, a further finding, shown in Table 2.3, is that of the differences in perspective taken in real memories and IFAMs. Real memories were strongly associated with a field perspective, as is consistent with previous work (Heaps & Nash, 2001). Indeed, perspective of real memory has been found to be altered to an observer perspective only when an experience is considered negative (Freud, 1915, Nigro & Neisser, 1983) or when

a memory is considered incompatible with a current self-concept (Libby et al., 2005). Further, Freud (1915) originally noted that a memory with an observer perspective is indicative of processing or 'editing' following memory formation. It is therefore suggested that the higher frequency of observer perspectives taken during IFAM generation may reflect this 'editing' of the original memory, which for some may render the new image incompatible with the current self-concept. Although the scope of the present data cannot provide a definitive answer, what can be concluded is that IFAMs are equally as likely to have a field or observer perspective, whereas truthful autobiographical memories are very frequently presented with a field perspective.

2.5 Conclusions

In sum, data from both recollective qualities and linguistics suggest a process of IFAM generation that is more effortful than AM generation. IFAMs are less vivid, less recent, do not have an association between vividness and age and require more cognitive effort to construct. Additionally, IFAMs are less likely than real memories to have a field perspective. Further, they contain language that is representative of a reduction in cognitive complexity, such as an increase in the use of motion words and an increase in the number of (spoken) non-fluencies. These differences in characteristics and verbal description of the two types of memories reflect the differing cognitive processes underlying IFAM and AM generation, strengthening the argument that IFAMs are more effortful to generate due to an additional process of 'editing'.

The present experiment is the first to investigate the processes by which IFAMs are generated. Understanding these processes is integral to future work investigating IFAMs and lying more generally. Understanding the cognitive processes involved with fabricated memory generation may lead to new ways to identify IFAMs.

Chapter Three

3 The Effect of Secondary Task Demands on the Generation of Truthful and Fabricated Memories

3.1 Introduction

The previous chapter helped to establish that the process of generating an intentionally fabricated memory involves firstly retrieving generic or more specific knowledge from long-term memory and then consciously editing this information to generate a novel mental representation – an IFAM. Differing cognitive processes between AM and IFAM generation resulted in reliable differences in language and phenomenology that in turn indicated an IFAM was more cognitively effortful to generate compared to the generation of a truthful autobiographical memory. The additional cognitive effort associated with IFAM generation was attributed to the additional process of editing that takes place only in IFAM generation.

This next chapter aimed to test this assertion empirically by investigating the cognitive load associated with truthful and fabricated memory generation using a dual-task procedure, explicitly aimed at taxing cognitive resources through the inclusion of a concurrent numerical memory task.

3.1.1 Predictions

Since it has been shown that a fabricated memory is more cognitively taxing to generate than a truthful autobiographical memory, it is expected that IFAM generation will impact more on a secondary task than AM generation. For example, secondary task accuracy is expected to be lower during the generation phase of a memory not based on real experience as opposed to the generation phase of a memory that is grounded in truthful experience due to additional cognitive processes

involved with IFAM generation. Further, the number of correctly remembered digits is expected to be lower during IFAM generation than during truthful AM generation.

Since the secondary task will only be present during the generation phase of memory creation, no additional differences from those already noted from the previous chapter are expected to be found when the memory is elaborated – such as within the language use or the descriptions of phenomenology, hence the same measures will be used.

3.2 Method

3.2.1 Participants

Thirty-one participants were recruited for the study (19 females and 12 males). Their ages ranged from 19 - 37 years, with a mean age of 25. All participants received a small payment in return for their participation.

3.2.2 Materials and Procedure

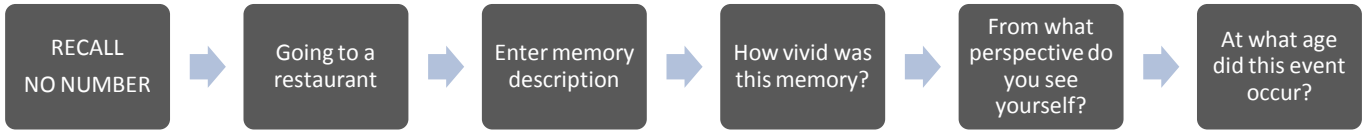

Figure 3.1. Trial Presentation Order

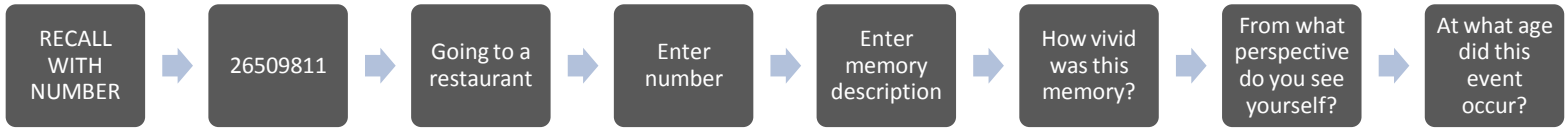

Figure 3.2. Dual Task Trial Presentation Order

Figure 3.1 and Figure 3.2 show the presentation order of cues and ratings for each trial for both conditions of the study. Participants were tested individually and all testing was completed using a computer. Participants completed the experiment using software designed for running psychological studies, E-Prime. Participants were presented with a screen displaying “RECALL WITH NUMBER”, “RECALL NO NUMBER”, and “IMAGINE WITH NUMBER” or “IMAGINE NO NUMBER” which remained on screen until the participant indicated they were ready to continue by pressing the space bar. For recall and imagine no number conditions a cue was displayed, e.g. going to a restaurant which remained on the screen until the participant indicated, by pressing the space bar, that they had retrieved a memory, or fabricated a memory for the cue. For recall and imagine with number conditions participants were presented with 8 digit sequences for 2000ms (Heaver and Hutton, 2011; Gil-Gomez Liano and Botella, 2011) prior to presentation of the cue. Participants were asked to hold this number in mind whilst generating a memory and to then enter the number, on a separate screen, following memory generation. Participants were instructed to be as accurate as possible when entering the number.

There were 16 cues naming common everyday activities, (taken from Bower, Black, & Turner, 1979; Trafimow & Wyer, 1993; Reiser, Black, & Abelson, 1985), see appendix III for cue lists. Cues were identical to those used in chapter two, with the sixteen cues scoring the highest ‘ease to recall/imagine’ score in the event suitability survey (see appendix II) selected for use in the present study. Cues were randomly assigned to four blocks of 4 trials and were counterbalanced across participants and conditions, ensuring that all cues were used to generate both IFAMs and AMs and under both load and no load conditions. One block of 4 cues instructed the participant to recall whilst holding a number in mind, one asked to recall without holding a number in mind, one asked to imagine whilst holding a number in mind, the

other asked to imagine without holding a number in mind. There was a short 2-mimute pause between blocks while the instructions, indicating what condition would be presented for the next block, were reviewed.

Participants were instructed to either generate a truthful memory or imagine an event that had never occurred associated with the given cue. They were then instructed to press the space bar once they had brought clearly to mind a memory or imagined a fabricated past event, there was no upper or lower time limit on memory retrieval / image generation. Participants were instructed to ensure all fabricated events occurred in the past and to describe them as if they were trying to convince another person that the event had actually been experienced. For AMs they were instructed to bring to mind a memory of an event which they had directly experienced that had lasted for minutes or hours but no longer than one day. Both types of memory could be recalled or located at any point in their own personal past. Participants were instructed to construct memories as quickly as they could but to ensure they were specific.

Memory retrieval, image generation and number input times were recorded in milliseconds from cue on-screen to space bar press. After a memory had been provided, participants rated the vividness of AMs and IFAMs using 7-point scales (1=low, 7=high). Participants also indicated the perspective or point-of-view in their memory: they were instructed to judge a memory as having an 'observer' perspective if they saw themselves in the memory and to judge a 'field' perspective if they had something approximating to their original perspective or what would have been their original perspective for an IFAM. Finally, participants were asked to judge the approximate age at which the memory had occurred. They were instructed to plausibly fabricate this information for IFAMs.

3.3 Results

3.3.1 Secondary Task

3.3.1.1 Manipulation Check

Table 3.1. Percentage number of trials with <6, 6, 7 and 8 correct digits

Digits Correct	AM	IFAM
< 6	4.0	12.0
6	4.0	6.9
7	20.1	36.0
8*	95.0	69.0

*p < 0.001

To ensure participants had been performing the concurrent task correctly, the number of correct digits entered by participants, regardless of order, was counted. It was found that 97% of participants correctly entered six digits or more whilst concurrently generating a truthful memory, and 90% entered a number containing six or more correct digits whilst concurrently generating a fabricated memory. Interestingly however, differences in the amount of correct digits were observed between conditions. Reliably more participants entered completely correct (8 digits in any order) numbers whilst generating a real autobiographical memory, than when they were generating an IFAM, t(1, 30) = 5.0, p < 0.001, *d* = 1.6, see Table 3.1.

3.3.2 Secondary Task Accuracy

Results revealed that participants entered reliably fewer entire numbers in correct serial order (out of a total of 4 inputted numbers for each condition) following IFAM generation (m = 0.65, S.D. 1.2) than after recalling a memory of an experienced event (m = 1.6, S.D. 0.8), *t*(1, 30) = 5.0, p < 0.001, *d* = 0.9. Note – answers were only scored as being in correct serial order if all numbers matched the originally presented number; this was done due to the complexity of analysing such numerical data for accuracy. Seen as percentages, after generating an IFAM, participants entered the

entire original number in correct serial order only 16% of the time, whereas after remembering real events, participants entered the entire original number in correct serial order 40% of the time.

Participants were also found to take reliably longer to input their number after fabricating a memory (9554ms, S.D. 3079ms) than after retrieving a memory of experienced events (8155ms, S.D. 3051ms), $t(1, 30) = 4.2$, $p < 0.01$, $d = 0.5$.

3.3.3 **Memory Recall / Image Generation Times**

Table 3.2. Means and standard deviations of a memory recall times, recollective qualities and linguistic features of real and fabricated memories.

Memory Feature	AM with Load	IFAM with Load	AM without Load	IFAM without Load
Memory Recall Time *	9708 (9272)	13794 (16395)	8275 (6392)	11803 (12660)
Vividness (1-7) **	5.3(1.0)	4.3(1.2)	5.4 (1.2)	4.2 (1.2)
Account Length	377 (187)	334 (194)	371 (159)	339 (171)
Retention Interval	3.1 (3.0)	3.4 (2.8)	3.3 (3.1)	3.5 (2.3)
Motion Words *	2.9 (0.9)	3.6 (1.2)	3.4 (1.1)	3.5 (1.0)
Six Letter Words	14.5 (3.1)	13.7 (2.6)	13.3 (2.9)	13.6 (3.2)

** $p < 0.001$ *$p<0.05$ (reliable main effects were found for memory recall times and vividness, an interaction effect was found for motion words)

Memory retrieval times (see Table 3.2) were investigated using a 2 (AM or IFAM) x 2 (load or no load) repeated measures ANOVA. A main effort of condition was revealed such that IFAMs took significantly longer to retrieve than memories of experienced events $F(1, 30)=5.2$, MSe = 17028741, $p < 0.05$, $\eta^2 = 0.2$. Although the main effect of load increased both AMs and IFAMs generation time, the difference was not found to be reliable. This is likely due to the variation found in such memory recall and shown here by very large standard deviations.

3.3.4 **Recollective Qualities**

Two recollective qualities (vividness and retention interval) were entered into separate 2x2 repeated measures ANOVAs, with two levels of memory condition (AM and IFAM) and two levels of dual task (with or without). Results revealed a main effect of condition for vividness ($F(1, 30) = 24.0$, MSe = 1.3, $p < 0.001$, $\eta^2 = 0.4$), indicating that IFAMs were reliably less vivid than AMs. Table 3.2 shows the means and standard deviations (in parentheses). No other reliable differences were found.

Table 3.3. Number of memories recalled with field and observer perspectives

Memory Type	Own eyes	See Self
AM Load	95	29
AM No Load	90	34
IFAM Load	54	70
IFAM No Load	58	66
Total AM	185	63
Total IFAM	112	136

Since frequencies of perspective were so similar across load types (see Table 3.3), results were collapsed across conditions. Memory perspective was investigated using Chi-Square. It was found that 75% of AMs had a field perspective (the participant

sees the memory through their own eyes) and the remaining 25% had an observer perspective (the participant sees themselves in the memory). For IFAMs 45% of imagined events had an observer perspective with 54% having a field perspective. These differences in perspective between AMs and IFAMs were found to be reliable overall, ($\chi^2(1) = 44.7$, $p<0.001$).

3.3.5 **Content Analysis**

Memory accounts were analysed for three predefined linguistic constructs: motion words, account length and six letter words for both true and imagined accounts, Table 3.2. The counts were made using the Linguistic Inquiry and Word Count, LIWC, program (Pennebaker, Francis, & Booth, 2001) and the totals for each memory in each of the IFAM and AM conditions entered into separate 2 (memory type) x 2 (load or no load) ANOVAs. An interaction effect was found for motion words ($F(1, 30)= 4.3$, $MSe = 1.0$, $p < 0.05$, $\eta^2 =0.1$). Indicating that IFAM accounts contained reliably more motion words ($MD = -0.4$, $p<0.05$) than AM accounts, but only under the load condition. No other reliable differences were found.

3.4 Discussion

The present findings show that generating an IFAM impacted more on secondary task ability and accuracy as compared to truthful AM generation, indicating that the generation phase of memory retrieval is more cognitively effortful for intentionally fabricated than truthful autobiographical memories.

In previous work (chapter two) it was suggested that creation of an IFAM involves a process of firstly accessing information or specific detail in long-term memory followed by a conscious process of editing: a memory is first recalled, which in itself is effortful, followed by a period of editions leading to the creating of a novel mental representation. This additional process of editing, of deletion-substitution, leads to a

more effortful generation compared to AM generation. Results from the present study serve to support the above hypothesis.

Results indicated that the majority of participants recalled at least six digits of the original number, indicating that there was a concurrent memory load. However, when concurrently generating an IFAM, reliably fewer participants recalled all eight digits, in any order, as compared to recall when generating a truthful memory. Further, IFAMs were found to have fewer numbers recalled in original sequence as compared to truthful AMs. Number input time was also reliably slower whilst concurrently generating IFAMs as compared to concurrently generating truthful AMs. In other words, participants took longer to input the concurrent number following IFAM generation and the accuracy of these numbers was reliably lower for both serial and non-serial order recall, as compared to AM generation. These results serve to further underscore the increased cognitive effort associated with IFAM generation since finite cognitive resources were already depleted due to the additional phases associated with IFAM construction, leaving little cognitive resource left for additional tasks. Finally, IFAM construction in the no-load conditions took reliably longer than AM construction, further suggesting the occurrence of an additional processes such as conscious editing.

It was also found that IFAMs were rated as less vivid, contained more motion words and were seen equally through field and observer perspective. AMs, on the other hand, were rated a more vivid, contained fewer motion words and were recalled through a first person perspective most frequently. These findings are highly consistent with those in chapter one, suggesting robust effects. Although these are discussed in detail in chapter one, they are briefly considered here too.

It is known that episodic memories contain detailed recollective qualities (Martin A Conway, 2009) which not only allow the rememberer to have a subjective sense of self in the past (Klein, 2001) but also provide criteria for distinction between other forms of mental representations (Arbuthnott, Geelen, & Kealy, 2002; Johnson et al., 1988). Here then, the differences in the vividness of these details may play an important role in the distinction between real autobiographical memories and deliberately fabricated autobiographical memories, those things that have been imagined.

In addition, the previous experiment reported in chapter two revealed that IFAMs contained linguistic constructs, such as increased use of motion words and greater use of non-fluencies, that have been found to be artefacts of cognitively effortful recall (Newman et al., 2010). The use of motion words in accounts is assumed to reflect increased cognitive effort since motion words serve to simplify an account (Newman et al., 2010). Here however, this linguistic construct was found within IFAM accounts, but only after the load condition. It may be that this cue is more transparent in this condition to help reduce the cognitive complexity associated with generating an account under load. More importantly, however, the results indicate that the use of 'motion' words may not be a reliable cue to deception, as frequency of use of motion words differed dependent upon load.

Finally, Freud (1915) originally noted that a change in the perspective of a memory reflected some kind of revision of distortion. Indeed, perspective change tends only to occur for negative emotional events (Nigro & Neisser, 1983) and for those memories which represented a past self that is incompatible with aspects of the current self (Libby et al., 2005). Here then the high frequency of IFAMs reported from

an observer perspective suggests editing of some kind such that the memory is no longer visualised from its original perspective.

3.5 Conclusions

In summary, results have shown that IFAM generation impacts more on secondary task accuracy than AM generation suggesting that the generation phase of an IFAM is more effortful than the generation phase of an AM. This increased cognitive effort associated with IFAM retrieval is attributed to a conscious 'editing' phase. This finding was reflected both in the dual task data, as was evidenced by poorer performance on the secondary task whilst generating a fabricated memory as compared to whilst generating a truthful memory, and also in the recollective qualities data which was indicative of increased cognitive effort though linguistic analysis. Both these findings serve to support the notion that information from long-term memory is accessed and subsequently altered to produce an IFAM.

Chapter Four

4 Beliefs About Autobiographical Memory

4.1 Introduction

As was noted in chapter one, little is known about the beliefs that the public hold about autobiographical memory. It is particularly important that these beliefs are understood since, the only way individuals can evaluate memories is on the basis of their own knowledge and beliefs about memory, so called: common sense. This issue is particularly pertinent when members of the public form a jury, as has been noted, there have been calls by judges for jurors to ensure that they rely on their common sense judgements regarding memory, for example, in R. v. Adams, D.J. (1997, as cited in Lynch & McNally, 2003) jurors were required "to evaluate evidence and reach a conclusion not by means of a formula, mathematical or otherwise, but by the joint application of their individual common sense and knowledge of the world to the evidence before them". Additionally, in the case of R v Weller (2010), the jury were reminded that "if one tries to question science purely by reference to published papers and without the practical day-to-day experience upon which others have reached a judgment that attack is likely to fail…".

The question must then be asked: what is common sense about memory? Previous studies that have investigated the public's, judges' and even psychologists' beliefs about memory in general (Desmarais & Read, 2011; Magnussen et al., 2006; Magnussen & Melinder, 2011; Simons & Chabris, 2011; Wise & Safer, 2004) have found that although mostly all groups had a good basic understanding of memory and eye witness ability, a number of questions, for example those concerning repression, and the capacity and nature of long-term memory, revealed views divergent from

current scientific evidence (Magnussen & Melinder, 2011). This chapter therefore reports the results of a survey based that probed beliefs about autobiographical memory in an attempt to ascertain what level of understanding the public has about autobiographical remembering.

4.2 Method

4.2.1 Participants

There were 233 respondents drawn from the staff and students of the University of Leeds, 25 male, 208 female. Of these 185 respondents were students and 48 staff. Mean age was 21 with a range of 18-67 years of age.

4.2.2 The Questionnaire

4.2.2.1 Question Generation

Questions were chosen as they were believed to probe particular facets of autobiographical memory. The questions were generated with regards to items used previous studies (Desmarais & Read, 2011; Magnussen et al., 2006; Magnussen & Melinder, 2011; Simons & Chabris, 2011; Wise & Safer, 2004) to ensure questions were novel.

4.2.2.2 Pilot Testing

The questionnaire was pilot tested using a small student and non-student sample. Pilot participants were asked for feedback following their completion of the questionnaire. In line with feedback, some questions were clarified and some response categories were altered from fixed response categories to open-ended responses. An additional demographic measure of 'psychology education level achieved' was also included to investigate whether individuals who had some psychological background would provide different answers to those with a non-psychological background.

4.2.2.3 Final Questionnaire

The questionnaire contained 27 questions and statements (see appendix IV), addressing different aspects of autobiographical memory. The questions and statements were judged using a variety of response categories including 7-point scales (based on response categories in previous literature (Desmarais & Read, 2011; Magnussen et al., 2006; Magnussen & Melinder, 2011), fixed choices and open-ended questions. The questions sampled beliefs about a person's own memories and their beliefs about the memories of other people. They addressed issues of accuracy and detail and focussed on memory for everyday as well as emotional events. Separate sets of questions dealt with childhood memories and memory in the courtroom. Respondents also answered a number of demographic questions concerning gender, employment, education level and formal education in Psychology. None of the demographic measures gave rise to reliable effects and consequently are not reported further.

4.3 Results

Before reviewing the results, it is important to note that on some occasions, only a small percentage of people either 'very much' or 'completely agreed' with the statements provided in the questionnaire, suggesting that an absolute acceptance of certain beliefs may be limited to a small percentages of respondents, with the majority of those agreeing often only answering with 'slightly agree'. Although there exists a degree of difference in strength of belief here, what is important are the percentages of those participants who hold the belief to be true or who *could be persuaded* to hold the belief to be true. It was felt that with this line of thought, it would be appropriate to group all 'agree' responses insofar that these respondents at least have the potential to hold the beliefs identified below to be true.

4.3.1 **Judgments of accuracy, detail, emotion and memory vividness**

Table 4.1. Percentage participants responding in each answer category

Question/Statement	Completely Inaccurate / Vague	Very Inaccurate / Vague	Slightly Inaccurate / Vague	Neither Agree nor Disagree	Slightly Accurate / Detailed	Very Accurate / Detailed	Completely Accurate / Detailed
Are Everyday Memories Accurate?							
Own Memory	0	5.2	10.7	2.1	42.1	39.9	0
Others' Memory	0	2.6	9.9	6.4	53.2	27.9	0
Are Everyday Memories Detailed?							
Own Memory	0	5.6	13.3	7.3	40.8	30.5	2.6
Others' Memory	0	3.4	9.0	13.3	54.5	19.3	0.4
Question/Statement	Completely disagree	Very Much Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Very Much Agree	Completely Agree
Memory Does not change over time	15.5	38.2	29.2	2.1	7.7	6.0	1.3
Memory is a snapshot of an original experience	17.2	28.3	29.2	10.7	11.6	2.6	0.4
There is a limit to what we can remember	10.3	12.0	18.0	15.0	15.5	16.7	9.9

As shown in Table 4.1, the majority of respondents (81%) indicated that they believed their own and the memory of others (82%) to be 'slightly' or 'very' accurate representations of the original experience. No respondent believed their memory to be completely accurate and few believed their own or the memories of others to be inaccurate to any marked extent. Interestingly, however, there was a reliable overall difference in ratings of accuracy of own and others' memory ($\chi^2(13) = 778.7$, $p < 0.0001$). Post-hoc analysis, using Wilcoxon Signed-Rank Tests with a Bonferroni corrected $p < 0.007$ (used throughout unless otherwise stated), found that respondents rated their own memory as 'very accurate' reliably more than they rated the memories of others as 'very accurate', ($Z = -3.8$, $p < 0.007$). Conversely they judged the memories of others as 'slightly accurate' reliably more often than they rated their own memory as 'slightly accurate' ($Z = -3.2$, $p < 0.001$). In other words, the respondents had more belief in the accuracy of their own memories than in the accuracy of the memories of other people. Reflecting, perhaps, a bias in confidence in favour of the self.

The same pattern of results was found for judgements regarding memory details. There was a reliable overall effect of own versus others ($\chi2(13) = 639.0$, $p < 0.001$) in rated memory detail, with own being rated higher. Post-hoc analysis found that respondents rated their own memory as 'very detailed' reliably more often than they rated the memories of others as 'very detailed' ($Z = -3.1$ $p < 0.005$). Conversely, the memories of others were rated as 'slightly detailed' reliably more often than they rated their own memories as 'slightly detailed' ($Z = 3.5$, $p < 0.005$). Finally, high positive correlations were found between accuracy and detail ratings for own memory, $r=0.62$, $p<0.001$, and between accuracy and detail ratings for other's memory, $r=0.63$, $p<0.001$, such that those respondents who reported their own and

others' memories as being detailed also reported their own and others' memories as being accurate

Respondents generally believed then that their own memories were highly accurate and detailed and more accurate and detailed than the memories of other people - which, of course, is most unlikely to be the case. Possibly this (implicit) belief arises simply because we know our own memories better than we know the memories of others – a familiarity effect that leads to over-confidence in the accuracy and specificity of one's own memory. Positive correlations between accuracy and detail ratings for own and other memories would seem likely to reflect a belief that the more detail a memory has the more likely it is to be accurate. This pattern of over-confident belief in the accuracy and detail of one's own memories relative to others is referred to here as the *Memory Self-Superiority (MSS) Belief*, and to the belief that accuracy increases with increasing detail, as the *Memory-Accuracy-Detail (MAD) Belief.*

Turning next to beliefs about emotional experiences and specifically to the belief that highly emotional experiences give rise to highly accurate memories. Controversial though this belief may be it is nonetheless a widespread belief and Magnussen, et al. (2006), for instance, found that over 70% of respondents in their survey believed memory for a dramatic event to be more accurate than memory for an everyday event. In the present survey this figure was even higher and we found that over 80% of respondents believed that their own and the memory of others for emotional events would be more accurate than less emotional more everyday events ($Z = -11.8$, $p < 0.001$ and $Z = -12.1$, $p < 0.001$ respectively). Related to this finding were judgements of the statement that "the more vivid a general, everyday, memory is, the more accurate it is". In the present sample 69% of respondents agreed with this

statement, to at least some extent. In contrast, only 23% disagreed with it. Although scientific literature has contrasting findings regarding the association of vividness and accuracy (Brown & Kulik, 1977; Christianson & Safer, 1996) results from chapter two and three suggest that vividness may be associated with truthful AM, as findings indicated that AMs were rated as reliably more vivid than IFAMs. In any case, participants agreed to varying extents that vividness and accuracy are associated, and that emotional memories are more accurate than everyday events. Taken together this belief is referred to as the *Burnt-In-Memory (BIM) Belief*.

Another belief that was probed was the claim that a memory stays the same over time, regardless of whether opinions or attitudes change over time. Interestingly, 83% of respondents 'completely', 'very much' or 'slightly' disagreed with this statement, whilst only 15% 'agreed' (to varying degrees), a reliable difference ($Z = -8.9$, $p < 0.001$). Thus, the majority of participants believed memory to be malleable. Relatedly, in response to the statement: "A memory is like a snapshot of what we witness or experience - it is clear and accurate". Respondents (75%) generally disagreed and indicated their disagreement, to varying degrees, with only 14% agreeing ($Z = -5.8$, $p < 0.001$). Interestingly, 11% of the sample answered with 'neither agree nor disagree' suggesting a group who could, perhaps, be persuaded one way or the other. Thus, there could potentially be up to 25% of the sample who do, or who could come to believe, that memory is like a photograph. Overall, however, memory was believed, with varying degrees of conviction, to be malleable and not of snapshot/photograph accuracy, and presumably, therefore, fragmentary. This is referred to here as the Memory-Malleable-Fragment (MMF) Belief, and note that the MMF belief is highly inconsistent with the MAD belief identified earlier. I also note the converse of the MMF belief, the Unchanging-Clear-Photograph (UCP) Belief. The

UCP belief is more consistent with the MAD belief and, according to the present findings, could potentially be held by as many as 1 in 5 people.

Most strikingly for the statements: “Some people have better memories for their personal life events than others” and “If two people witness the same event, their memories will be almost exactly the same”, over 99% of the sample agreed with the first statement and over 94% disagreed with second. We term this the *Memory Individual Differences (MID) Belief*. Finally, in judging the statement: “There is a limit to how much we can remember about our lives”, responses were mixed and 40% ‘completely’, ‘very much’ or ‘slightly’ agreed whereas 42% completely, ‘very much’ or ‘slightly’ disagreed. There were also 15% of respondents who answered with ‘neither agree nor disagree’. Thus it would seem that there are two opposed beliefs commonly held, to varying degrees, about the capacity of long-term autobiographical memory: one is that it is limited and the other that it is limitless, a belief is termed here the *Memory-Limited-Unlimited (MLU) belief*.

4.3.2 Judgments of Earliest Memories: Age, Accuracy, Details & Vividness

Respondents were asked to recall their first memory and their age at the time of the remembered experience. They were also asked to give their estimate of the earliest age from which it would be possible for anyone to have a first memory. Note that, mean age of first memory usually dates to about 3 years 4 months, with quite marked variability around this mean, although very few memories date to below the age of about 2 years 6 months (Rubin, 2000). In the present study mean age of own first memory was judged as 4.0 (S.D. 1.1) years. In contrast, the mean estimated age of others’ first memories was judged to be 3.2 (S.D. 1.0) years, nearly a full year earlier than own memory, and this difference was reliable ($t(232) = 11.0$, $p < 0.001$, $d = 0.8$). Remarkably then respondents believed that other people were capable of remembering earlier first memories than they themselves were. Two important

points from this findings are that, i) people do not appear be using their own memories to make such estimates, and ii) it follows that most people would be willing to accept a first memory that dated to an age earlier than their own first memory. Both have important implications for judgements of childhood memories in legal settings where childhood memory, for example of abuse, is the evidence.

Table 4.2. Percentages of participants reporting own and other's earliest memory at each age group

Age at which memory occurred	Percentage Ratings for Own Memory	Percentage Ratings for Others' Memory
Birth	0.0	1.7
1	0.0	0.9
2	6.4	18.0
3	24.9	41.6
4	37.8	24.5
5	21.0	8.6
>5	9.9	4.7

In analyses (the same as those reported earlier) comparisons were made between own and other first memories across age categories from birth up to age 5+years (see Table 4.2). Reliable differences were found between the following age categories age 2 years, ($Z = -4.4$, $p < 0.001$) own<other, age 3 years ($Z = -4.0$, $p < 0.001$), own<other, age 4 years ($Z = -3.3$, $p < 0.001$), own>other, age 5 years ($Z = -4.0$, $p < 0.001$), own>other, and greater than age 5 ($Z = -3.4$, $p < 0.001$), own>other.

These findings then address beliefs about the period of childhood amnesia. As expected a very small number of people, less than 1%, indicated that they had an earliest memory dating to the age of two years and none dated their own earliest

memory to the age of 1 year and birth. However, over 20% of these same respondents believed that first memories were possible for other people dating to 2 years of age and below. Remarkably, a small group judged that other people's memories dating to birth were possible too. These findings show judgements of memories are based on beliefs about earliest memories rather than on one's own earliest memory and/or scientific findings that define the period of childhood amnesia. Possibly people have been exposed to others who claim memories dating to these ages. In a current on-going large scale survey of earliest memories it has been found that over 20% of respondents (approximately 1500 people) claimed that their earliest memory dated to the age of 2 years or earlier. Such claims may influence people whose own earliest memories date only to the 3 to 5 year-old period, or older, and lead them to believe that recalling memories from these earlier ages is possible, if not for them, but for others. This is termed here the *Earliest Memory Overestimation (EMO) Belief.* Clearly, the EMO belief has important implications for judgements of early memories when these constitute 'evidence' in legal proceedings.

Table 4.3. Percentage participants responding in each answer category

Question/Statement	Completely Inaccurate / Vague	Very Inaccurate / Vague	Slightly Inaccurate / Vague	Neither Agree nor Disagree	Slightly Accurate / Detailed	Very Accurate / Detailed	Completely Accurate / Detailed
Are First Memories Accurate?							
Own Memory	2.1	21.5	26.2	4.7	27.9	15.5	2.1
Others' Memory	5.6	23.6	25.3	6.0	25.3	12.4	1.7
Are First Memories Detailed?							
Own Memory	3.4	31.8	36.5	5.6	19.7	3.0	0.0
Others' Memory	5.2	32.2	29.6	6.9	21.9	3.9	0.4
Question/Statement	Completely disagree	Very Much Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Very Much Agree	Completely Agree
The more vivid a memory is, the more accurate it is							
Everyday Memories	1.7	4.7	16.3	8.6	34.3	32.6	1.7
Childhood Memories	1.7	6.4	21.5	16.3	33.0	19.7	1.3
The more detailed a memory is, the more accurate it is							
Everyday Memories	1.7	5.6	15.0	7.7	39.9	28.8	1.3
Childhood Memories	2.1	8.2	19.3	13.3	35.6	20.6	0.9

Table 4.3 shows the percentage of participants using each answer category for accuracy of earliest memories and it can be seen that 46% of respondents rated the accuracy of their own first memory as 'completely', 'very' or 'slightly' accurate. In direct contrast, the remaining respondents rated their first memory as 'completely', 'very' or 'slightly' inaccurate. This bimodal distribution indicates that there are two distinct and opposed beliefs about the accuracy of first memories. One belief, held with varying degrees of conviction, is that the first memories are to varying degrees accurate and the other belief is that first memories are to varying degrees inaccurate.

Although these polarised beliefs appear to underlie judgements of accuracy of a person's own earliest memory, the situation was found to be quite different and highly inconsistent for accuracy judgments of another person's earliest memory. Here, 72% of respondents believed others' first memory to be 'completely', 'slightly' or 'very' inaccurate, with only 23% believing it to be 'completely', 'slightly' or 'very' accurate. Thus, there is a shift from the two-belief bimodal distribution of accuracy judgments of own first memory to a unimodal distribution for accuracy judgements of the first memories of others. Essentially the first memories of others were judged to be low in accuracy. Statistical analyses found a reliable difference overall difference between estimated accuracy of own compared to others first memory ($\chi^2(13) = 374.3$, $p < 0.001$). Post-hoc analysis found own first memory to be less frequently rated as 'very' inaccurate compared to others' first memory ($Z = -3.5$, $p < 0.001$). Similarly, own first memory was less frequently rated as 'slightly' inaccurate compared to others' first memory ($Z = -2.7$, $p < 0.007$). Conversely, respondents were more likely to rate their own first memory as 'very' accurate more frequently than they rated others' first memory as 'very' accurate ($Z = -4.8$, $p < 0.001$). Indeed, 16% of respondets rated their own first memory as 'very' accurate compared to only 3% of respondents who rated other's first memory 'very' accurate. It is also interesting to

note that a small percentage of respondents believed their first memory to be 'completely' accurate, whereas no respodents judged others' first memory 'completely' accurate.

Turning next to the rated details of first memories, a highly similar pattern of findings was observed (see Table 4.3). Here, 40% rated their own first memory as 'completely', 'very' or 'slightly' detailed in contrast to 55% of who rated their first memory as 'completely', 'very' or 'slightly' vague. A clearly bimodal distribution, in which one group judged their first memory as detailed and the other group judged it as vague. In contrast, 67% of respondents rated others' first memory as completely, very or slightly vague, with only 26% rating others' first memory as 'completely', 'very' or 'slightly' detailed. Together with the accuracy findings for own and others' earliest memory we suggest this reflects a MSS, held with varying degrees of conviction, for earliest memories and will refer to it below as *childhood Memory Self Superiority (cMMS) Belief*. Most interestingly, positive correlations between accuracy and detail ratings in own first memory, $r=0.58$, $p<0.001$, and in others' first memory, $r=0.64$, $p<0.001$, show the MAD belief in operation for early memories, i.e. the more details the better the accuracy. We refer to this as the *childhood Memory-Accuracy-Detail (cMAD) Belief.*

A reliable difference was found between rated detail for own and others' first memory ($\chi^2(13) = 298.3$, $p < 0.001$) and post-hoc analysis established that respondents rated their own first memory as 'very detailed' reliably more frequently than they rated others' first memory as 'very detailed' ($Z = -3.5$, $p < 0.001$). Also, respondents rated others' first memory as 'very vague' reliably more often than they rated their own memory as 'very vague' ($Z = -2.8$, $p < 0.007$). Thus, when reporting the detail of one's own first memory details are judged as either 'detailed' or 'vague'

compared to first memory of others which, by-and-large, is judged as 'vague'. Finally, a similar pattern was present in judgements of the vividness and detail of childhood memories where 54% and 57% of respondents respectively 'completely', 'slightly', or 'very much', agreed that vividness and detail predict the accuracy of childhood memories compared to 30% of respondents for both ratings who disagreed (see Table 4.3). Thus, the BIM belief appears to extend to childhood memories, where it constitutes a *childhood Burnt-In Memory (cBIM) belief*.

4.3.3 **Judgments of Witness Recall in the Courtroom**

Table 4.4. Percentage participants responding in each answer category

Question/Statement	Completely disagree	Very Much Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Very Much Agree	Completely Agree
Does confidence indicate accuracy?	5.6	12.9	25.3	15.5	31.8	9.0	0.0
Does recalling many details from a negative event indicate a truthful witness?	0.0	5.2	18.5	17.2	30.5	26.6	2.1

Respondents judged the statement: ‘The more confident someone is that his or her memory is accurate, the more accurate the memory probably is.’ Results (see Table 4.4) showed a mixed understanding of the relation between confidence and accuracy as 44% of respondents completely, very much or slightly disagreed with the statement whilst 40% of respondents completely, very much or slightly agreed with the statement. This bimodal distribution represents a split opinion regarding the nature of confidence judgements. In addition, 16% of respondents answered using the category ‘neither agree nor disagree’ suggesting a degree of uncertainly within some respondents or those who could be persuaded either way. The erroneous belief, held with varying degrees of conviction, that confidence is necessarily associated with accuracy is termed here as the *Witness-Confidence-Accuracy (WCA) Belief*.

Focusing on remembered details respondents judged the statement: ‘An individual is being interviewed about a very negative childhood event in court. They can remember many minor details from the event. This person is likely to be being truthful about what they can remember.’ It was found that nearly 60% of respondents agree, to varying degrees, that the truthfulness of a witness recalling a negative childhood event is reflected in the amount of detail of the recall: the more detail, the more likely the memory is to be truthful, consistent with the earlier, MAD belief (see Table 4.4).

Respondents were also asked to judge the statement: ‘A witness is being interviewed in court about their memory for a crime. They say "I don't know’ to a number of questions. Are they more likely to be a truthful or a deceptive witness?”, 78% of respondents said that this behaviour would be more likely to represent a truthful witness but 22% judged it characteristic of an untruthful witness. Thus, the majority

considered that a truthful witness would be more likely admit that they could not answer a question. Results therefore show the application of the MMF belief to witness testimony and general understanding that truthful memory may not represent a clear, accurate memory. However, we can also see the UCP belief in action here for the quarter of respondents who judged "I don't know" responses to be characteristic of a deceitful witness, believing that a lack of memory is equivalent to deceit. Respondents also judged the converse of this: 'A witness is being interviewed in court and answers every question posed to them. Are they more likely to be a truthful or a deceptive witness?' Interestingly, 63% of respondents believed that answering every question was indicative of a deceptive witness. Again, we can see both the MMF and the UCP beliefs in action; respondents generally understand that memory, although visual in nature does not act like a photograph of an event and thus testimony that resembles the UCP belief is generally deemed deceitful. Again, however, it should be noted that 37% of respondents believed that the ability to recall all information from an event more likely represented the behaviour of a truth teller, somewhat consistent with the UCP belief.

Taken together, the understanding that truthful and deceitful responses may differ in terms of their certainty (i.e. whether they are tentative or clear, unchanging memories) is termed here as the *Truthful-Deceitful-Responses (TDR) Belief*.

Table 4.5. Percentage of participants stating each characteristic for positively or negatively affecting judgement

Judgement	Trust	Distrust
Inappropriate emotion, anger or aggression	2.0	2.0
Inappropriately dressed, scruffy, unkempt, unclean	33.9	29.9
Language used	34.5	32.6
Avoiding eye contact, being shifty	6.6	13.4
Female	1.7	-
Male	-	0.3
Age, adolescent, child, elderly	4.0	3.8
Perceived class	3.4	5.8
No	11.5	9.6

Finally, respondents were asked if there were any attributes of witnesses that might lead to increased trust or distrust in them as individuals. Respondents judged the statement: 'If you were a juror and a witness came into court to give evidence, before you heard anything they had to say, are there any attributes that would make you more likely to trust / distrust their evidence?. The open-ended responses were categorised and results are shown in Table 4.5.

Only 12% of respondents said that there were not any attributes that would increase their trust in an individual's testimony. In short, this means that 88% of respondents reported that at least one physical or perceived attribute would positively influence their perception of the witness. Of these respondents, nearly 70% stated that smart dress / good overall presentation (35%) and/or a clear, confident speech (34%) would increase trust in the individual's testimony. The former traits are assumed to be important factors when judging the trustworthiness of an individual and thus constitute the *Positive-Presentation-Bias (PPB).* 7% of respondents said that maintaining eye contact would also positively influence their trust of the witness.

Respondents also noted that middle-aged adults (4%), perceived middle-class (3%), appropriate emotional display (2%) and a female witness (2%) as being factors that would positively influence their trust in the witness statement.

For attributes leading to distrust, 90% of respondents said that at least one attribute would make them more likely to distrust a witness's evidence. Of these 30% of respondents stated that evidence from a scruffy, unkempt or inappropriately dressed individual would be more likely to be distrusted, 17% said that unclear speech or contradictory evidence would make them distrust the witness. This pattern of thinking conversely reflects the PPB belief and is as such, termed the *Negative-Presentation-Bias (NPB)*. Results further showed that 13% said that avoiding eye contact and being fidgety would make them suspicious. Other attributes that respondents stated would negatively affect their judgement about a witness included overconfidence in their story or arrogance (9%), a foreign accent or an accent that is perceived as 'common' (6%), the perceived class of the individual (5%), inappropriate (i.e. too much or too little) emotion (2%), perceived cultural background / religion (1%) and if the witness was male (0.3%).

Further, a reliable difference was found between response categories for "trust" and "distrust" attributes ($\chi 2(13) = 446.2$, $p < 0.0001$). Post-hoc analysis, however, found only one reliable difference and this was within the "amount of eye contact" category ($Z = -3.2$, $p < 0.007$), in which higher contact equalled more trust and 13% judged that a lack of eye contact would make them more likely to distrust a witness compared to 7% of respondents who judged that maintaining eye contact would make them more likely to trust a witness. Thus, although a reliable difference was found, ratings were low and overall eye-contact did not appear to be an important variable in judging witness trustworthiness. Finally, it was found that middle-aged adults were more

likely to be rated as truthful witnesses compared to children, adolescents and the elderly who were rated as more unreliable. Related to this person attribute, a small minority of respondents specified that they would be more likely to trust evidence if it was from a female rather than a male witness.

4.4 Discussion

Table 4.6. Fourteen Beliefs about Autobiographical Memory

Beliefs		Scientific Evidence?	Likely to be True?
MSS	Memory Self-Superiority	None	No
MAD	Memory-Accuracy-Detail	Against	No
BIM	Burnt-In Memory	Mixed	No
MMF	Memory-Malleable-Fragment	Supported	Yes
UCP	Unchanging-Clear-Photograph	Against	No
MID	Memory-Individual-Differences	None	Possibly
MLU	Memory-Limited-Unlimited	None	Yes for L, No for U
EMO	Earliest Memory Overestimation	Against	No
cMSS	childhood Memory Self-Superiority	None	No
cMAD	childhood Memory-Accuracy-Detail	None	No
WCA	Witness-Confidence-Accuracy	Against	No
TDR	Truthful-Deceptive-Responses	Mixed	Yes
PPB	Positive-Presentation-Bias	None	Yes
NPB	Negative-Presentation-Bias	None	Yes

Results highlight that, in the present sample, beliefs about autobiographical memory rest upon a complex set of inconsistent, erroneous, and often entirely incorrect (insofar that they do not correspond with current scientific research) beliefs regarding detail, vividness, accuracy and emotional of own and others' every day and childhood memories. Further, results highlighted that these beliefs also permeated judgements of recall in the courtroom. Table 4.6 lists the 14 beliefs identified in the present study, the scientific evidence supporting each belief, and an evaluation as to whether the beliefs are likely to be true or not. An evaluation of the above table reveals that

many of the beliefs simply do not have any corresponding scientific evidence, meaning particular judgements of memory simply do not have any objective verification.

The first part of this review will therefore address those incorrect beliefs for which contradicting evidence does exist. Firstly, the MAD belief asserts that a detailed account necessarily points to an accurate account, although the birth of flashbulb memory literature nearly four decades ago (Brown & Kulik, 1977), would have considered this belief correct, subsequent research has however shown that highly detailed memories are susceptible to the same patterns of forgetting and inaccuracies as memories of everyday events (Luminet & Curci, 2009). What can be concluded with recent research is that detail is not an accurate predictor of accuracy, despite this pervasive belief. A somewhat related belief is the BIM belief, which states that experiencing an emotional event will necessarily lead to an enduring and accurate memory. The scientific evidence corresponding to this belief is mixed: it may be suggested that factors such as increased attention for the event and internal and external rehearsal (particularly for public events) may serve as factors to improve the memory of the event (Brown & Kulik, 1977; Rubin & Friendly, 1986). However, it has also been argued that a memory for trauma can give rise to wholly inaccurate and erroneous memories too (Conway, et al., 2004; McNally, 2003). A further related belief is that of the UCP that states that once encoded, a memory is unchanging. This belief underlies the notion of the 'storehouse' view of memory in which records of experience are preserved, ready for access when necessary. The notion of the storehouse has long been disregarded from memory research, with modern memory research viewing memory as a constructive process mediated by current goals and self-beliefs (Conway & Pleydell-Pearce, 2000). However, it seems that this belief still exists for some, outside of the scientific community.

In addition, many of the beliefs about childhood memory are inaccurate or have no scientific corroboration (cMSS and cMAD beliefs). Of particular concern is the belief that memories can be recalled from the preverbal period (EMO belief). A vast amount of research has supported the notion that adults cannot remember before around the age of 3 years 4 months. Indeed, even studies that have found memories dating to this period (Eacott & Crawley, 1999; Usher & Neisser, 1993) have been unable to verify the accuracy of such memories.

Further, inaccurate beliefs can be seen regarding judgements of witness recall. For example, the WCA belief states that a belief in the accuracy of memory is a reliable predictor of its objective accuracy. Much research has been undertaken investigating the notion - known as the accuracy-confidence correlation - that increased confidence in one's memory does not necessarily lead to increased accuracy for an event with the vast majority of results failing to find a reliable correlation between confidence and accuracy (Sporer, Penrod, Read, & Cutler, 1995). Strikingly, but unsurprisingly, results showed that 89% of respondents would be more likely to trust someone's evidence based on one or more physical attribute, and 90% of respondents claimed they would be more likely to distrust evidence based on one or more physical attribute. In particular, being well spoken, dressing appropriately and not avoiding eye contact were seen as indicators of trust, whereas poor / unclear speech, scruffy dress and a lack of eye contact rendered the individual less trustworthy. These particular sets of behaviours and attributes constitute both the PPB and the NPB respectively.

However, what can be affirmed, and what some respondents believed too, is what can be described as the 'modern view' of human memory. This view describes long-term autobiographical memory as fragmentary, constructive, unlimited and although

dominated by visual imagery, not at all like photographs or videos, (Conway, 2005). A consequence of this constructive system is that memories are particularly prone to error, distortion, and even to the creation of false memories (Bell & Loftus, 1989; Brainerd & Reyna, 2005; Hyman & Pentland, 1996; Loftus, 1993; Roediger & Mcdermott, 1995; Schacter, 1999). In addition, research has shown that different patterns of responding can occur depending on whether an individual is being truthful or deceptive (Raskin & Esplin, 1991, Chapters six, seven & eight of this thesis). Respondents seemed to be aware of this view, most probably from their own experience of receiving and telling lies.

However, despite some of the identified beliefs corresponding with current memory research, many of the beliefs were polarised and inconsistent. For example, people believed others to have vague memories yet believed that others could have earlier memories then themselves, that memory is malleable and often incorrect yet frequently rate their memories as highly accurate. Some people believe memory to be like a photograph whereas others believe it to be something like what is assumed by the modern view of memory. Finally, the beliefs found in this study are not necessarily based on individual experience, as in the EMO belief, or common sense, such as the MLU belief and people often view themselves as superior rememberers, such as the MSS and the cMSS beliefs.

In sum, without an understanding of the modern view of human memory, or without a memory expert to guide the jury, it is likely that accounts of memory will be judged using beliefs about the way in which science currently believes memory works. As had been shown, these beliefs are often incorrect, erroneous, polarised, inconsistent and for some, their truth value is unknown. The implications for briefing those who

have to judge accounts of memories as evidence and providing a courtroom that prioritises anonymity are, self-evident.

4.5 Limitations & Future Work

Although the present sample was suitable for the current study, I acknowledge that it is limited and could be expanded in a number of ways, for example, encompassing and sampling a wider range of ages, socio-economic backgrounds, education levels and geographical locations, allowing the sample to be more demographically representative. Further, the study would also benefit replication within other samples such as those working within the legal system (judges, triers of fact, police personnel) in order to ascertain if such beliefs are held widely. It would also be interesting to begin to understand children's beliefs regarding autobiographical memory. Indeed, Ceci & Bruck (1993) estimate that up to 13,000 children a year may be required to provide, often uncorroborated evidence to the courtroom, with a similar number giving unsworn statements to police and other legal personnel.

It is also important to note that the present study was based on an unbalanced gender sample, with the study comprising of 208 females but only 25 males. Although the results were assessed with regards to gender and no reliable differences were found, is it like that such a small representation of males would have yielded reliable differences, should they have existed. It may be that males and females have differing opinions of the way in which memory works. Certainly, future work should ensure an equal (or at least weighted) sample of male and female respondents to systematically address the question of whether different genders hold differing beliefs about memory.

The questionnaire itself could also benefit from revision, as issues with specific memory activation may have rendered some questions difficult to answer. For

example, question one asks, "*How accurate do you believe your own personal memories of your everyday life to be?*" the answer given may change dramatically depending upon which memory was activated by the respondent. Remembering a pleasant phone call with a friend may evoke entirely different responses than a memory of walking to work in the cold. Although both memories are 'everyday', they represent very different, albeit everyday, experiences.

Similarly, it may be important in future work to tease apart emotional and flashbulb memories. In the present questionnaire, a wedding and the events of 9/11 are categorised as 'emotional' memories. It may be important to make a clear distinction in future work between what could be considered an emotive memory and what could be considered a flashbulb memory.

It may also be appropriate to provide the respondent with a 'don't know' option in future studies. Although in this study, the 'neither agree nor disagree' category was seen as a sufficient index of uncertainty, it may need to be made more explicit in future work.

In sum, although the work is based on a somewhat limited sample and requires replication and revision, the results certainly posit that particular beliefs are held to be true by members of the public. An appropriate next step would be to construct a more refined and nuanced questionnaire to be distributed to a representative sample with the aim of replicating and furthering the present findings.

Chapter 5

5 Beliefs About Lying and Liars

5.1 Introduction

As was noted in chapter one, deception is generally categorised dichotomously: a lie is thought of as being trivial or serious (DePaulo et al., 2004). Trivial lies are the lies of everyday that enable and maintain successful social relationships between individuals, with the revelation of the lie unlikely to produce major consequences for the liar or recipient of the lie. Serious lies on the other hand are categorised as those that have serious negative consequences if they are revealed, described by DePaulo, Ansfield, Kirkendol, & Boden (2004) as "threats, transgressions, and betrayals; that result specifically in relationship problems; that endanger people's reputations; and that are forbidden by organized religion and indictable by law" (p. 148). It is these lies in which this thesis is interested.

Much research investigating these high-stake lies (Vrij, 2000) has focussed on attempting to understand differences in the behaviours and language used whilst lying (objective indicators) and what individuals believe others do when they lie (subjective indicators). Further, these studies have generally employed similar methodologies whereby participants are instructed to lie in laboratory settings, usually about a staged event or to generate falsely held opinions or emotions. Behaviour and language is then measured and coded by independent raters. To date, only one study (DePaulo et al., 2004) has investigated serious lies that participants (both a student and community sample) had previously told and received i.e. lies that were not generated in and for the laboratory. In particular, this study was

investigating the topography of the lie – its content, the motivation for its use, reactions of the liar and receiver and to whom the lie was told.

The study concluded that most serious lies were told to or received from someone who was perceived as being a close relative. Lies were told, amongst other reasons to enable activities to which the liar felt they were entitled, to evade punishment and to protect and hurt others. Liars' feelings about having delivered the untruthful information varied dramatically depending upon what lie had been told.

Although this study provides useful and unique insight into the 'make-up' of the serious lie, it did not ask questions regarding specific behavioural, emotional or linguistic patterns used by the liar – to avoid detection or that occurred sporadically whilst lying. Nor did it ask, whilst receiving a lie, if the individual noticed, or deliberately looked for particular behavioural patterns in individual telling the lie. This chapter therefore reports the results of a study that attempted to answer the above unanswered questions about serious lies that had been told by and received by the individual in their life. In particular, the study aimed to understand how individuals construct lies and how they determine what information they are being told is untruthful, how they deal with challenges to their lie and how, or if, they challenge information that they believe is false. Additionally it attempted to examine the perceived physiological, emotional, behavioural and linguistic changes (either deliberate or unconscious) noticed in the self and others whilst lying. It is hoped that by understanding, in particular the perceived behavioural and linguistic changes whilst lying and whilst being lied to, it can be determined how individuals detect lies and how they present themselves in order to appear truthful. Understanding such mechanisms would be useful for more applied settings such as the courtroom where often demeanour is scrutinised for believed 'tells' of lying. Further, gaining insight

into how lies are constructed may add support to the proposed mechanisms that drive fabricated memory generation – those of editing.

5.2 Method

5.2.1 Participants

There were 127 respondents drawn from the staff and students of the University of Leeds, 33 males, 94 females. Of these 116 were students and 11 were staff. Mean age was 21, ranging from 18-60. Two respondents' data were removed as their questionnaire was submitted incomplete.

5.2.2 The questionnaire

5.2.2.1 Question Generation

Questions were chosen as they were believed to probe particular facets of serious deception that had not been previously investigated. In particular, the questions were generated to probe the psychological processes associated with telling and receiving serious lies, including what behavioural, emotional, linguistic and physiological changes were noticed when being lied to and deliberately altered when lying. The questions were generated with regards to items used previous studies (DePaulo, 2004) to ensure questions were novel.

5.2.2.2 Pilot Testing

The questionnaire was pilot tested using a small student and non-student sample. Pilot participants were asked for feedback following their completion of the questionnaire. In line with feedback, a number of questions were added, in particular those regarding the subject of the lie. These were included to allow respondents to contextualise the information provided and were not intended for analysis. A small number of questions were revised to improve the clarity of the wording.

5.2.2.3 Final Questionnaire

The questionnaire contained 13[2] questions, 8 of which regarded a highly consequential lie that *the respondent had told* and 5 regarded a highly consequential lie *the respondent had received*, see appendix v. In particular, the questions addressed psychological constructs underlying telling and receiving a lie. Questions investigated ways in which lies are constructed and how false information is determined, the individual's perceived ability to lie and to detect lies, how accusations are dealt with, how accusations take place and the identification of physiological, emotional, behavioural and linguistic changes in self and others whilst lying. Participants responded using open ended answering for each question. These responses were then categorised for further analysis (see appendix v).

Respondents also answered a number of demographic questions concerning gender, employment, education level and formal education in Psychology. None of the demographic measures gave rise to reliable effects and consequently are not reported further.

5.3 Results

5.3.1 Manipulation Check

To ensure that each respondent had provided highly consequential lies, the content and subject of lies given and received was checked. Respondents had provided serious lies, with their topics ranging from romantic affairs, crashing cars, theft etc. These lies fell into a number of categories, see Table 5.1. Type of Lie Provided

[2] [1]the questionnaire contained 19 questions in total; however, 6 were removed from analysis as these questions dealt with the features of the lie i.e. the content of the lie. Such questions were used to contextualise participants' responses, and were not intended for analysis. These questions are reported in appendix VI for completeness.

Table 5.1. Type of Lie Provided

Percentage	*Category of Lie*
5.3	Romantic Infidelity
20.3	Whereabouts
8.2	To get time off work/school
10.3	To avoid a situation / person
32.1	About doing something, or not doing something
18.0	Personal attribute (age, job, status)
3.2	Real feelings (about something or someone)
2.7	Financial situation

5.3.2 Constructing and determining lies

The majority of respondents (73%) reported basing their lie on existing events, with only 27% using entirely false information to construct their lie. This suggests that highly consequential lies tended to be formed through a process of editing of the truth, rather generating an entirely fabricated account.

Table 5.2. How was veracity determined?

Percentage	*How was veracity determined?*
34.1	Behavioural cues
16.5	Linguistic cues
34.1	Contradictory information from another source
15.3	They had lied before / known to be untrustworthy

When asked how respondents determined the veracity of the information they were being told, 52% of the respondents said that they knew the information they were being given was false and 48% said that they presumed it was false. Of the people who presumed the information they were being told was false (i.e. those who did not have objective proof that the information they were being told was false), approximately 50% used subjective, (behavioural (34%) or linguistic (16%)) cues to aid their decision in determining the veracity of the information they were being told (see Table 5.2). The remaining respondents reported using objective indicators to

determine veracity, such as having contradictory information or basing their decision on the perceived trustworthiness of the individual.

5.3.3 Dealing with challenges and challenging lies

Table 5.3. Dealing with a challenge

Percentage	Type of Challenge
51.2	Continue to lie
33.9	Lie was not challenged
6.3	Change the conversation
4.7	Challenge the challenge
3.9	Admit the truth

Respondents were asked whether their lie had been challenged by the receiver, and if it was, how they dealt with the accusation (see Table 5.3). Results showed that 66% of respondents had their lie challenged with the majority of these respondents dealing with the challenge by continuing to lie. A small percentage of respondents dealt with the challenge using tactics of avoidance (changing the conversation), becoming defensive and challenged the challenge (e.g. act surprised that the lie was not believed) and finally, actually admitting the truth.

Results therefore show that respondents were highly motivated to have their lie believed as is evidenced by the high percentage (62%) of people who adopted a strategy to preserve the lie.

Table 5.4. Degree of confidence of that lie was believed

Percentage	Confidence Category
3.9	100% Confident
29.1	Very confident
39.4	Quite Confident
5.5	50/50
14.2	Quite Unconfident
7.9	Very Unconfident
0.0	100% Unconfident

Despite the fact that the majority of lies were challenged, results, in

Table 5.4, show that over 70% of respondents were confident, to varying degrees, that their lie was believed. Less than a quarter of people were unconfident, however no one reported to being completely sure their lie was disbelieved. However, it would seem likely that the lie respondents reported telling in the present survey would be one that was successful (as is evidenced by high rated confidence that the lie was believed). In this case then, it can only be suggested that for the lie reported, the majority of respondents viewed themselves, as successful deceivers, with only just over 22% of participants indicating doubt, to varying degrees, that their lie was believed.

Table 5.5. Did you challenge the lie?

Percentage	Challenge Type
48.0	Yes, direct challenge / accusation
12.6	Yes, indirect challenge (checked phone, asked other people)
39.4	No

The majority of respondents (60.6%) said that when they believed they were being lied to, they did directly challenge the lie, see Table 5.5. However, a large percentage of respondents (39.4%) also said they did not directly challenge the lie. The remaining respondents said they challenged the lie indirectly e.g. by checking text

messages or asking other people. This bimodal distribution suggests that broadly, two opposing actions tend to be taken when presented with information that is presumed or known to be false: either a direct accusation is made or no action is taken.

5.3.4 Believed emotional and physiological changes whilst lying

Table 5.6. Emotion Felt whilst and after lying

Percentage WHILST lying	*Percentage AFTER lying*	*Emotion Felt*
62.2	17.0	Nerves/fear *
21.3	39.0	Guilt *
6.3	5.1	Amusement/excitement
4.7	7.9	Nothing
3.1	-	Upset
2.4	31.0	Relief *

* $p < 0.001$

As shown in Table 5.6, over 60% of respondents reported feeling nervous or scared whilst they were lying with just over 20% experiencing guilt whilst lying. Excitement, upset and relief featured as low reported emotions felt whilst lying. Interestingly, a small percentage of the sample said they had no emotions at all when telling a highly consequential lie.

Further, respondents were asked what emotions they experienced *after* lying. Nearly 40% of respondents said they felt guilty after they had lied. 31% said they felt relived, and 17% said they felt nervous. For 5.1% of respondents lying was exciting, and 7.9% of respondents said they did not feel anything after lying.

The results were compared between emotions felt during and after lying and revealed a reliable difference ($^2(9) = 248.2$, $p < 0.001$). Post-hoc analysis revealed that respondents felt reliably less nervous after they have delivered the lie ($Z = -7.0$, p

< 0.001), however, respondents also felt reliably guiltier after they had finished lying ($Z = 3.3$, $p < 0.001$). A reliable difference was also found for relief ($Z = -6.0$, $p < 0.001$) as respondents reported feeling more relieved following lying.

Table 5.7. Physiological Changes Noticed Whilst Lying

Percentage	*Modality Categories*
32.7	None
28.0	Sweating/blushing
26.0	Increased heart rate
9.4	Fidgeting / shaking / moving more than usual
3.9	Feeling uneasy or sick

Respondents were asked to describe any physiological changes they remembered experiencing whilst lying, see Table 5.7. Of those respondents who did report bodily changes, most recalled sweating or blushing and/or increased heart rate. Small numbers of participants reported moving more than normal and feeling sick or uneasy. It is also interesting to note that nearly a third of respondents did not report remembering any physiological changes whilst lying.

5.3.5 Perceived behavioural and linguistic changes when lying and whilst being lied to

Table 5.8. Comparisons of behavioural cues when lying and when being lied to

Percentage LIE RECEIVED	*Percentage LIE TOLD*	*Behavioural Cue*
20.5	12.6	Nervous/avoidant behaviour
22.0	14.2	Lack of eye contact
12.6	27.6	What was said or how it was said *
7.1	7.9	Facial expression
37.8	37.7	No behaviour noticed

* $p < 0.005$

As shown in

Table 5.8, the majority of respondents did not feel that any aspect of their behaviour was giving their lie away. The category with the highest frequency was in fact "what was said or how it was said", suggesting, rather than the way in which they acted, respondents felt what they *said* was more of an indicator of deceit (see Table 5.9 for analysis of verbal indicators of deceit).

A number of respondents did note a change in behaviour whilst lying with the majority stating that 'lack of eye contact' represented the largest behavioural change, followed by nervous/avoidant behaviour. Small percentages of respondents stated that they believed their facial expression may have changed whilst lying.

Conversely, approximately half of the respondents did not remember the person lying to them showing any particular behavioural cues to deception (38% said no, 12% believed language was the biggest indicator). Of those who did remember noticing behavioural differences, the majority stated a lack of eye contact, followed by an increase in nervous behaviours. Small percentages of respondents noted the individual displaying 'distant' behaviour and changes in facial expression whilst lying.

Comparisons between behaviours remembered to have occurred whilst lying and whilst being lied showed a reliable difference ($^{2}(9) = 82.9$, $p < 0.001$). Wilcoxon post hoc tests with a Bonferroni corrected $p < 0.01$, showed one reliable difference: what the liar said ($Z = -3.1$, $p < 0.005$). Since the category referring to what the liar said regards speech patterns, results suggest here that in fact, behaviours believed to be displayed whilst lying are similar to those behaviours noticed in an individual who is lying. In other words, individuals noticed similar behaviours in others that they themselves claimed to change whilst lying.

Table 5.9. Linguistic changes noticed when lying and whilst being lied to

Percentage LIE RECEIVED	*Percentage LIE TOLD*	*Linguistic Category*
10.2	-	Emphasising words
10.2	5.5	Tone of voice changed
8.7	11.0	Stuttering / repeating words
18.9	14.2	Talking too fast or too much
52.0	57.5	No
-	8.7	Vague

Most respondents (58%) in the present study did not feel that their language was an indicator of deceit, see Table 5.9. It seems likely that "leakage" through language would represent more of an unconscious cue, as conscious editing of language whilst lying is likely to be considerably cognitively effortful. However, of those who did believe that their language was indicating their deceit, most stated their influent or rapid speech would give their lie away.

The majority of respondents did not notice any changes in language whilst receiving a lie. Those who did mainly noticed a quickening of speech or shortening of answers. 10% of respondents said they detected a change in the individual's tone of voice. The remaining respondents said they noticed particular words being emphasised or confused / jumbled answers.

Similarly to behavioural cues, no differences were found between categories that overlapped between received and told lie. However, when receiving a lie, some respondents claimed to notice that the liar was emphasising particular words in order to sound truthful, whereas no respondents claimed to use this technique to make their own lie seem more convincing. Further, when telling a lie, a small percentage of people said that they were deliberately vague, however, none of the respondents noticed vagueness whilst being lied to.

5.4 Discussion

5.4.1 How was the lie generated / determined

It has been suggested that creating a lie firstly involves accessing the truth, followed by a conscious 'denial' of the truthful facts (Polage, 2004). Indeed, conclusions from chapters two & three suggest that to generate intentionally fabricated autobiographical memories (IFAMs), information in long-term memory is often initially accessed and a fabricated account is then created by editing the existing information. In the present study, a mixture of both lies *per* se, i.e. the denial of feelings and IFAMs, i.e. providing a false account of one's whereabouts was recorded. Results support both the above theories as it was found that the majority of fictitious information was created by editing existing information or knowledge rather than creating it anew.

When detecting information that is believed to be fictitious (opposed to information that is known to be fictitious), respondents used polarised strategies that were either subjective or objective in nature. Subjective cues included examining behavioural or linguistic cues for believed signs of deceit, whereas objective cues included using contradictory information to inform the decision regarding the veracity of the information or basing the decision upon the perceived trustworthiness of an individual – i.e. if someone was known to be untruthful potentially false information was likely to be doubted. Results therefore show that even without knowing the truth-value of information, respondents use differing strategies to attempt to ascertain its veracity. However, problems may arise when attempting to detect a lie if, in particular, subjective cues used to detect lies are based on erroneous beliefs, discussed in more detail in section 5.4.4.

5.4.2 Dealing with challenges and challenging a lie

Most people will strongly protect their lie if it is challenged. A number of techniques were discovered to deal with an accusation, but in general, the respondents dealt with a challenge by continuing to lie. Particularly for highly consequential lies, discovery of deceit is likely to be very costly as not only will the undesirable behaviour be discovered, but also the relationship between the liar and the target may suffer as a consequence of deceitfulness. Indeed, in a study investigating 'serious lies' (DePaulo, 2004), it was found that for those respondents who believed that their lie would have detrimental, negative consequences for their relationship with the receiver if it was discovered, a reliable decrease in closeness and increased guardedness was found. Therefore, since respondents know that their lie being discovered would pose problems not only regarding the discovery of the hidden

truth, but also for their interpersonal relationships, it seems understandable that a strenuous effort would be made to prevent the truth from being revealed.

Despite over 65% of respondents reporting that their lie was challenged, over 70% of respondents were confident, to varying degrees, that their lie was believed by the receiver. Results therefore show that although the majority of respondents had their lie challenged, most believed that their response to the challenge was sufficient and subsequently stated that their lie was believed. In other words, respondents claimed to be able to deal with any accusations successfully and, in turn, viewed themselves as effective deceivers, at least for the lie presented in this survey.

Viewing ourselves as good lie detectors allows us to reject the notion that we may be being duped by those closest to us and allows us to view ourselves as perceptive – we want to believe that we can capable of 'filtering' fictitious information. Indeed, when we are presented with information that is presumed to be false, it seems that two opposing strategies are adopted by the receiver of the lie: either a direct accusation takes place or no action takes place. Failing to accuse the liar may represent a number of measures taken by the individual being lied to. Firstly, failure to accuse may be a self-serving mechanism undertaken to avoid dealing with the truth – the information that is being concealed, for example, a husband may not wish to believe his wife has had an affair. Facing and dealing with the truth would necessarily lead to further problems. In other words, the revealing of the truth may be too high a consequence of accusation. Secondly, the failure to accuse may be a 'relationship-serving' measure taken by some individuals – not highlighting the lie and allowing it to be perceived by the liar as 'believed' allows the relationship to remain unchanged whereas an accusation may lead to relationship dissolution, loss of trust in a friendship etc. Thirdly, however, a failure to accuse the liar may also be due to a lack

of supporting evidence – an individual may feel they are being lied to (by evaluating subjective linguistic and behavioural cues) but may have no objective evidence to substantiate the claim. Indeed, results show a small number of participants who seek out evidence from a third party before accusing the liar. Therefore, those who do not accuse the liar based on a lack of evidence may have exhausted, or been unable to find contradictory information from another source. However, it should also be remembered that without evidence, even an accusation is likely to be detrimental to a relationship as it questions many foundations upon which a relationship is built such as trust, reliability and honesty.

5.4.3 Believed physiological and emotional changes whilst lying

Ekman (1989, 1992) suggested that three common emotions occur *whilst* we lie: guilt, fear and excitement, or "duping delight", but he is clear to state that not all liars will experience these emotions. The strength and indeed occurrence of the emotion is likely to be based both on personality factors (for example, those who score highly on the Machiavellianism scale are more likely to lie and manipulate others to get what they want and less likely to evaluate such behaviour negatively) and a complex interplay between the receiver of the lie, the purpose of the lie and of course the lie itself. For example, we may not feel guilty for a lie we have justified to ourselves as necessary or a lie that is believed to have been constructed for the receiver's benefit, indeed Vrij (2000) notes that if a lie is thought of as being legitimate, regardless of its seriousness, then it is unlikely it will be appraised with a negative emotion.

Results from the present study support Ekman's theory, with anxiety/fear featuring as the most frequently experienced emotion (62%), followed by guilt (21%), however excitement was only experienced by marginal numbers of respondents (6%). Interestingly, a small percentage of respondents reported feeling no emotions whilst

they lied: this may be due to a number of factors including appraisal of the lie or the lack of existing, contradictory evidence.

Advocates of the physiological arousal approach to lie detection (Lombroso, 1985, In Bunn, 2012) suggest that the above noted emotions go on to produce detectable physiological changes in the individual. A lengthy history surrounds the theory suggesting that lying is associated with particular physiological activity (Vrij, 2000). Indeed, the polygraph is a machine created to read and graphically represent minor changes in many types of physiological activity, with the primary channels of bodily activity including palm sweating, blood pressure and perspiration (Bunn, 2012). Therefore, theory underlying the measurement of physiological changes states that emotional arousal may occur when telling a lie, which in turn leads to unconscious and uncontrollable changes in physiological activity. The measures of physiology are therefore an indirect measure of deceit.

Although using the current data it is impossible to conclude whether particular emotions gave rise to physiological changes, the majority of respondents (68%) did report noticing a physiological change whilst they were lying. In particular, respondents reported noticing an increase in sweating, often accompanied with blushing and additionally respondents reported an increased heart rate. Results are therefore consistent with theory regarding physiological correlates of lie detection, but it must be noted here that a 'truthful' baseline was not asked for – for example, whilst attempting to proving innocence, individuals may experience particular physiological changes, indeed, they may be fearful that their story will not be believed. Ekman (1988) refers this overgeneralisation of perceiving fear solely as an indicator of guilt as *Othello's Error*. Therefore, although results seemingly provide

support for a physiological approach to lie detection, caution must be taken in their interpretation.

It is also interesting to note that a third of respondents did not report noticing *any* physiological changes whilst lying. However, this finding must be interpreted with caution – some physiological changes may not be consciously detectable, or indeed, the respondents may simply be recalling inaccurately their bodily state when they lied. Although the percentage may be a liberal estimate of those who did not experience any physiological changes whilst lying, results have shown that a small percentage of people also report not feeling any particular emotions either whilst or after lying, suggesting there may be a small subset of people who do not feel particular emotional responses to lying and who therefore do not display the expected bodily arousal.

In addition, a large shift in emotion was reported after the lie had been told. The majority of respondents felt guilty after they had lied, suggesting that lying is personally costly, and highlighting that for some, although deemed necessary, lying led to undesirable feelings. However, a large percentage of respondents reported feeling relief following a lie, and for these respondents the feeling of 'getting away with it' may have been more pervasive than feelings of guilt. A small number of respondent reported feeling 'fear/anxiety' following telling the lie, possibly due to potentially being 'found out'. Further, as Ekman (1989, 1992) proposed, a small number of respondents felt 'excited' after lying, representing "duping delight", a thrill felt by some people after a (believed) successful deception – or indeed, this thrill may represent excitement regarding the gain attained from lying i.e. getting away with theft. It is also interesting to note that a small percentage of respondents did not report feeling any emotion after lying – this is possibly due to appraisal of the

necessity of the lie – if a lie is deemed necessary or no possible alternative is believed to be available, then a lie may not carry such negative emotional consequences.

5.4.4 Behavioural and linguistic changes whilst being lying and being lied to

As discussed above, Ekman's (1989, 1992) behavioural approach to lie detection states that liars will feel particular emotions when they lie (guilt, fear and excitement). He continues to state that that these emotions will manifest in the liars' behaviour and as such, liars will 'leak' cues to deception.

No differences were found between cues believed to 'leak' from the individual and cues perceived in another for behavioural cues *per se*. A difference was found for the category 'what was said or how it was said'; respondents felt that their language was making the lie transparent more than they used language to distinguish another's lie. However, this difference may simply occur since the individual is aware of his or her own conscious linguistic editing and inflate their transparency, whereas subtle language changes, although obvious to the liar, may not be perceivable or known by the receiver.

Of those who did report a behavioural change, or 'leakage' whilst lying, the majority of respondents said that a lack of eye contact made their lie transparent. Gaze aversion has in fact been found to be reliable cue to deception during high stake interactions (DePaulo et al., 2003). However, gaze aversion also represents a subjective – or believed - cue to deception (Vrij, 2000). Therefore, caution must be exercised when analysing this finding – respondents may have noticed an increase in gaze aversion, however, what may be being reported here is what is expected to happen whilst lying – we expect people to avert their eyes when they are lying. A further highly reported cue to deception was that of nervous/avoidant behaviour. Since nervousness encompasses a number of behaviours e.g. gaze aversion, register

change, and increase in hand movements, (incidentally, all of which have been found to be associated with deception (DePaulo et al., 2003; Vrij, 2000)), it is difficult to say which behaviours respondents were experiencing since answers often did not specify. However, Vrij (2000) states that in fact, the cue 'nervousness' in general tends to be a subjective rather than objective indicator of deception, simply because we expect lies to be stressful. Again, here it is impossible to verify if respondents were noticing objective – reliable - indicators of deceit or if they were in fact reporting what they expected to occur – subjective - indicators of deception. The latter seems a more likely conclusion since measures taken using this questionnaire are memory-based self-report measures of beliefs and perceptions of own behaviour, not immediate observations.

In recent years, much of the focus of deception research has turned towards finding linguistic cues to deception, with some researchers even suggesting that language would be the most fruitful way of distinguishing a true account from one that is fabricated (Porter & Yuille, 1996; Vrij, 2008). Additionally, with much forensic evidence gathered through spoken accounts, it would make sense that this should be a natural progression. A number of linguistic indicators have shown to be associated with an untruthful account. It has been found that, in general, liars may repeat words and ideas, use fewer first person pronouns, more motion words (go, walk), more negative emotion words and speak in a higher register (DePaulo et al., 2003; Newman et al., 2003; Sporer, 1997). However, it is important to note that many cues to deception are culturally bound, with many of the cues reported to be reliable (subjective or objective) indicators of deception only applying to a Western society. In particular, the use of the first-person singular pronoun has been found to pertain to an individualist culture, were as a collectivist culture is more oriented to the first-person plural pronoun (Na & Choi, 2009). The culture from which the detector and

deceiver are from must therefore be considered when investigating such cues to deception.

For the present results, no differences were found between linguistic changes perceived in the lie told or the lie received. Of those who did report noticing a change in language whilst lying or whilst being lied to, the majority stated rapid or influent speech was most likely to give their lie away, followed by a change in tone or register. However, findings show that a slowed speech rate has been positively associated with deception (DePaulo, 1996). In other words, liars speak slower than truth tellers do. Therefore, again, although respondents may be recording some objective cues to deception when lying and when receiving a lie, it seems here that they are also reporting cues which have not been found to occur whilst lying, possibly indicating that they are reporting what they expect to change, rather than what actually did.

It should also be noted that over half the respondents for both lie told and lie received did not notice any linguistic changes. As noted earlier, these changes may be particularly difficult to detect in individuals who are telling a lie and may in fact be unconscious 'edits' in the lie being told. For example, results reported in chapters five & six revealed an increase in non-fluencies when providing IFAMs, however non-fluencies were found to be an artefact of increased cognitive effort due to underlying account generation processes, suggesting that respondents are unlikely to notice many of their linguistic changes.

In sum and in line with previous research (Akehurst et al., 1996) data collected regarding the believed linguistic and behavioural changes noticed both in others and the self whilst lying may not reflect actual, objective cues to deception, but in fact may represent a set of beliefs held by the respondents. We expect liars to be nervous, to avoid eye contact, to fall over their words and to speak rapidly. Although

many of these behaviours have been found to be reliably associated with deception, many represent subjective cues to deception revealing that respondents hold a mixed and often incorrect understanding of the behaviours associated with lying. Holding erroneous beliefs regarding the patterns of behaviour and language that occurs, particularly in others, whilst lying is likely to have particularly detrimental effects for applied settings, for example, in courtrooms, customs etc.

5.5 Conclusions

In conclusion, results have shown that lies are constructed by editing the truth and that lies are detected using both subjective and objective means. Liars deem themselves both good liars and good lie detectors, most probably for self-serving reasons. We want to believe we can 'get away' with our misdeeds but we also want to view ourselves as astute information filterers – we do not want to view ourselves as easily dupable. A great deal of negative emotion is felt whilst lying, suggesting that it is not a favourable act in which to participate. However, it would seem that these negative emotions represent less of a negative outcome than the alternate path of action - revelation of the truth. Negative emotion is also felt following the telling of a lie suggesting that for some, these unfavourable emotions remain and linger. Further, it is unclear whether respondents are using subjective or objective cues when assessing behavioural and linguistic changes whilst lying and whilst receiving a lie. Some cues reported as changing whilst telling or receiving a lie do not have any objective support in the literature, whilst others have been found to be subjective – or believed cues to deception. It was concluded that what participants remembered doing and seeing whilst lying might in fact reflect what is believed to occur when lying and when receiving a lie. Clearly, this has ramifications for applied settings where individuals' veracity may be judged by language or behaviour.

As with the previous questionnaire, it is important to note that that the sample contained an unequal number of male and female participants, with 33 males and 94 females responding to the questionnaire. The issue of gender may be all the more important with regards to attitudes and beliefs about lying as gender differences have shown to generate reliable differences regarding aspects of lying, for example Levine, McCornack, & Avery, 1992 showed that women view lying as less socially acceptable and reported more reliably negative reactions when being lied to. Gender was considered when analysing findings in the present study but failed to yield any reliable results, most likely because of the small sample size. Future work should ensure a sample that is equally represented by both genders and ensure gender of the respondent is considered during analysis.

Chapter Six

6 Recalling Truthful and Entirely Fabricated Memories of an Everyday Event

6.1 Introduction

This chapter aims to investigate the accounts of truthful and entirely fabricated memories for a staged event. Participants will attend a testing session and then recall their memory for this event a number of days later, either truthfully or deliberately falsely. Having access to the ground-truth of the original testing session will allow the memories to be measured and examined in terms of their accuracy and distortions of the original event. Memory reports will also be assessed using findings that received the most support from deception detection studies and statement analysis procedures such as the length of the report and the amount of detail reported. The study will also investigate the source of the details provided in the study, since as noted by Vrij (2005) source monitoring has previously been entirely omitted from deception detection / statement assessment methodologies (see 1.3.10). No measures of subjective experience such as vividness or emotionality will be taken as the usefulness of the memory account alone is of interest in the present study and since such measures are unlikely to reflect the sort of material that would be elucidated from real-world questioning procedures.

Additionally, the staged event methodology allows a set of standardised questions to be issued to each participant regarding the details of the testing session since each participant is recalling a memory (albeit deliberately distorted in the fabricated condition) of the same event. Such standardised questions are used regularly by police (PEACE (Clarke & Milne, 2001) and Cognitive Interview styles of questioning (Fisher & Geiselman, 2010)). Therefore, the study may also provide insight into the

relevance and usefulness of such questioning styles in aiding truthful recall and for detecting fabricated recall.

6.1.1 **Predictions**

Since participants in the fabricated condition were asked to provide fabricated information regarding all aspects of the initial test session, a number of differences are expected. It is anticipated, based on previous work (Newman et al., 2010) that when describing their memories of an event experienced a number of days prior, participants in the fabricated condition will use fewer first person pronouns but more second person pronouns, fewer sense words and as per chapters two and three, more motion words and that their accounts would contain more non-fluencies than truthful accounts. Further, based on the findings from statement assessment techniques (Colwell et al, 2007; Porter et al, 1999) it is expected that IFAMs will contain fewer overall details and be shorter in length than AMs. Finally, categories of words that might prove interesting but have not been empirically investigated previously include cognitive mechanisms "cause, know, ought" and insight words "think, know, consider" since these words explicitly relate to metacognitive processes such as evaluating ones memory. It may be that truth tellers are more likely to display metacognitive reasoning, such that they are more likely to admit a lack of memory.

Specific questions from AMs and IFAMs are also likely to display different source classifications. It is expected, due to findings regarding beliefs about memory (see chapter four) that answers to specific questions from IFAMs will contain more answers from memory (due to a belief that accurate memories are held with confidence and contain more detail witness-confidence-accuracy (WCA) belief) whereas it is likely that in fact, based on previous findings (Boychuk, 1991; Raskin & Esplin, 1991) and results from statement assessment techniques (Colwell et al, 2007)

AMs will contain more guessed and uncertain answers, with truthful recallers more likely to admit a lack of memory.

6.2 Method

6.2.1 Participants

Twenty-five participants (2 male, 23 female) took part in the study with a mean age of 23 years. Participants were either undergraduate students at the University of Leeds (who were given course credit for their participation) or staff from the University of Leeds (who were given £5 for their participation).

6.2.2 Materials and Procedure

The study took place across two testing sessions, the first testing session included a number of memory measures: "War of the Ghosts", Bartlett (1932) and recall from "Burglar / Buyer" test (Anderson & Pichert, 1978). These were selected to provide a ruse that the study was interested in the outcomes of the memory tests, whereas the interest was in the quality of memory for the event itself. Therefore, in the second testing session participants were interviewed about their memory of the events from the first session. Participants were told that the study consisted of two sessions involving a number of memory tests. They were not informed prior to the interview that they were to be interviewed or that they would have to recall any of the events from the first test session. Participants were tested in groups of no less than two in session one, and then interviewed individually, by a new researcher, in session two.

The room used for the first test session was a large classroom and contained twelve individual desks and a number of other items – some consistent with a testing room (computer, whiteboard), others inconsistent (yellow traffic cone, coat hangers), (Brewer & Treyens, 1981). Prior to the participants entering the room, testing booklets, pens and an envelope were placed on each desk. Inside the envelope was a piece of paper containing the word "burglar" or "buyer". The participant was asked

not to touch this until instructed to do so. One researcher was present in the room for the duration of the test session. The researcher seated participants at the individual desks and told them that they were going to be read a story and that they must, once the story is completed, reproduce the story in as much detail as possible. Bartlett's (1932) War of the Ghosts was then read aloud (see appendix VII). Once the researcher was confident that all of the participants had completed writing their recall, a further memory test was given: the burglar or buyer memory test (Pichert & Anderson, 1977). The researcher asked the participants to open their envelope but not to let other participants see its contents. The researcher then read aloud a passage which described the contents of a house (see appendix VIII) and the participants were then asked to imagine viewing the house from the perspective of either a burglar or buyer (according to the card in the envelope). The participants were then asked to recall as much detail from the story as possible. Once the researcher was confident that participants had completed their recall, they were informed that the testing session was complete, but in order to gain an accurate record of what the participant was wearing on this day, the researcher asked the participants if they would allow a photograph to be taken from the neck down to be used later in the study. All participants agreed and had their photograph taken.

For the second test session, four days later, participants arrived at testing at their chosen time and met with a new researcher. The researcher gave the participant an envelope which contained instructions of the remainder of the session (see appendix IX). The envelope informed the participants that they would be interviewed about the events in the first session. The participants were told that they should imagine themselves as a witnesses to the events from the first testing session and to either correctly recall information about the tasks they undertook (truthful memory condition) or to deliberately provide fabricated information (plausibly) about the

events (fabricated memory condition). As far as the participants were concerned, the interviewer only knew that the participant took part in a psychology experiment and was blind to the purpose or conditions within the experiment. The interviewer was however aware of the conditions to which the participants were assigned, which may have meant that the interviewer's behaviour was different altered between conditions. Although every effort was made to keep interviewing consistent, further research should use a double blind approach whereby both the participants and the researchers involved are blind to experimental conditions, this will help ensure behavioural consistency over conditions.

The participants were given an opportunity to ask the researcher to clarify any details of which they were unsure. The researcher then asked the participants to recall in as much detail, what happened during the first testing session. Once the participants had finished giving all their details, the researcher asked a series of standardised specific questions to clarify some of the details from the story. Additional questions were asked such as "what were you wearing?", "what was the weather like?" and "what was the researcher wearing?" etc. (see appendix X for script). These questions were included to replicate the sorts and style of questions generally employed within a standard police interview, particularly those which follow the Cognitive Interview (Fisher & Geiselman, 2010) or PEACE models (Clarke & Milne, 2001), as both investigation tools incorporate a section of free recall followed by 'specific questioning'. The interview was audio recorded.

The participants were also asked to draw the layout of the room, where they sat and to add any other details they noticed or thought were significant. Vrij et al. (2010) found that drawing was a useful tool for detecting deception such that liars drew

reliable fewer details than truth tellers and also failed to draw significant but relevant individuals. Drawing was therefore incorporated into the present study in an attempt to replicate and further the findings. Following the drawing, participants were asked to rate how motivated they were to provide either thorough and accurate recall or how motivated they were to provide a compelling and believable fabricated account. This was measured on a 7-point Likert scale (1 very unmotivated – 7 very motivated). Participants were then debriefed.

6.3 Results

6.3.1 Manipulation Check

When fabricating, participants were asked to provide an entirely false account. An investigation into the accounts provided indicated that participants were following this instruction, providing on average, fabricated answers to 16.4 (s.d. 4.8) of the 22 specific questions. Of these fabricated details, approximately 30% were fabrications about central details (the room, the other participants) and approximately 70% were peripheral details (clothing of the self and others, the weather during the test session). The amount of fabricated information provided in the free recall section of the interview cannot be as easily qualified, but the data were screened prior to their inclusion in the study, and any participants who it was felt had not followed instructions to provide an entirely, or at least almost entirely fabricated account were not included in the study.

6.3.2 Motivation

Participants were found to be motivated, the mean motivation rating was 5.6 (SD =0.8). An independent t-test showed that this did not differ between the truthful

memory recall condition (M = 5.8, SD = 0.5) and the fabricated memory recall condition (M = 5.5, SD = 0.9), $t(1, 24) = 0.6$, $p > 0.05$.[3]

6.3.3 Source attributions

Table 6.1. Frequency of use of source attributions (out of 22) for specific questions (means and standard deviations)

Source Attributions	AM	IFAM
Memory	13.3 (1.1)	17.9 (1.3)
Indirect Memory	0.8 (0.7)	0.4 (0.7)
Inference	2.1 (0.9)	1.5 (0.7)
Guess	2.2 (1.5)	0.8 (0.7)
"I don't know"	3.6 (1.9)	1.7 (0.8)

Answers given to specific questioning were coded using the following system: memory based – the answer was a memory of what happened; memory using external event – the answer was obtained because of a memory of something external to the study e.g. remembering the study was in the morning because the participant remembers feeling tired; inference – the answer was inferred e.g. assuming the researcher had brown eyes because she had dark skin; guess – the answer was guessed and "don't know" – the participant admitted lack of memory. Two raters coded the data, correlational analyses revealed an extremely high inter rater reliability ($r=1.0$, $p < 0.001$).

[3] The motivation ratings were used as a co-variate when analysing the results from the study. However, due to the lack of variability within the motivation ratings, the co-variate analysis did not provide any additional insight into the data. Future research should however consider such ratings when analysing results to investigate if additional factors such as motivation to lie has an effect upon how a lie is reported.

Source attributions (see Table 6.1) were investigated using Chi-Square. Results showed differences in source attributions between AMs and IFAMs, $X^2(9) = 31.5$, $p < 0.001$, $\phi = 0.2$. An inspection of the residuals (critical value 1.96) indicated that AMs contained fewer memory-based responses, more inferences, more guesses and more "don't know" responses than IFAMs.

6.3.4 **Answer Accuracy**

Answers given by participants in the truthful recall condition were checked for accuracy. It was found that overall participants were 74% accurate in the answers they provided. Over answer types it was found that answers based on memory were 90% correct, answers based on memory of an external event were 84% correct, answers based on inferences were 62% correct and answers based on guesses were at chance level, with 58% correct.

6.3.5 **Content Analysis**

Table 6.2. LIWC categories by condition for free recall (means and standard deviations)

LIWC category	AM	IFAM
Word Count***	477.3 (240.2)	167.5 (81.1)
First person singular pronouns *	2.8 (1.6)	1.5 (0.9)
Overall first person pronouns **	5.7 (1.1)	4.5 (0.9)
Overall second person pronouns **	0.1 (0.1)	1.5 (1.8)
Overall third person pronouns ***	4.9 (1.7)	1.5 (1.1)
Non-fluencies**	3.4 (1.1)	5.4 (2.4)
Motion words**	2.3 (0.6)	0.7 (0.8)

*** $p < 0.001$ ** $p < 0.01$ *$p < 0.05$

Independent samples t-tests using condition as factor and linguistic categories predefined in LIWC[4] (Pennebaker, Francis, & Booth, 2001) as dependent variables revealed a number of differences in content of free recall between conditions (see

Table 6.2). AMs were found to be longer in length ($t(1,23) = 4.2$, $p < 0.001$, $d = 1.7$), to contain more first person singular pronouns (I, my, me), ($t(1,23) = 2.4$, $p < 0.05$, $d = 1.0$), more overall first person pronouns (I, we, me), ($t(1,20) = 2.6$, $p < 0.01$, $d = 1.2$), fewer overall second person pronouns (you, you'll), ($t(1,22) = -2.7$, $p < 0.01$, $d = 1.1$), more overall third person pronouns (she, their, them), ($t(1,22) = 5.9$, $p < 0.001$, $d = 2.4$), fewer non-fluencies (umm, err), ($t(1,23) = 2.7$, $p < 0.01$, $d = 1.1$) and more motion words (walk, move, go), ($t(1, 23) = 5.3$, $p < 0.001$, $d = 2.3$) than IFAMs. No other reliable differences were found.

[4] Note: LIWC counts words as percentages of the overall word count, thus counts are proportionate to their corresponding word count.

Table 6.3. LIWC categories by condition for specific questions (means and standard deviations)

LIWC category	AM	IFAM
Word Count	165.8 (90.3)	162.7 (40.5)
Cognitive Mechanisms*	17.5 (3.1)	14.2 (3.4)
Insight***	4.2 (2.1)	2.0 (1.9)
Present**	7.0 (2.1)	3.6 (2.8)
Past	7.5 (2.6)	9.6 (2.4)

*** $p < 0.005$ ** $p < 0.01$ *$p < 0.05$

Independent samples t-tests using condition as factor and linguistic categories predefined in LIWC (Pennebaker, Francis, & Booth, 2001) as dependent variables revealed a number of differences in content of specific questions between conditions (see Table 6.3). AMs contained reliably more cognitive mechanisms (words pertaining to cognitive processes, such as "think", "know", "consider") ($t(1, 23) = 2.3$, $p < 0.05$, $d = 1.0$), more insight words ($t(1, 23) = 2.6$, $p < 0.01$, $d = 1.1$), more words relating to the present ($t(1, 23) = 3.3$, $p < 0.005$, $d = 1.4$) and marginally fewer words relating to the past ($t(1, 23) = -2.0$, $p < 0.06$, $d = 1.0$) than IFAMs. No other reliable differences were found.

6.3.6 Account Detail

Table 6.4. Details in drawings and free recall by condition (means and standard deviations)

LIWC category	AM	IFAM
Free Recall Detail**	124.4 (60.7)	40.5 (19.0)
Detail/Word Count	0.3 (0.09)	0.3 (0.09)
Room Drawing Detail**	9.5 (3.7)	7.0 (2.2)

** $p < 0.001$ * $p<0.05$

Detail was investigated using the Levine internal/external episodic rating system (Levine et al., 2002). This system advocates coding a given account in terms of the internal and external detail presented. Internal details are those relating to the event, external details are those peripheral to the event. In the present study, participants only provided internal detail, as requested, hence only these details were carried forward for analysis. Results, in Table 6.4, show that AMs contained reliably more internal episodic detail than IFAMs, $t(1, 23) = 4.7$, $p < 0.005$, $d = 1.9$. However, when considered proportionately i.e. in relation to total number of words provided (number of details / word count), detail in account was not found to reliably differ.

6.3.7 **Drawing**

Further differences were found between truthful and fabricated recall by analysing the drawings each participant provided. Results showed that participants in the truthful memory condition drew reliably more details than participants in the fabricated memory condition, $t(1, 23) = 2.1$, $p < 0.05$, $d = 0.8$. Interestingly, only four participants drew what was considered an inconsistent detail (traffic cone, oil can). All those participants were in the truthful condition. No participants in the fabricated condition falsified inconsistent information.

6.4 Discussion

The present study investigated the information gained from free recall followed by specific questioning with particular focus on the differences of source monitoring and content provided when participants were asked to provide truthful and deliberately fabricated details for a previously experienced event. Alongside this the present study was also interested in the accuracy gained from, and relevance of questions posed to respondents as such questioning formats are common in police interviews (Fisher & Geiselman, 2010).

6.4.1 **Source attributions**

An important finding in the present study was that AMs elicited using the specific questions was not solely a product of memory; instead recall consisted of guesses, inferences and "don't know" responses. In contrast IFAMs were based, or claimed to be based, on memory. This finding has several implications.

Firstly, when attempting to ascertain the veracity of a report, tentative accounts of memory appear to be indicators of truthful memories. It is the liar who provides an account based on robust, certain 'memory'. This pattern of answering is likely to be influenced by beliefs about memory – in particular the witness-confidence-accuracy (WCA) memory-accuracy-detail (MAD) beliefs (see chapter four). These beliefs support the spurious notion that a detailed account held with confidence is likely to be true. Therefore, when creating a deliberately fabricated memory, it is likely that respondents are providing patterns of answers which fulfil these held beliefs about the mental representation of an experienced event.

Secondly, unless source attributions are made, every answer provided by the truthful interviewee will be presumed to be an accurate memory and thus incorporated into the "truthful narrative". Despite clear instructions not to guess and the explicit option to decline to answer, participants provided a number of guessed and inferred answers. Results showed that such answer types were at chance accuracy levels and that together, these types of answers comprised nearly 25% of a truth teller's statement. Essentially participants were producing what could be considered 'non-malicious fabrications': fictitious information not intended to deceive but in fact produced to conform to interview procedure. If these non-malicious fabrications included descriptions of a perpetrator or related to the time of crime, then they could be extremely costly indeed. Therefore, the use of specific questions in interviews may in fact be detrimental to truth tellers, leading them to 'fill in the gaps' to questions they are unable to recall. It would

seem that the best recommendation from these findings is to altogether omit any answers that are not the products of memory. If we removed guesses, inferences and other non-memory based answers were removed altogether then truthful account accuracy rise would rise from 67% to 90%.

Conversely, these specific questions essentially provide a platform from which those providing fabricated information can create highly detailed accounts. Following a series of more specific questioning, liars present reliably more 'memory' answers than truth tellers. It is this inclusion of detail which can be troublesome for a jury since detailed accounts are often judged by a jury as more reliable than vague accounts, as per the MAD belief (a widely held but untrue belief that detail is associated with accuracy in memory accounts) and work on trivial persuasion (Bell & Loftus, 1989).

6.4.2 **Content Analysis**

A further indicator of the veracity of a report elicited during memory recall is that of the type of language that a respondent uses. Using Language Inquiry and Word Count (LIWC; Pennebaker, Francis, & Booth, 2001) results indicated that the free recall section of AM accounts contained more first and third person pronouns than the free recall section of IFAM accounts, and that IFAMs contained more second person pronouns than AMs. Speaking of the self using first person pronouns is likely to reflect the mental representation of an experienced event, whereas the increased use of second person pronouns in fabricated accounts is likely to reflect a schematic representation of an event, based on expectations and beliefs about how a particular situation is likely to unfold.

Increased use of third person pronouns in AMs shows a tendency to refer to others more when describing a truthful rather than fabricated memory. Vrij et al. (2010) showed how, when drawing a crime scene, liars tended not to draw other significant people who were

in fact present. A tendency to not discuss others when describing an event may reflect the complexity associated with IFAM generation (see chapters two and three) insofar that it reduces the number of details to be described. This increased cognitive complexity associated with IFAM generation is also likely to be responsible for the increased number of non-fluencies in fabricated accounts (see chapters two and three).

Interestingly in the present study AMs were found to contain more words regarding motion than IFAMs. In previous studies this finding was reversed, with IFAMs containing more motion words than AMs. Here motion words are thought to reflect content rather than be produced as artefacts of underlying cognitive processes. AMs were more likely to contain details regarding movement between and within locations, probably reflecting a re-experiencing of the original event. It is therefore important to note that 'motion' words may represent a problematic cue for distinguishing truthful and fabricated memories with the frequency of inclusion of motion words in each memory type entirely changing over the course of studies included in this thesis.

Differences in language use were also found between truthful and fabricated answers to specific questions. Truthful responses were found to contain more words corresponding to cognitive process such as "think" and "know" and are likely to be reflecting truth tellers' internal evaluation of their mental representation. By outwardly evaluating the quality of their memory, truth tellers may be demonstrating themselves as careful rememberers (Bysouth, 2009). Further, increased use of such language in truthful accounts may reflect the mental re-reliving of the experienced account – a process essential to episodic memory recall (Conway, 2001).

6.4.3 **Account Detail**

Although free recall of AMs appeared to contain more detail than IFAMs, when further analysed proportionately, it was found that per word, AMs and IFAMs contained identical

levels of detail. In other words, although shorter in length, fabricated memories are as detailed with respect to the amount of information given, as their longer, truthful counterparts. Increased detail in truthful accounts is a robust finding within deception research (DePaulo et al., 2003; Vrij et al., 2008), and is used as a primary criterion for distinguishing truthful from fabricated memories in a number of techniques (SVA, RM, MAP and ACID, see 1.3.9). Present findings, however, serve to suggest that when analysed proportionately, differences may not exist in detail. Since in a real-world interview situation, truthful and fabricated narratives would not be directly comparable, details would have to be measured proportionately, and as suggested here, may fail to be a reliable indicator of deception when measured in such a way.

6.4.4 Drawing

Unlike Vrij et al. (2010) results in the present study revealed that when asked to draw a picture of the room in which the event took place, those providing fabricated information gave reliably less detail than those providing truthful information. The lesser detail found in the fabricated drawings may reflect the difficulty involved with visualising and maintaining a novel mental representation. It may also reflect a more schematic visualisation of a room, including details commonly associated with an experimental environment (Brewer & Treyens, 1981). Relatedly, only a small number of participants included detail that was inconsistent with the testing environment in their drawing. All participants who did so were in the truthful condition. These results therefore serve to support the notion that entirely fabricated drawings are drawn from schematic representations, due to the inclusion of only schema-specific detail.

6.5 Conclusions

In sum, the findings highlight previously unknown differences between the language used and the source of memories for AMs and entire IFAMs of an experienced event.

It has also shown, that the police interview itself has previously unknown effects upon both truthful and fabricated memory.

Chapter Seven

7 Recalling Truthful and Partially Fabricated Memories of an Everyday Event Over Time

7.1 Introduction

This study aimed to extend the previous study in a number of ways. Firstly, rather than being asked to provide a completely fabricated account, the participant was asked to provide only deliberately fabricated information regarding one aspect – the researcher who was present in the first test session. This was done to reflect what is more likely to occur in a real-world situation whereby an individual may report a witnessed event but may substitute real for fabricated details to distort the narrative (Sapir, 1987, Vrij, 2005, and see findings from chapter two regarding the construction of fabricated memories). Partially fabricated memories have also received no attention in the scientific literature therefore this study represents the first to investigate such memories. Secondly, the interview was extended over two sessions such that the participant was interviewed twice. The multiple interviews were used to assess the way in which truthful and fabricated memories behaved over time. Note, measures of language and content were kept consistent to those in the previous chapter to provide comparison between entirely and partially fabricated IFAMs.

7.1.1 Predictions

Because of this change in instruction, a very different set of results is anticipated. It is expected that little difference will be found between the linguistic measures of AMs and IFAMs since it is assumed that fabricated details will be incorporated into a predominantly truthful account as per findings from chapter two. The truthful account is therefore expected to comprise the majority of the memory report with

fabricated details substituted in when necessary. Distinction between the two memory types will therefore be difficult due to the lack of fabricated narrative. This lack of difference is expected to remain stable over time. However, it is believed that source-monitoring clarifications of specific questions will follow the same pattern found in the previous study since fabricated details will be explicitly assessed in the specific questioning section and cannot be hidden within truthful detail. AMs are expected to consist of inferences and guesses, whereas IFAMs are expected to be claimed to be based more on 'memory'. It is expected that these source-monitoring judgements will remain stable over time. Further, in accordance with previous research (Peace & Porter, 2011), it is anticipated that AMs will be more consistent and contain more detail than IFAMs.

7.2 Methods

7.2.1 Participants

Thirty-eight participants (15 male, 23 female) took part in the study with a mean age of 24 years. Participants were either undergraduate students at the University of Leeds (who were given course credit for their participation) or staff from the University of Leeds (who were given £5 for their participation). However, three participants were removed from the study as they failed to complete all sessions.

7.2.2 Materials and Procedure

Participants attended three testing sessions with approximately one week between each session. In session one, participants completed two memory measures (The War of The Ghosts (Bartlett, 1932) and the Deese-Roediger-McDermott (DRM) paradigm (Roediger & Mcdermott, 1995), see appendices VII, XII and XIII) in a group of no less than 2. The burglar/test was substituted for the Deese/Roediger-McDermott paradigm in this study due to participants having problems understanding requirements of the burglar/buyer test in the previous study. These

were selected to provide a ruse that the study was interested in the outcomes of the memory tests, whereas the interest was in the quality of memory for the event itself. Therefore, the second and third test sessions involved individual structured interviews regarding the events of session one. These comprised a free recall section, a specific questioning section and participants were asked to sketch the location of the original test session. The specific questioning section was categorised into two broad subsets: a subset regarding the testing environment, the self and others (the control subset, containing 12 questions) that all participants answered truthfully, and a subset asking specifically about the researcher (the experimental subset, containing 10 questions), which was answered deliberately untruthfully by the participants in the fabricated condition, but truthfully by those in the truthful condition. Asking participants to provide fabricated information on a specific subset of questions allows the fabrication condition to be tightly controlled, and for direct comparison to be made between known fictitious and known truthful information. The interview was audio recorded.

Participants were told that they would attend three sessions, each of which would involve a number of memory tests. Participants were informed at the end of the first test session that they were to be interviewed twice about the events of the session – they were also told whether they had been assigned to the truthful or fabricated condition. Participants in the truthful condition were required to give a truthful account of the events they remembered from session one in both free recall and specific questioning phases of interview. Participants assigned to the fabricated condition were required to provide deliberately untruthful information when discussing the researcher in the free recall section and for questions regarding the researcher in the specific questioning (the experimental subset).

The study employed a between-subjects design with one main independent variable: recall type (truthful or fabricated) which was counterbalanced across participants. The main dependent variables that were assessed included the free recall and answers to specific questions elicited from the interview in both sessions two and three, the linguistic characteristics of participants' interviews, participants' sketches of their location, and evaluation of recall from "War of the Ghosts" and the DRM paradigm.

The room to be used for the first test session was a large classroom containing twelve individual desks and a number of other items – some consistent with a testing room e.g. computer, whiteboard, others inconsistent e.g. yellow traffic cone, coat hangers (Brewer & Treyens, 1981). Prior to the participants entering the room, testing booklets, pens and an envelope were placed on each desk. Inside the envelope was a piece of paper containing information regarding the condition to which each participant was assigned (see appendix XI). The participant was asked not to touch this until told to do so.

One researcher was present in the room for the duration of the test session. The researcher seated participants at the individual desks and began the first part of the first memory test, the Deese-Roediger-McDermott (DRM) paradigm. Participants were read six lists of twelve words (see appendix XII) and asked, after each list, to recall as many words as possible in the answer booklet. Participants were then asked to place the DRM booklet to one side and the researcher then told participants that they were to hear a story and that they must, once the story was completed, reproduce it in as much detail as possible, without paraphrasing. The researcher then read aloud Bartlett's (1932) War of the Ghosts, see appendix VII. Once the researcher was confident that all of the participants had completed recall, the second part of the

DRM was given. Participants were presented with a booklet containing six lists of seven words, comprising two new words unrelated to the original list, two new but weakly related to the original list, two old and one new "critical lure", highly related to the words on the original list (see appendix XIII). Participants were asked to rate each new word on a 4-point scale (1 – sure it's new; 2 – probably new; 3 – probably old; 4 – sure it's old). When the researcher was confident that participants had completed scoring the words, participants were asked to open their envelope and read the instructions for the next two test sessions. After this was done, participants were informed that the testing was completed but in order to gain an accurate record of what the participant was wearing on this day (participants were directly asked what they were wearing during the second test session), the researcher asked the participants if they would allow a photograph to be taken from the neck down to be used later in the study. All participants agreed and had their photograph taken.

Approximately one week later, participants arrived individually at testing at their chosen time and meet with a new researcher for session two. The researcher gave each participant an envelope containing a reminder of instructions for the test session and the condition to which the participant was assigned (see appendix XIV). The participants were told that the new interviewer was blind to the instructions, condition and the events of session one. The researcher then asked the participant to draw the layout of the room, where they sat and to add any other details they noticed or thought were significant. Following this, each participant was asked to recall, uninterrupted and in as much detail as possible, what happened during the first testing session. Once the participant completed the free recall phase, specific questions were asked (see appendix XV for script).

The third test session, approximately a week after the second was identical to that of session two. However, following the interview, participants were asked to rate how motivated they were to provide either thorough and accurate recall or how motivated they were to provide a compelling and believable fabricated account. Participants were then debriefed.

7.3 Results

7.3.1 Manipulation Check

Participants in the fabricated condition in this study were asked to provide fabricated information regarding the researcher in session one. Participants followed this instruction successfully, providing on average 8.9 (s.d. 0.3) answers to 10 specific questions with fabricated information. All information specifically regarding the researcher could be considered peripheral detail. Information participants provided in the free recall section of the interview was also assessed to ensure participants had followed the instruction. Interestingly, most participants avoided mentioning the researcher, or if they did, they provided vague, but fabricated detail – for example referring to the researcher as "he" rather than "she" but proving no other details. Providing vague detail is interesting of itself, and will be considered further in the discussion (section 7.4).

7.3.2 Motivation

Participants were found to be motivated, the mean motivation rating was 5.5 (SD =1.4). An independent t-test showed that this did not differ between the truthful memory recall condition (M = 5.6, SD = 1.5) and the fabricated memory recall condition (M = 5.4, SD = 1.8).[5]

[5] As with the results reported in chapter 6, the motivation ratings were used as a co-variate when analysing the results from the study. However, due to the lack of variability within the motivation ratings, the co-variate analysis did not provide any additional insight into the data.

7.3.3 Source Attributions

Table 7.1. Frequency of use of source attributions for the 10 questions from the experimental subset at interview one and two (means and standard deviations)

Source attribution	AM Interview 1	IFAM Interview 1	AM Interview 2	IFAM Interview 2
Memory	6.2 (1.6)	7.7 (1.2)	6.0 (1.3)	7.8 (1.1)
Indirect Memory	0.1 (0.2)	0.0 (0.0)	0.1 (0.2)	0.0 (0.0)
Inference	0.6 (0.7)	0.2 (0.4)	0.9 (0.8)	0.2 (0.4)
Guess	0.6 (0.8)	0.1 (0.3)	0.7 (0.8)	0.1 (0.2)
"I don't know"	2.7 (1.7)	1.9 (0.8)	2.3 (1.5)	1.9 (1.2)

Source attributions were investigated using Chi-Square (see Table 7.1). Results showed differences in source attributions between AMs and IFAMs at interview 1, $X^2(9) = 13.1$, $p < 0.01$, $\phi = 0.2$. An inspection of the residuals (critical value 1.96) indicated that AMs contained fewer answers attributed to memory, more guesses and more "don't know" responses than IFAMs. A reliable difference was also found between source attributions for AMs and IFAMs at interview two, $X^2(9) = 22.8$, $p < 0.001$, $\phi = 0.3$. An inspection of the residuals (critical value 1.96) indicated that AMs contain fewer answers attributed to memory, more guesses (although it is important to note that guessed answers represent a very low proportion of the answer types given and although they provide a reliable difference, they may not be a useful cue for distinguishing AMs and IFAMs) and more "don't know" responses than IFAMs. No reliable differences were found between memory types over time, indicating that source attributions were stable across interviews.

7.3.4 Accuracy

Answers for the control subset of specific questions were coded for accuracy. It was found that for interview 1, participants were, overall, 64% accurate. Over answer types, it was found that answers based on memory were 70% correct and answers

based on memory of an external event were 82% correct, answers based on inferences and guesses were at chance, with 50% and 54% correct respectively. Accuracy for the control subset of questions was also investigated at interview 2. It was found that overall, participants were 62% correct. Across answer types it was found that answers based on memory were 69% correct, answers based on memory of an external event were 77% correct and answers based on inferences and guesses remained at chance, with 45% and 55% correct respectively, showing a slight decline in accuracy in all answer categories over time.

7.3.5 **Consistency**

Information provided for the questions in the experimental subset for both truthful and fabricated conditions was assessed for consistency across interview 1 and interview 2. Here, inconsistency is viewed as providing information in one interview and omitting it in another, or contradictory information across interviews. Although those providing truthful information yielded a higher score indicating a greater level of consistency across interviews, (with 81% of information remaining unchanged) than those providing IFAMs, (with 78% of information remaining unchanged) this was not found to be a reliable difference.

7.3.6 **Content Analysis**

Table 7.2. LIWC categories by condition for free recall (means and standard deviations)

LIWC category	AM Interview 1	IFAM Interview 1	AM Interview 2	IFAM Interview 2
Word Count *	237.2 (98.7)	169.0 (44.0)	231.8 (103.6)	122.7 (31.0)
First person singular pronouns	1.4 (1.6)	1.9 (2.1)	1.6 (1.0)	1.7 (2.1)
Overall first person pronouns	11.9 (3.5)	10.3 (2.1)	11.3 (2.7)	10.8 (2.3)
Overall second person pronouns	0.7 (0.7)	1.3 (2.6)	0.8 (0.9)	0.2 (0.6)
Overall third person pronouns	1.2 (0.1)	1.9 (1.5)	0.7 (0.9)	1.6 (1.9)
Non-fluencies	3.7 (2.3)	3.4 (1.9)	3.1 (2.0)	3.4 (2.5)
Motion words	1.3 (0.7)	1.0 (1.0)	1.1 (0.5)	1.2 (1.2)

*$p < 0.05$

Individual mixed model 2 (AM or IFAM) x 2 (Interview 1 or interview 2) ANOVAs were conducted for the seven predetermined linguistic categories predefined in LIWC (Pennebaker, Francis, & Booth, 2001) for the free recall section of the interview (Table 7.2). A main effect of interview was found for word count ($F(1, 37) = 5.1$, $MSe = 1341.7$, $p < 0.05$, $n^2 = 0.3$), showing that both AMs and IFAMs were shorter during their second recall. No other reliable differences were found.

Table 7.3. LIWC categories by condition for specific questions (means and standard deviations)

LIWC category	AM Interview 1	IFAM Interview 1	AM Interview 2	IFAM Interview 2
Word Count *	65.6 (30.00)	52.5 (22.3)	65.2 (35.5)	53.0 (21.2)
Cognitive Mechanisms	19.2 (4.8)	15.9 (7.6)	18.3 (6.1)	17.0 (6.8)
Insight	7.4 (4.8)	5.0 (3.2)	7.3 (4.1)	5.9 (4.5)
Present	9.9 (6.9)	8.2 (5.6)	9.4 (5.6)	7.3 (4.7)
Past	6.0 (2.8)	5.6 (3.7)	5.8 (2.9)	4.5 (3.9)

*$p < 0.05$

Individual mixed model 2 (AM or IFAM) x 2 (interview 1 or interview 2) ANOVAs were conducted for the five predetermined linguistic categories predefined in LIWC (Pennebaker, Francis, & Booth, 2001) for the experimental subset of specific questions (see Table 7.3). A main effect of interview was found for word count, ($F(1, 37) = 4.3$, $MSe = 643.6$, $p < 0.05$, $n^2 = 0.1$) such that AMs contained more words than IFAMs. No other reliable results were found.

7.3.7 Account Detail

Table 7.4. Details in drawings and free recall by condition (means and standard deviations)

LIWC category	AM Interview 1	IFAM Interview 1	AM Interview 2	IFAM Interview 2
Free Recall Detail	24.5 (10.8)	27.5 (6.6)	28.0 (11.1)	23.2 (5.4)
Room Drawing Detail*	8.5 (2.6)	6.2 (2.1)	9.4 (3.6)	6.9 (2.0)

* $p<0.05$

Detail was investigated using the Levine internal/external episodic rating system (Levine et al., 2002). (Levine et al., 2002). This system advocates coding a given account in terms of the internal and external detail presented. Internal details are those relating to the event, external details are those peripheral to the event. In the present study, participants only provided internal detail, as requested, hence only these details were carried forward for analysis.

A 2 (AM or IFAM) x 2 (interview 1 or interview 2) mixed models ANOVA was use to analyse detail in report. Results, in Table 7.4, revealed no reliable differences across conditions or across interviews.

7.3.8 Drawing

Further differences were found between AMs and IFAMs by analysing the drawings each participant provided. A 2 (AM or IFAM) x 2 (interview 1 or interview 2) mixed models ANOVA was use to analyse detail in the drawings. Results, in Table 7.4 show that participants in the truthful condition drew included more details in their drawings than those in the fabricated condition ($F(1, 37) = 5.1$, $MSe = 10.6$, $p < 0.05$, $n2 = 0.2$. No other reliable differences were found. Further, three participants provided details that were inconsistent with the experimental room in interview 1,

and the same three participants drew these same inconsistent details in interview 2. Two participants were in the truthful condition, one was in the fabricated condition.

7.4 Discussion

The study investigated the information gained from two interviews, occurring one week and two weeks after a staged event. Primarily, the aim was to investigate the differences between truthful and *partially* fabricated recall of an everyday event and evaluate the performance of such memories over time. The study also assessed the accuracy and consistency of truthful information to investigate memory more generally.

This study improved on chapter six in a number of ways. Firstly, rather than asking participants to provide an entirely fabricated statement, they were asked to provide fabricated information about one particular aspect – the researcher. Not only did this allow for tight control of the fabricated information insofar that it could be explicitly known which parts of the transcript were deliberately fabricated, it was also more likely to reflect the way in which IFAMs are created (Vrij, 2005). Indeed, findings from chapters two, three and five posit that IFAMs are created by editing a truthful memory through the process of deletion-substitution rather than generating entirely fictitious scenarios, events and people. Sapir (1987) also suggests that up to 90% of a fabricated statement may comprise truthful details. Secondly, the study required participants to provide an account on two separate occasions, providing an insight into how truthful and fabricated memories behave over a given time period, allowing measures such as consistency and accuracy over time to be taken.

7.4.1 Source attributions

This study replicated findings from chapter six, again showing that IFAMs were based, or claimed to be based predominantly on memory. AMs on the other hand were more likely to be tentative, containing fewer memory-based responses, more guesses

and more “don’t know” responses. Additionally, these source attributions remained stable over time, suggesting that remembered answers are not forgotten, that guessed or inferred answers do not become incorporated into memory and that ‘don’t know’ answers are rarely retrieved. These findings demonstrate that participants provide similar categories of information over time, suggesting that they are aware of the source of given information.

It was also found that the actual information provided (in addition to its source clarification) was highly consistent over time, with participants in the truthful condition providing 81% consistent information and those in the fabricated condition providing 78% consistent information. Therefore, participants in both conditions were consistent not only in the information they were providing, but also in the source monitoring category to which it was assigned. This finding has a number of important implications.

Firstly, a great deal of emphasis has been placed on consistency in forensic settings, with some legal professionals even using consistency as a cue to differentiate truthful from fabricated accounts (Fisher & Culter, 1995). Here, however, results showed found that both truthful and fabricated answers to specific questions were highly consistent over time, directly opposing such beliefs. However, it is important to note that the time period between interviews in the present study was only one week. Therefore, results can suggest that over a delay of a week, truthful and fabricated accounts were consistent; however, different results may be found if they delay was substantially increased. This could be a particularly interesting avenue that future research could investigate.

Secondly, although this finding may suggest that participants were able to recall the staged event accurately over time, information provided by participants served to

suggest otherwise. It seemed that when providing information for interview 2, participants were simply recalling the information given at interview one, rather than recalling the actual mental representation of the event. For example:

"I think I said looked around bored last time so I'll stick with that this time "

"Last time I said she was wearing a ring, so a ring"

"I think I said she was right handed last time, right handed"

"Erm, I know I said right handed last time I'm going to say right handed"

This is likely to be due again to the emphasis placed on interviewees by legal professionals to be consistent over time (Walczyk et al., 2009) and failing to do so can cause negative consequences for the rememberer. If it is the case that the majority of participants are recalling information provided in the first interview for the purposes of consistency, then every effort must be put into ensuring the information given in interview 1 is complete, accurate and comprehensive. Alternatively, it may be important to highlight to interviewees that providing accurate information is more important than consistency.

As discussed in the previous chapter, the source attribution findings also serve to demonstrate that information provided which is claimed to be almost entirely based on memory should be viewed with caution or investigated further. It is believed that participants responded in such a way when fabricating to fulfil erroneously held beliefs about the nature of memory. The Witness-Confidence-Accuracy (WCA) and Memory-Accuracy-Detail (MAD) beliefs (see chapter four) posit that detailed information held with confidence is likely to be accurate. Therefore, it would seem that when fabricating their accounts, these spurious beliefs may have been informing participant's answer patterns.

As discussed in the previous chapter, without the interviewer asking for specific source attributions, all information provided, unless explicitly categorised by the interviewee as unknown, is likely to be assumed to be veridical memory. In this study, it was found that 13% of information provided in interview 1 was either guessed or inferred and 17% of information in interview 2 was guessed or inferred. This guessed and inferred information can be considered as 'non-malicious fabrications' – fictitious information provided not to deceive but to 'fill-in-the-gap', to conform with believed expectations about remembered information. Interviewees may believe that if a question is being posed, it should be answerable and therefore may provide an answer, known to be not derived from memory, to comply with this. It was recommended in the previous chapter that all answers which are not explicitly based on memory should be removed from the interview. This recommendation is strengthened here as it was found that by removing all non-memory based answers, accuracy of the information provided increased from 62% to 73%.

It must also be highlighted here, as in the previous chapter, that although the specific questions allow more detail to be elicited from the witness, they also provide a platform from which an individual providing deliberately fabricated information can include additional information and create a highly detailed account. This inclusion of highly specific, confident information may lead to an IFAM appearing truthful, as per the WCA belief and findings from Bell & Loftus (1989) regarding the powerful persuasive effects of additional detail in accounts.

7.4.2 **Content Analysis**

Analysis of language used in the free recall section of the interviews revealed only that participants in both conditions gave a shorter account in interview 2 than in interview 1. However, it is unclear from these results alone whether participants were simply being more concise in their answers or if they were in fact providing less

detail over time. Analysis of detail in free recall accounts showed that participants provided the same level of detail regardless of memory type and this was not affected over time. Therefore, it seems that participants are providing more concise free recall in interview 2, without loss of detail.

In addition, the finding that detail does remain stable both over time and between AMs and IFAMs is robust within deception research (DePaulo et al., 2003; Vrij et al., 2008), and is used as a primary criterion for distinguishing AMs from IFAMs in a number of statement assessment techniques (see 1.3.9). However, when the way in which a partial lie is likely to be constructed is considered, particularly in this study – by recalling the truth and editing it through deletion-substitution - it is unlikely that any differences in detail would emerge, since truthful detail can primarily be incorporated into the account and counter factual information can be easily substituted in for the factual information.

As expected, no differences were found between language used in the free recall of AMs and IFAMs. This is likely due to the way in which participants were providing their IFAMs. In the previous chapter and the majority of previous work investigating IFAMs (Merckelbach, 2004; Porter et al., 2007; Porter, Yuille, & Lehman, 1999a, 1999b; Ruby & Brigham, 1997), when fabricating, participants have been asked to provide entirely fictitious accounts of an event. Again, when it is considered that the fabricated accounts are likely to be edited versions of the truth - it is unlikely that any linguistic differences would occur since the IFAM is primarily truthful with only a small number of details altered.

Not only do these findings show then that an IFAM can be almost entirely hidden within an AM, but also that tools for statement assessment e.g. Statement Validity

Analysis (SVA) and Memory Assessment Procedure (MAP), would more than likely fail at detecting memories fabricated in such a way.

The section of the interview that did yield reliable differences in content was within the experimental subset of specific questions. It was found that AMs contained more words pertaining to cognitive processes, such as “think”, “know” and “consider” than IFAMs. Those providing an AM therefore seem to verbalise their reasoning and metacognitive processing, often hedging responses to questions with “I think”, further supporting the notion that truthful accounts are more tentative than IFAMs. Additionally, this difference in linguistic styles may be a rhetorical device, used by truth tellers to demonstrate that they are careful, thoughtful and thorough rememberers. What is important then is some demonstration of ‘thinking’ and of effortful memory retrieval (Bysouth, 2009).

Recommendations from these findings would be for researchers to focus on assessment of answers to specific questions, rather than free recall since fabrications can easily be substituted and therefore hidden within the free recall section, whereas all details given in the free recall can be explicitly examined in subsequent specific questioning.

7.4.3 **Drawing**

Results from the drawings indicated that those participants in the truthful condition included more details than those in the fabricated condition. This is consistent with findings in the previous chapter and may represent an attempt by those fabricating to reduce the number of details included for possible interrogation. Drawing may therefore be an interesting avenue future research investigating truth and lies could explore, as in this and the previous study (and indeed work by Vrij et al., 2010), number of details have proven to be a reliable indicator of deception. Interestingly

however, inconsistent detail was included by three participants, from both truthful and fabricated conditions. In the previous study, only participants in the truthful condition included inconsistent detail, thought to reflect the fact that truthful drawings were elicited from memory, whereas fabricated drawings were based on schemas of classrooms (Brewer & Treyens, 1981). However, in the present study, the inconsistent detail included within the fabricated condition serves to show that the drawing is most probably a product of memory, edited where necessary.

7.5 Conclusions

In sum, this study has shown that an IFAM can be almost entirely truthful, and therefore will lack many of the cues to fabrication favoured in traditional deception detection studies and statement analysis techniques (see section 1.3.9). However, a number of linguistic and source monitoring differences were highlighted between the two account types but only in the specific questions sections of the interview, offering new and alternative methods of delineating AMs from IFAMs and highlighting the importance of using and analysing specific questions.

Chapter Eight

8 Recalling Truthful and Fabricated Memories of an Emotional Event Over Time

8.1 Introduction

The study reported in this chapter aims to build on the previous two studies in a number of ways. Firstly, the study will use a more emotive staged event and assess the effect this may have upon recall. Porter et al's (1998) work investigating IFAMs of trauma yields very different results to the investigation of IFAMs of more neutral events (Colwell et al., 2007) such that traumatic memories were reported with an 'over-the-top' quality. It is one of the aims of the present study to further these findings and investigate how AMs and IFAMs of an emotional event are reported in comparison to AMs and IFAMs of more neutral events (chapters six and seven). Answering such a question will inform the current understanding of IFAMs, deception and memory more broadly, indicating whether the emotionality of an event is likely to change the way in which is it remembered and reported. Secondly, the study will include an additional condition that instructs participants to provide IFAMs on two occasions and then provide an AM on a final occasion. This condition will assess the impact that providing intentionally fabricated information has on subsequent ability to recall the truth. Finally, because of the failure of the free recall section to elicit any reliable differences in content between AMs and partial IFAMs and due to the usefulness of the specific questioning section (chapter seven), this study will focus on the source of answers given to specific questions and the confidence held in these answers. Because of this, the methodology will differ from those in previous studies insofar that online questionnaires will be used in place of face-to-face interviews due to the self-report nature of the questionnaire. It is important to note that because of

this change in methodology, the findings in this chapter may not map onto the previous chapters particularly well. It may also be difficult to attribute any differences in the findings solely to the emotionality of the event, it may be that using online interviews, or using self-report measures may affect the results given. In any case, this study represents an interesting and novel investigation into real and fabricated memories of an emotive staged event, future work may expand upon these to help refine the differences between everyday and emotional real and fabricated memories and help elucidate which processes and methodological alterations are responsible for results given.

8.1.1 **Predictions**

It is expected that the emotional event on which the AMs and IFAMs will be based will influence source monitoring and confidence ratings. However, since such a study has not been previously conducted, it is not certain how such ratings will be influenced. It may be that confidence ratings are inflated for IFAMs, as per Porter et al. (1998) finding that traumatic memories display an 'over-the-top' quality.

Additionally, since previous work assessing the effects of fabricating on memory has been primarily reduced to investigating lying about autobiographical facts, it is unclear how providing an IFAM will affect the ability to subsequently recall the original AM. It may be that providing an IFAM will bolster the original AM as per Polage (2004), alternatively, results may find that providing an IFAM may hinder the ability to recall the AM, with individuals coming to believe their IFAM as per false memory creation. Such predictions are difficult to make due to the lack of previous research.

8.2 Methods

8.2.1 Participants

Forty-two participants (3 male, 39 female) took part in the study with a mean age of 19 years. Participants were undergraduate students at the University of Leeds and were given course credit for their participation. Data from four participants were removed from the study as they failed to complete all sessions.

8.2.2 Materials and Procedure

Participants attended one group session, with no less than two participants, where they completed a memory measure, The War of The Ghosts (Bartlett, 1932), see appendix VII. This was selected to provide a ruse that the study was interested in the outcomes of the memory test, whereas the interest was in the quality of memory for the event itself. They then witnessed an unexpected staged altercation between the researcher and another individual, claiming to need the testing room for teaching immediately. Following this, participants read a piece of paper that detailed the condition in which they would be for the remainder of the experiment. Participants were in one of three conditions. Participants in the truthful condition were required to give a truthful account of the events they remembered from session one in all subsequent questionnaires. Participants assigned to the continual-fabrication condition were required to provide deliberately untruthful information for specific questions centred on the staged altercation (the experimental subset) and provide truthful information on all remaining questions (the control subset) in all subsequent questionnaires. Participants in the fabrication-subsequent-truth condition were asked to give deliberately fabricated information on the experimental subset and truthful information in the control subset in the initial and second questionnaire. They were then asked to provide truthful information to the entire third questionnaire.

Following this, participants were asked to complete a short survey regarding the events they had just witnessed. The survey comprised ten questions regarding the session, the altercation, the participant, other participants and the researcher (see appendix XVI). Some participants were asked to complete the survey truthfully, these participants were in the truthful condition, and others were asked to complete the survey by providing deliberately fabricated information for specific questions (the experimental subset). These questions focussed upon details of the altercation including what was said, actions that occurred and what the individual who interrupted looked like. Participants were then instructed to provide truthful information for all other questions (the control subset). These participants were in both the continual-fabrication condition and the fabrication-subsequent-truth condition. The session was then ended and participants were reminded of when to expect the email link to the first questionnaire.

The initial survey provided a record of an individual's experience, allowing for later measures of consistency to be taken. Participants were then emailed links to online questionnaires regarding the events of the session one week (questionnaire one) after the session and finally three weeks after the initial session (questionnaire two), see appendix XVII. The questionnaires contained sixteen items (eight in the experimental subset, eight in the control subset) regarding the test session, the self, the altercation, the researcher and other participants. Each question was followed with a source attribution (memory based – the answer was a memory of what happened; memory using external event – the answer was obtained because of a memory of something external to the study e.g. remembering the study was in the morning because the participant remembers feeling tired; inference – the answer was inferred e.g. assuming the researcher had brown eyes because she had dark skin; guess – the answer was guessed and "don't know" – the participant cannot

remember the answer to the question). Additionally, participants were asked to rate how confident they were that they had provided the correct answer to the question (5 very confident - 1 not at all confident). Participants in both fabricated conditions were asked to provide source monitoring decisions and confidence ratings that they felt would make their account seem convincing to an external assessor.

The study employed a between-subjects design with one main independent variable: recall type (truthful, continual-fabricated or fabrication-subsequent-truth) which was counterbalanced across participants. The main dependent variables that were assessed included accuracy of answers to the specific questions elicited from questionnaires one and two, the source attributions and confidence judgements of these answers in both questionnaires and the consistency of answers over all questionnaires.

The room to be used for the first test session was a large classroom containing twelve individual desks and a number of other items consistent with a testing room e.g. computer, whiteboard. Prior to the participants entering the room, testing booklets, the questionnaire, pens and an envelope were placed on each desk. Inside the booklet was additional information regarding the condition to which each participant was assigned (see appendices XVIII and XIX). The participant was asked not to touch this until told to do so.

One researcher was present in the room for the duration of the test session. The researcher seated participants at the individual desks, then told them that they were to hear a story and that they must, once the story was completed, reproduce it in as much detail as possible without paraphrasing. The researcher then began reading aloud Bartlett's (1932) War of the Ghosts. Once the researcher was confident that all of the participants had completed recall, the researcher contacted a second

researcher discreetly who then entered the room, disturbing the session and began the altercation regarding the room booking (see appendix XX for all altercation transcripts[6]). The issue was resolved and the second researcher left. Following this, participants were asked to open the questionnaire, read the information regarding condition assignment and complete the questionnaire following these instructions. Participants were also informed that the altercation had been staged.

One week following the test session participants were emailed a link to the online questionnaire. The questionnaire firstly reminded the participants of the condition to which they were assigned and reminded them how to answer the questionnaire in accordance with the condition.

Three weeks after the initial test phase (two weeks after the second questionnaire) participants were emailed another link to the online questionnaire. Again, participants were reminded of their condition assignment and provided with instructions on how to complete the questionnaire in line with the condition. It was in this final questionnaire that those participants in the fabrication-subsequent-truth condition were asked to provide truthful answers to the experimental subset of questions. Following completion of the final online questionnaire, participants were presented with a screen presenting the study debrief and an email address to which any questions concerning the study could be directed.

[6] The altercation differed slightly on some occasions. However, this was taken into account when participant questionnaires were coded ensuring responses were matched to the appropriate transcript and scored accordingly.

8.3 Results

8.3.1 Source Attribution

Table 8.1. Number of questions answered (out of eight) with each source attribution from the experimental subset from questionnaire one (means and standard deviations)

Source attribution	Truthful Memory Questionnaire 1	Fabricated-subsequent-truth Questionnaire 1	Continual-fabrication Questionnaire 1
Memory	6.5 (1.1)	6.0 (2.1)	5.5 (2.0)
Indirect Memory	0.4 (0.8)	0.9 (1.1)	1.5 (1.7)
Inference	0.3 (0.6)	0.7 (1.1)	0.4 (0.6)
Guess	0.7 (0.6)	0.3 (0.8)	0.6 (1.2)
“I don’t know”	0.1 (0.3)	0.1 (0.4)	0.1 (0.3)

Source attributions, shown in Table 8.1 were investigated using Chi-Square, however no reliable differences were found between source attributions between conditions in questionnaire one.

Table 8.2. Number of questions answered (out of eight) with each source attribution from the experimental subset from questionnaire two (means and standard deviations)

Source attribution	Truthful Memory Questionnaire 2	Fabricated-subsequent-truth Questionnaire 2	Continual-fabrication Questionnaire 2
Memory	5.8 (2.3)	3.2 (2.8)	5.1 (2.7)
Indirect Memory	1.4 (1.9)	1.6 (1.9)	1.5 (1.8)
Inference	0.1 (0.5)	1.1 (1.3)	0.6 (0.9)
Guess	0.4 (0.5)	1.3 (1.8)	0.4 (0.9)
"I don't know"	0.4 (0.5)	0.8 (0.4)	0.4 (0.8)

Results, shown in Table 8.2, revealed differences in source monitoring between conditions in questionnaire two, $\chi^2(8) = 33.3$, $p < 0.001$, $\phi = 0.3$. An inspection of the residuals (critical value 1.96) indicated that participants in the fabricated-subsequent-truth condition gave fewer memory based answers, but more answers based on inferences and guesses than those in the truthful and continual-fabrication conditions. Further, a reliable difference was found in the source attributions between conditions over time, $\chi^2(18) = 43.4$, $p < 0.001$, $\phi = 0.2$. An inspection of the residuals (critical value 1.96) indicated that participants in the fabricated-subsequent-truth condition gave less memory based answers, but more answers based on inferences and guesses in time two than in time one. No other reliable differences were found, suggesting that for the other two conditions, source attributions were stable across interviews.

8.3.2 **Consistency**

Information provided for the questions in the experimental subset for truthful and both fabrication conditions was assessed for consistency between questionnaire one and questionnaire two. Here, inconsistency is viewed as providing information in one interview and omitting it in another, or contradictory information across interviews (a

highly consistent answer was scored two points, a slightly altered or less detailed answer was given one point and a different or omitted answer was scored zero). Truthful recallers received a mean consistency score of 12.1 (s.d. 4.1), participants in the continual-fabricate condition received a mean consistency score of 11.2 (s.d. 3.3) and participants in the fabricate-subsequent-truth condition received a mean consistency score of 0.1 (s.d. 0.3). Seen as percentages, 67% of information in the truthful condition remained unchanged, 70% of information in the continual fabrication-condition remained unchanged and only 1% of information in the fabricate-subsequent-truth condition remained unchanged. A one-way ANOVA with condition as factor and consistency score as dependent variable revealed an effect of condition, $F(1, 41) = 68.3$, $p < 0.001$, $n^2 = 0.8$. Bonferroni post-hoc tests revealed that participants in the fabricate-subsequent-truth condition received reliably lower consistency scores than participants in the truthful ($m = -12.0$, $p < 0.001$) and continual-fabricate condition ($m = -11.1$, $p < 0.001$).

8.3.3 **Confidence**

Table 8.3. Confidence scores (out of 5) for questions from the experimental subset from questionnaire one (means and standard deviations)

Source attribution	Truthful Memory Questionnaire 2	Fabricated-subsequent-truth Questionnaire 2	Continual-fabrication Questionnaire 2
Memory	4.3 (0.6)	4.6 (0.5)	4.6 (0.5)
Indirect Memory	3.5 (0.5)	3.9 (0.7)	3.6 (0.6)
Inference	3.5 (0.5)	3.4 (0.7)	3.0 (0.7)
Guess	2.8 (0.8)	2.2 (1.3)	2.8 (1.0)
Overall Confidence	4.5 (0.6)	4.2 (0.7)	4.1 (0.6)

Overall confidence scores of the experimental subset at questionnaire one (shown in Table 8.3) were investigated using a one-way ANOVA with condition as factor and overall confidence scores as dependent variables. No reliable differences were found between conditions, such that participants in all conditions rated their answers with equal confidence.

Table 8.4. Confidence scores for questions from the experimental subset from questionnaire two (means and standard deviations)

Source attribution	Truthful Memory Questionnaire 2	Fabricated-subsequent-truth Questionnaire 2	Continual-fabrication Questionnaire 2
Memory	4.4 (0.6)	4.6 (0.4)	4.4 (0.5)
Indirect Memory	3.5 (0.8)	3.6 (0.6)	3.6 (0.9)
Inference	2.6 (0.6)	3.2 (0.7)	2.9 (0.9)
Guess	2.1 (0.6)	2.6 (0.7)	2.1 (0.8)
Overall Confidence	4.0 (0.6)	3.7 (0.7)	4.0 (0.9)

Overall confidence scores of the experimental subset at questionnaire two (shown in Table 8.4) were investigated using a one-way ANOVA with condition as factor and overall confidence scores as dependent variables. No reliable differences were found between conditions, such that participants in all conditions rated their answers with equal confidence.

Further, confidence in source monitoring judgements was investigated over time. However, no reliable differences were found, suggesting that source attributions remain stable classifications over multiple interviews.

8.3.4 Accuracy

To investigate the effect of lying on memory, accuracy scores in the experimental subset of questions in questionnaire two were compared between the fabricate-

subsequent-truth condition (participants in this condition had attempted to recall the truth after having lied in all previous questionnaires) and the truthful condition, in which participants had been required to provide truthful answers throughout all questionnaires.

An independent t-test revealed that there was a reliable difference between accuracy scores in the experimental subset ($t(26) = 5.4$, $p < 0.001$) such that participants who provided truthful accounts after having given fabricated responses were less accurate in their responses (41% accuracy) than those who had provided truthful answers continually (85% accuracy).

Further, to investigate the nature of *truthful* recall over time, answers for the control subset of specific questions (in which all participants were instructed to provide truthful responses) from all three conditions were coded for accuracy. It was found that for questionnaire one, participants were, overall, 49% accurate. Over answer types, it was found that answers based on memory were 72% correct and answers based on memory of an external event were 70% correct, answers based on inferences and guesses were at less than chance levels, with 27% and 27% correct respectively. A one-way ANOVA with accuracy of answer types as dependent variables indicated a reliable difference ($F(1, 41) = 7.2$, $p < 0.05$, $n^2 = 0.8$). Bonferroni post hoc tests revealed that answers attributed to memory were reliably more accurate than those attributed to inferences and guesses (see percentages above). Additionally, answers attributed to indirect memories were reliably more accurate than those attributed to inferences were and guesses (see percentages above).

Accuracy for the control subset of questions was also investigated in questionnaire two. It was found that overall, participants were 48% correct. Across answer types it was found that answers based on memory were 80% correct, answers based on memory of an external event were 54% correct and answers based on inferences and guesses remained at less than chance levels, with 27% and 30% correct respectively. A one-way ANOVA with accuracy of answer types as dependent variables indicated a reliable difference ($F(1, 41) = 14.1$, $p < 0.005$, $n^2 = 0.9$), such that answers attributed to memory were more accurate than those attributed to an indirect memory, those inferred or those answers that were guessed.

Further, the relationship between confidence and accuracy was assessed to investigate the confidence-accuracy correlation. This states that the higher rating of confidence an answer receives, the more likely it is to be accurate (see Sporer, Penrod, Read, & Cutler, 1995). This correlation has received mixed results, with some studies supporting and others rejecting the correlation. In the present study no reliable correlations were found across time, conditions and source attributions such that, for example, confident answers based on memory were not associated in any way with the accuracy score their received.

8.4 Discussion

This study aimed to strengthen findings from two previous studies, particularly those regarding source attributions of answers to specific questions. Additionally, it aimed to extend previous methodologies by introducing a more salient staged event and a third condition that required participants to attempt to recall truthfully their memory for the event, having provided fabricated information in all questionnaires previously. The effects of such an instruction, prior to this study, was unknown. It must however be reiterated that because of substantial changes to the methodology used in this

chapter and the ones previous, differences in findings may not be solely attributable to the changed emotionality of the event – other alterations such as the modality of reporting or the online format of the questionnaire may have played a pivotal role in the differences noted. The results will therefore be interpreted taking this into consideration.

8.4.1 Section 1: Distinguishing Truthful and Fabricated Memories

Results regarding the source attributions of the truthful and continual-fabrication conditions serve to highlight important beliefs underlying the construction of fabricated memories. Unlike the previous studies, no reliable differences were observed between source monitoring categories. Previous results suggested that truthful memories consisted more of guesses, inferences and "don't know" answers, whereas fabricated memories were claimed to be based, more frequently, on "memory", yet this finding failed to be replicated here. However, an inspection of the proportionate use of these answer types across studies shows that in fact, in the present study, fabricated answers yielded similar high percentage use of "memory" answers. In other words, in the previous two studies and the present study, fabricated memories contained 81%, 79% and 71% of "memory" based answers respectively (the latter two percentages are averaged across two interviews as no reliable differences of time were observed). As has been discussed in the previous two chapters, is does still remain likely that the Witness-Confidence-Accuracy (WCA) and memory-accuracy-detail (MAD) beliefs (see chapter four) that posit that detailed information held with confidence is likely to be accurate, influence the classification of source attributions (however it is important to note that the beliefs the participants in the present study hold about memory were not explicitly investigated. Until more work is completed replicating findings in the belief to memory questionnaire, it is not possible to say that such beliefs are universal. However, it is

possible to say that these beliefs *may* occur in the population – and therefore such beliefs *may* be influencing how memories are reported). Therefore, these results serve to strengthen the previous findings.

What appears to be different in the present study are the answer types provided by those required to give truthful recall. In this study, we see an elevated proportionate use of memory based answers in the truthful recall condition, such that truthful responses in previous two studies contained 60% and 61% of memory based answers, whereas the present study contained 77% of memory based answers (again, the latter two percentages are averaged across both interviews as no reliable differences of time were observed). In chapter four, results revealed that individuals hold a number of inaccurate beliefs about memory – one such belief is the Burnt-In Memory (BIM) belief that holds that emotional memories give rise to highly accurate mental representations. In may be that such a belief is underlying the construction and subsequent classification of source attributions in the present study, providing that it is assumed that the change in emotionality is the cause of such differences. Participants may have believed that the emotive event they witnessed gave rise to a more stable and salient memory, therefore making them more likely to categorise answers as being grounded in memory, rather than, as has been observed with more everyday memories, guesses and inferences.

Results from the present study may suggest that, because of underlying beliefs, AMs and IFAMs behave differently, depending upon the to-be-remembered event. Although this can be seen by the varying results produced when detecting everyday and traumatic memories using the MAP (Porter et al., 1999), this study highlights, for the first time, if the differences in emotionality are taken to be the root cause of such changes, that the differences an everyday and more salient event can have upon

recall. Although results need to be replicated and furthered, and the reasons for the changes in results need to be elucidated, the data may suggest that classifying the veracity of an emotional event may require entirely different criteria than when the event is more mundane. In previous chapters (six and seven) recommendations were to investigate further or treat with suspicion, answers that contained an unusual amount of 'remember' responses. However, here it would seem that a high amount of remember responses is acceptable, providing the remembered account is, to some degree, emotive. It may be then that in cases where an individual witnesses an emotive event, source attributions may not be a clear-cut way of identifying potential IFAMs and asking for source monitoring attributions in an interview setting may not be useful for detecting fabrications.

Additionally, it is important to note that source attributions for AMs and IFAMs were not found to reliably differ over time, suggesting that participants were aware of their answer type classification, recalling it accurately over time and not incorporating guessed or inferred answers into memory. It seems then that participants may be aware that they are providing inferred and guessed answers, but may masquerade these as 'memories' to fulfil interview expectations. For example, truthful accounts contained 13% of guesses and inferences in interview one, and 6% in interview two. In other words, participants are giving 'non-malicious fabrications' to answer questions that memory may not be able to provide. Indeed, removal of all non-memory based answers sees accuracy rise from 47% to 68% in interview one, and from 45% to 65% in interview two, further strengthening the previous assertions that answers not based on memory should be removed from investigation, allowing for a more accurate account to be generated.

As in the previous chapter, it was found that the actual information provided (in addition to its source attribution) was consistent over time, with participants in the truthful condition providing 67% consistent information and those in the fabricated condition providing 70% consistent information. Therefore, participants in both conditions were consistent not only in the information they were providing, but also in the source to which the information was attributed. This finding opposes beliefs regarding consistency held by some legal scholars who suggest that consistency is a reliable indicator of veracity (see Fisher & Culter, 1995), however, it must be remembered that the findings in this study only apply to a relatively short delay (three weeks in total); it may be the case that entirely different results would be found after a more substantial delay. Certainly, future research could address this area.

An investigation of confidence ratings revealed that answers in both truthful and fabricated conditions were rated equally as highly confident in both interviews. However, no reliable correlations were found between accuracy and confidence across conditions therefore suggesting that it does not necessarily follow that confident answers are accurate.

8.4.2 Section 2: The effects of fabricating upon the subsequent ability to recall the truth

Results from the fabricate-subsequent-truth condition in the present study serve to highlight the detrimental effects fabricating a memory can have upon subsequent truthful recall attempts. Results from the source monitoring data show that when attempting to recall a truthful memory after providing fabricated recall, answers to specific questions were more based on guesses and inferences with fewer memory based answers as compared to truthful memories that had not been preceded by fabrication. This suggests that when providing truthful recall after having fabricated,

answers are more tentative, more based more on guesses and less reliant on memory than if truthful recall had been provided throughout.

Relatedly, and indeed most strikingly, it was found that those in the fabricate-subsequent-truth condition provided answers that were reliably less accurate (44% less accurate) than those who had provided a truthful account throughout. This finding serves to show that deliberately fabricating an account not only reduces the amount of information that is retrieved from memory, but also reliably impairs the ability to subsequently recall accurately.

Interestingly, further analysis of the incorrect answers suggests that participants did not come to believe the fabricated information, with only 1% of the incorrect data being consistent with previously given fabricated information. Therefore, it seems that individuals are able to reject previously given fictitious information, preventing this internally generated information from being incorporated into memory. It would seem likely that a process of recollect-to-reject (Brainerd et al., 2003; Pezdek et al., 2009) was employed to discriminate self-generated information. This process posits that fabricated information is rejected on the grounds that it is remembered as being generated to fulfil the need to fabricate. In other words, a participant can recall their fabricated information and successfully classify it as fabricated information since the participants is aware that it was generated to be false. What seems to be interesting however is that following successful rejection of fabricated information, participants performed poorly at accurately recalling the original event. It would seem likely that this poor level of accurate recall may be due to the lack of explicit rehearsal of the original event to which participants in the continual-truth condition would have been exposed. In such a case, it may be that individuals have to rely more on schema-based knowledge of an event or simple guesswork. The results certainly seem to

support this notion. Brewer & Treyens (1981) suggested that schemas contain inference-based information, and results indicated that accounts in the fabricated-subsequent-truth condition contained reliably fewer memory based answers and more inferences and guesses than continual-truthful and fabricated accounts, suggesting that they may indeed be schematic representations and guesswork rather than answers based on existing mental representations of the original event. Interestingly however, those in the fabricate-subsequent-truth condition rated their answers as highly in confidence as those who had provided truthful recall throughout despite receiving reliably lower accuracy scores. This therefore suggests that these participants were not aware of their impaired recall ability and serves to show that confidence ratings should not be used as a way of discerning accurate information.

8.5 Conclusions

Results from this study not only bolster a number of the previous findings but also indicate some important implications for fabricated memory. Firstly, the results supported previous findings and recommendations such as removing non-memory based answers from an account to increase account accuracy and that fabricated memories primarily consist of 'memory' based answers. Additionally, they highlight the differences in recall between everyday and more emotional events – although this finding must be treated with caution since, due to a number of methodological changes from previous studies, it is difficult to elucidate which alterations may have impacted upon results. However, if emotionality is accepted as being the cause of differences in results, it could be suggested that because inaccurate beliefs permeate individuals' understanding of emotional memory, such that emotional events are remembered differently from more everyday events, they are, in turn, reported differently. Certainly, more work needs to investigate this finding, but it serves to lay the groundwork for more refined analysis of IFAMs, taking into account the emotive

status of the original event. Results also indicated that answers should not be discounted or indeed reviewed favourably with regards to their confidence rating. Confidence was not found to be associated, in any way, with accuracy. Finally, findings show that deliberate fabrication can impair subsequent attempts at truthful recall, not because the fabricated information is incorporated into memory due to failures of source monitoring, but most likely because of the lack of explicit rehearsal of the original event leading the individual to rely on schematic knowledge of a given interaction/event. Noticeably, however, such answers were rated with the same confidence as those that had been consistently truthful throughout, again bolstering the notion that confidence should not viewed as a measure of accuracy.

Chapter Nine

9 Discussion

This concluding chapter aims to outline and evaluate the principal findings from this body of work. It will also provide a discussion of the implications of these findings for applied settings and indicate future pathways for study.

9.1 Generating Fabricated Memories

The central findings from chapter two showed that truthful autobiographical memories (AMs) play an integral role in the generation of intentionally fabricated autobiographical memories (IFAMs). Results revealed that when asked to recall an AM or generate an IFAM to a given word cue, IFAMs are frequently created by firstly recalling an AM, either general autobiographical facts or a more specific episodic memory, and subsequently editing this mental representation to create a new fictitious event. Post experimental interviews with participants clarified that the most frequently used strategy for editing was deletion-substitution whereby specific episodic details were deliberately altered. For example, an AM, "last night I made a curry" may be substituted with "last night I made a lasagne" to generate an IFAM based upon an experienced event. This study was the first to empirically clarify this process, with previous work having only theorised the differences in the construction phases of AMs and IFAMs (Porter, 1998, Colwell et al., 2002).

Table 9.1. Occurrence of principal memory features in AMs and IFAMs

Memory Feature	AM	IFAM
Vividness	+	-
Non-Fluencies	-	+
Field Perspective	+	-
Observer Perspective	-	+

AM and IFAM reports were also measured on a number of linguistic and phenomenological constructs and were found to differ in a number of ways, see Table 9.1. Most notably, IFAMs were recalled more often from observer perspectives than AMs. Freud (1915) originally noted that a memory often takes an observer perspective after it has been edited or processed in some way. This position has been supported more recently (Libby & Eibach, 2002; Libby et al., 2005; Nigro & Neisser, 1983). Therefore, the higher frequency of observer perspectives reported for IFAMs is likely to reflect the previously edited AM. Relatedly, IFAMs were also reported as being experienced as less vivid than AMs. Robinson & Swanson (1993) noted that observer perspectives were often associated with more less mental imagery than memories recalled with a field perspective, whilst Johnson, Foley, Suengas, & Raye (1988) suggest that vivid imagery may provide an index for distinguishing experienced events from other types of mental representations such as imagining.

Interestingly, analysis of language used to describe both AMs and IFAMs showed a difference in frequency of use of 'motion' words, e.g. '"go"," walk"," run" such that IFAM accounts contained more words regarding motion that did AM accounts in some studies but not others (see chapter 2, 3, 6 and 7). Previous work (Newman et al., 2003) suggested that motion words are incorporated into accounts in order to reduce their complexity. Describing actions rather than emotions or other metacognitive details is thought to reduce the cognitive effort required for the

generation of the memory. However, it was suggested in chapter six that the increased use of 'motion' words found in AM accounts may in fact reflect the description of the account itself – that those generating an IFAM may have used fewer motion words to reduce the complexity of their account. Indeed, results from chapter three revealed that motion words were only a reliable use to deception when the account was generated under load and results from chapter 7 failed to find any reliable differences in motion words between accounts. Although this cue has received some support through previous research (Newman et al., 2003), results from the present studies have shown the cue may be an unreliable indicator of fabrication, with results changing according to load and dependent upon how the memory itself is reported.

However, it is likely that, due to the additional phase of editing, and the constant refreshing and accessing of a newly generated image, generating an IFAM is likely to be significantly more cognitively complex than recalling an AM. Therefore, the inclusion of more motion words is probably a strategy employed to help reduce the cognitive effort required to generate such a memory.

The cognitive effort associated with AM recall and IFAM generation was explicitly assessed in chapter three. Along with replicating findings regarding the linguistic and phenomenological characteristics of AMs and IFAMs found in chapter two, the study revealed that IFAMs required more cognitive effort to generate than AMs. This finding was elicited through the assessment of performance on a secondary number recall task, performed concurrently whilst generating AMs and IFAMs to given word cues.

It was found that whilst generating an IFAM, participants performed reliably poorer in the secondary task, recalling fewer numbers correctly, fewer in their originally

presented order and took longer to input the to-be-remembered digits than whilst recalling an AM. These results show that the generation of an IFAM impacted more on the ability to perform a secondary task than did the generation of an AM, revealing that IFAM generation is more cognitively effortful than AM generation.

Taken together, the results from chapters two and three show that the generation phase of memory retrieval is more cognitively effortful for intentionally fabricated than truthful autobiographical memories. IFAMs are more effortful to generate since they require more cognitive resources for the additional phase of editing a recalled AM. This editing phase can be indirectly observed by the increased number of fabricated memories recalled with an observer perspective. Holding in mind and constantly refreshing a novel mental image is also likely to be more cognitively effortful than recalling a longer held AM. This effort is reflected in the language used when IFAMs are recalled such that IFAM reports contain more "motion" words (although it is important to note that this difference in motion words was not replicated throughout the thesis).

Most importantly, the studies reported in chapters two and three reveal that memory plays a highly important, if not essential role in the generation of fabricated memories but also in deception more generally. Fabricating necessarily involves the retrieval of existing autobiographical information, most probably followed by a conscious 'editing' phase. Indeed, if IFAMs are considered as akin to the 'incubation' stage of false memory generation (whereby individuals are asked to consciously edit existing memories or to imagine alternate events) see section 1.3, it can be seen clearly that memory must be essential to fabricating. More broadly, memory should take a central role, or at least be considered when designing and interpreting deception detection studies, as it is very hard to conceive of a time where one would

deceive without sampling or drawing inferences from memory or imagination (which has shown to be inextricably linked to memory) in some way.

9.2 Reporting Truthful and Fabricated Accounts

The central findings from chapter six revealed that truthful and entirely fabricated recall for a recently experienced staged event could be reliably distinguished using a number of characteristics.

Table 9.2. Occurrence of principal memory features in free recall section of truthful and entirely IFAM accounts

Memory Feature	AM	IFAM
Word Count	+	-
First Person Pronouns	+	-
Second Person Pronouns	-	+
Third Person Pronouns	+	-
Non-Fluencies	-	+
Details	+	-

As shown in Table 9.2, in the free recall section of the memory accounts, AMs were longer in length, included more first person pronouns, more third person pronouns and more details than IFAMs. Conversely, IFAMs contained more second person pronoun and more non-fluencies than AMs.

The increased use of specific pronouns is particularly interesting as it seems to reflect underlying thought processes of the memory type. For instance, when fabricating, participants were more likely to describe their experience in the second person, stating, for example “you would go into the room…” rather than, as was seen in the truthful accounts, the tendency to report using the first person, by stating, “I went into the room”. This use of second person pronouns may reflect the use of schema-

based recall – the participants may be describing a script of events based on beliefs and expectations of how the given event could have happened. In contrast, the AM event descriptions, dominated by first person pronouns, reflect the lived experience as participants stated what happened, not what was expected to have happened. The pronouns here not only provide a useful tool for identification of IFAMs and AMs but also provide an interesting insight into thought processes involved with different types of recall.

Similarly, the increased use of third person pronouns in the AM recall seems to indicate a propensity to discuss others when describing the event. Previous research (Vrij et al., 2010) has shown that liars tend not to identify others. Such a lack of third person pronouns in fabricated accounts may reflect this attempt to avoid discussing others, which also may play a role in reducing the complexity of the given story by reducing the number of given details.

AM accounts were found to be longer in length and contained more episodic details than fabricated accounts. Truth tellers therefore seem to be more likely to talk about the experienced event for longer and in more detail. Those fabricating may deliberately reduce the amount of information given to reduce the complexity of the account and to provide fewer details that could be scrutinised. Interestingly however, when analysed proportionately (i.e. when details were calculated with respect to word count) no differences were found to exist between the number of given details. This finding is in direct contrast to much previous research that states that truthful accounts contain reliably more details that fabricated accounts (DePaulo et al., 2003; Vrij et al., 2008) and indeed, is often used as a primary criterion in a number of statement analysis tools (SVA, RM, MAP and ACID, see section 1.3.9)

Table 9.3. Occurrence of principal memory features in specific question section of truthful and entirely fabricated accounts

Memory Feature	AM	IFAM
'Memory'-based answers	-	+
Inferences	+	-
Guesses	+	-
Don't Know answers	+	-
Cognitive Mechanisms	+	-
Insight Words	+	-

As shown in Table 9.3, when answering specific questions about their experience of the staged event, truth tellers are more likely to base their answers on inferences, guesses and admit a lack of memory. Conversely, those who are providing fabricated accounts are more likely to attribute their answer to a direct memory. It seems therefore that when attempting to distinguish truthful from IFAMs, those accounts that appear to be based on mental representations may in fact be those that need to be approached with caution, whereas those memories that contain more uncertainties may be, according to these results, more likely to originate from real experience.

Additionally, the language used when answering specific questions about a previously experienced staged event reliably differed between truthful and fabricated narratives such that truth tellers used more words pertaining to cognitive mechanisms and more insight words ("think", "know") than those providing fabricated accounts. Providing such descriptions may be a rhetorical device; a way of demonstrating that the participants are thorough and careful remembers', as participants' demonstrate 'thinking' and effortful memory retrieval (Bysouth, 2009).

In sum then, when an entire event is fabricated, a number of linguistic and source monitoring cues are available to aid distinction between memory types. These cues manifest both when free recall of a previously experienced event is given and when answers to specific questions are given. Additionally, these cues seem to reflect differences in thought processes that underlie AM and IFAM generation and elaboration. Therefore, this cognitive based identification approach seems to offer a more successful detection method than those approaches based upon differences in emotional arousal.

Leading on from these findings is the study presented in chapter seven. This study aimed to identify whether cues that could distinguish truthful and **entirely** IFAMs could also distinguish between AMs and **partial** IFAMs. Such memories are created by interspersing fabricated with truthful details and may be more likely to represent the sorts of fabrications offered in real-world settings (Sapir, 1987, Vrij, 2005). Central findings from this study indicated that partial IFAMs represent a much greater challenge to the legal system than entirely fabricated memories since they yield reliably fewer cues allowing for distinction between memory types than entire IFAMs.

No linguistic features were found that could reliably distinguish AMs and IFAMs when participants were asked to provide a free recall of the previously experienced staged event. The lack of differences between the reports of AMs and IFAMs is likely to be due to the way in which the memory reports are generated. As noted in chapter two, often IFAMs are generated by recalling a truthful autobiographical memory and consciously editing this memory to create a novel mental representation. The process of editing was described by participants as one of deletion-substitution. Therefore, differences in accounts are likely to be slight since the majority of the story can remain truthful with existing information simply being substituted for fabricated

information. Indeed, results from the deception survey (see chapter five) indicated that the majority of lies told were based upon existing information, suggesting that most lies told will be editions of truth and therefore particularly difficult to detect.

Table 9.4. Occurrence of principal memory features in specific questions section of AMs and partial IFAM accounts

Memory Feature	AM	IFAM
'Memory'-based answers	-	+
Guesses	+	-
Don't Know answers	+	-

Results from the analysis of answers given to specific questions (shown in Table 9.4) were more promising, with a number of cues reliably distinguishing AMs from IFAMs. These cues generally replicated those in the previous study of entire fabrication as again, real memories were found to contain fewer memory-based answers and contained more answers based on guesses and inferences. Once more, this shows that truthful answers are more tentative and uncertain whilst fabricated answers contain more answers that are claimed to be based on actual memory.

Findings from the analysis of partial IFAMs suggest that they are very difficult to detect due to the limited number of cues allowing for distinction. Few cues exist since partially IFAMs can be almost entirely truthful accounts, with only the necessary or desired details altered. These details can be simply substituted for new fictitious ones. It seems that the most fruitful areas of potential detection is through the analysis of answers given to specific questions – fabricated answers tend to be more certain than those based on the truth, with most answers claimed to be based on remembered experience.

However, a related study (chapter eight), investigating how participants recalled and generated IFAMs of a more salient event (a staged altercation) highlighted further problems with the detection of AM and IFAMs. After witnessing a staged but unexpected altercation, participants were asked to provide truthful or fabricated answers to specific questions (the free recall was removed since the previous study indicated that it was not a useful tool for distinguishing truth from fabrication).

Here however, answer type did not distinguish between recall types as it had done previously. Results from previous studies showed that IFAMs of mundane events generated more answers attributed to memory than AMs, which tended to comprise more of guesses and inferences. However, when the event is more salient or memorable (such as the staged altercation) a different pattern of results occur (however, as noted within chapter 8, since a number of methodological changes were introduced, it is difficult to elucidate exactly which processes were influencing the differences found in this study, it can only be suggested that such differences are attributable to the increased saliency of the event). Although IFAMs still generate similar levels of answers attributed to memory as were seen in previous studies, the number of answers coded as 'memory'-based for AMs is greatly increased. This change in answering is likely due to a number of erroneously-held beliefs about memory – discussed later in section 9.5 (however, again, it must be remembered that the beliefs about memory have yet to be shown to universally occur within the general population. Caution must be exercised when generalising these findings from the respondents in chapter four to other respondents).

This increase in 'memory'-based answers for AMs renders the difference non-reliable, therefore making AMs and IFAMs non-discernible through the frequency of use of 'memory'-based answering. Further, since a large percentage of truthful answers

were now classified as 'memory'-based, the other classifications that had previously proven useful in distinguishing AMs and IFAMs were seldom used and they too failed to prove useful cues for distinction. Therefore, it may be the case when a remembered event is particularly salient or emotional (as long as it is assumed that the emotional saliency was primarily affecting results), AMs and IFAMs are, using the current coding systems, almost indiscernible.

9.3 Can Fabricating a Memory Affect the Ability to Recall the Truth?

A further question that was investigated in this thesis assessed whether generating and reporting an IFAM a number of times could affect an individual's ability to subsequently recall the truth. Participants witnessed a staged altercation and were asked to provide multiple fabricated accounts of the event over the following three weeks. After approximately one month, participants were then asked to provide an AM of what occurred during the original staged altercation. The findings showed that generating an IFAM has very detrimental effects on the ability to subsequently recall the truth. Participants who had previously given fabricated information were reliably less accurate at recalling AMs than those who had continually told the truth. This poor performance may be due to the lack of explicit rehearsal to which those who continually told the truth were exposed. Without original experience to rely on, it seems that participants based their memories on schemas – generic knowledge of how an event typically occurs. This was supported by an increased number of answers based on guesses and inferences – answer types that Brewer & Treyens (1981) suggested would be consistent with schema-based answering. However, an analysis of answers given indicated that participants did not come to believe their lies as only 1% of fabricated answers were carried through to truthful recall. Through processes of recollect-to-reject (Brainerd et al., 2003; Pezdek et al., 2009) which

states that fabricated information is rejected since it is remembered as being created to fulfil the need to lie, participants failed to incorporate internally generated information into memory.

A particularly interesting finding from this study showed that despite participants who had provided an IFAM and then attempted to recall the original AM receiving reliably lower accuracy scores than those who had provided AMs throughout, measures of confidence were not reliably different between groups. In other words, both groups were equally as confident in the answers they had provided, despite one group performing over 40% less accurately. This finding has particularly detrimental implications as it highlights an individual's inability to accurately assess the reliability of their own memory, reinforcing the notion that confidence should not be used as an indicator of accuracy.

9.4 Beliefs about Lying and Beliefs about Lies

Results from chapter five revealed the types of fabricated information that individuals distribute and receive in real-world situations and the feelings and behaviours that are associated with the dissemination and reception of such information. Despite the wide range of results, findings with particularly important implications are noted here. Results demonstrated that the majority of fabricated information told is an amalgamation of both truthful and fabricated information, with the majority of participants indicating that their fabricated information was created by editing existing information. As was noted above (section 9.2), fabricated information that is partially based upon the truth represents a particular challenge to those wishing to attempt to distinguish truth from fallacy since fabricated information is disguised within a truthful narrative thus reducing the number of cues available to aid detection. Results therefore suggest that the majority of fabricated information given

will be particularly difficult to detect since most often it is delivered alongside the truth, or at least information that is believed to be true.

Results also indicated that people often used cues to detect lies that are not supported by the scientific literature – at least in the lies they reported in the questionnaire. This may be particularly detrimental to personal interactions and in situations where individuals are required to assess the veracity of another's memory i.e. in court. Additionally, it was found that individuals tend to view themselves as competent lie detectors, capable of filtering information appropriately. However, much research has shown that lay people, and indeed police personnel, are no better than chance at detecting fabricated information (Vrij, 2000). Again, an inflated confidence in the ability of detect fabricated information is likely to be detrimental when assessments of such information are made.

9.5 Beliefs about Memory

Table 9.5 Fourteen Beliefs about Autobiographical Memory

Beliefs	
MSS	Memory Self-Superiority
MAD	Memory-Accuracy-Detail
BIM	Burnt-In Memory
MMF	Memory-Malleable-Fragment
UCP	Unchanging-Clear-Photograph
MID	Memory-Individual-Differences
MLU	Memory-Limited-Unlimited
EMO	Earliest Memory Overestimation
cMSS	childhood Memory Self-Superiority
cMAD	childhood Memory-Accuracy-Detail
WCA	Witness-Confidence-Accuracy
TDR	Truthful-Deceptive-Responses
PPB	Positive-Presentation-Bias
NPB	Negative-Presentation-Bias

The central findings from chapter four demonstrated that members of the public (at least those sampled in the questionnaire) hold a number of erroneous and inconsistent beliefs about the way in which memory works. Following analysis of a survey that addressed various aspects of own and others' memories, fourteen beliefs were identified, see Table 9.5. Although all beliefs represent interesting inaccuracies in understanding (insofar as they do not correspond with current scientific research), the MAD, BIM and WCA beliefs are of particular interest.

The Memory-Accuracy-Detail (MAD) belief states that amount of detail included in the description of a memory is positively associated with the believed accuracy of a memory such that a highly detailed account is seen as being highly accurate.

Although classic flashbulb memory literature (Brown & Kulik, 1977) originally stated that highly detailed memories represent a 'special' subset of accurately recalled memories, more recent research (Luminet & Curci, 2009) has opposed such a belief, showing that highly detailed memories are susceptible to the same distortions and errors as other more everyday memories.

The Burnt-In-Memory (BIM) belief is also of particular interest, as it pertains to the erroneous belief that an emotional event will generate an accurate memory trace that is resistant to forgetting and distortion. Although research does suggest that highly emotional events can give rise to highly accurate memories (Brown & Kulik, 1977; Rubin & Friendly, 1986), it has also been shown that traumatic memories can be wholly inaccurate and error prone (Conway, et al., 2004; McNally, 2003). Despite these differences in research findings, this belief may provide a useful tool for interpreting findings from other studies within this thesis. In particular, the BIM belief helps to explain the elevated levels of 'memory'-based answering by truth tellers after witnessing a more emotionally salient event. Participants may have erroneously assumed that the memory originating from an emotional event was more likely to remain vivid and accurate and therefore reflect this belief in their answering patterns.

The Witness-Confidence-Accuracy (WCA) belief represents the erroneous association between confidence and accuracy, such that the more confident an individual is in his or her answering, the more likely he or she is to be accurate in the information he or she is providing. Although there has been much opposing research investigating the accuracy-confidence-correlation, the majority of findings have failed to find a reliable association between confidence and accuracy (Sporer et al., 1995). However, the WCA belief helps in interpreting the finding from previous studies that revealed that

fabricated answers to specific questions are frequently claimed to be based upon 'memory'. It may be that the WCA belief is informing such answer patterns, with participants who are fabricating claiming to remember all details clearly in order to appear more confident, and, in accordance with this belief, claim to 'recall' only accurate memories.

Indeed, any number of the above beliefs may inform participants' answer patterns when fabricating a memory or indeed when recalling an AM. If individuals believe that memory works is specific ways, they are likely to generate, recall and judge memories based upon these beliefs. Clearly, it is important that the public and particularly those involved in assessing memories are educated about the way in which scientific research has found memory to work.

9.6 Implications for Identifying Fabricated Memories

This body of work is the first to investigate both completely fabricated and partially memories. It is also the first body of work to systematically examine implications for attempting to detect memories of everyday events and memories of more emotionally salient events. Previous work investigating IFAMs has only tended to explore *entirely* IFAMs, ignoring the fact that often, as Sapir (1987), Vrij (2005) and results from this body of work suggest, fabricated information is offered within an almost entirely truthful narrative. Additionally, work that has investigated emotional or traumatic memories (Peace & Porter, 2011) has not tended to compare the efficacy of detection tools between emotive and everyday memories, therefore failing to suggest that differences may occur between memory types.

Results from the present work have shown striking differences in the way in which entire, partial and emotive fabricated and indeed, AMs are reported. Firstly, results have shown the entirely IFAMs of everyday events are associated with the most cues

enabling their distinction from AMs. In particular, they can be differentiated through the language used to describe them, through the way in which answers to specific questions are formulated and given and through specific phenomenological ratings such as vividness and the perspective through which they are experienced.

However, when a memory for an everyday event is partially fabricated i.e. a truthful event is recalled and subsequently edited, distinction from AMs becomes increasingly difficult. Many of the cues that were unique to a completely fabricated account are lost since the partial memory account is essentially truthful. When attempting to detect these sorts of memory, the most fruitful cues to investigate are the types of answers given to specific questions. When fabricating, participants were more likely to claim that their answers were the product of 'memory', and were less likely to admit a lack of memory or to guess answers. Additionally, truthful recallers may demonstrate that they are 'thinking' or 'remembering' using words such as "think" and "consider" in order to present themselves as careful, thorough rememberers.

Finally, it was found that when a partial lie of a more emotional / surprising event is recalled, cues for detection (or at least the cues investigated in the present work) are almost non-existent (again, assuming that the emotionality of the event was responsible for the change in the ways in which the memories were reported). This is possible due to a change in answering patterns from truthful recallers. Whereas previously, answer type had proven to be a useful tool for distinguishing AMs and IFAMs, when recalling an AM of a more salient event, participants increased their use of memory-based answers, thus rendering this method of differentiation ineffectual. This change in answer pattern is likely due to erroneously held beliefs about the way in which emotional events are encoded and recalled, causing truthful recallers to

incorporate more memory-based answers into their accounts and, in turn, causing a non-reliable difference between answer type categories.

Therefore, this work is the first to demonstrate that fabricating or indeed lying is not a single-faceted phenomenon. An IFAM can be an entirely fictitious story or can be an edition of the truth and this difference has been shown to dramatically alter the cues available for detection. Additionally, the event upon which the fabrication is based also needs to be considered, since, as has been demonstrated here, remembered emotional events seem to alter the topography of the memory account, rendering its detection using cues employed in the present work, essentially impossible. Over the course of five experimental studies investigating AMs and IFAMs, cues that have been reliable indicators of one memory type in one study have failed to be replicated in another, with some cues in some cases pertaining to AMs, in others to IFAMs. These huge variations in reliable indicators come before more ecological factors are taken into account such as the motivation the individual has to lie, motivation not to be caught, appraisal of the lie and necessity (or believed necessity) of the lie. For example, an individual highly motivated not conceal information may act and speak very differently to an individual who was not as highly motivated. Further, a very nervous individual may act and speak in a very different way to an individual seasoned at lying. Indeed, as Vrij (2008) notes, those lies that are appraised as being necessary or unimportant may not yield any emotionality and hence may not provide as many cues to detection as those lies that are appraised differently.

This work then, rather than revealing more potential cues for distinguishing truthful from fabricated memories, has shown the potential variability of such 'reliable' cues. Essentially, this work suggests that development of a 'checklist' of cues that can

reliably distinguish truthful from fabricated memories may be a fruitless task – the variability of cues, the individual differences and the differences of lie type itself seems to add an endless number of variables, each of which may affect cues in different ways.

9.7 Implications for Interviewing

Although this body of work has not explicitly investigated police interviewing procedures, the results gained can provide some interesting insights for the interviewing process. A central finding from this work highlights problems with *truthful* witnesses and is related to the types of answers participants gave to specific questions when being asked about a previously experienced event. The present work categorised each answer given with regards to its source (i.e. memory-based, inference etc.). Without these explicit source attributions, all answers provided by interviewees are presumed to be memory-based and are subsequently taken forward and incorporated into the memory account. As can be clearly seen from the results from this thesis, many answers provided are in fact products of guesses and inferences. These non-memory-based answers can be considered 'non-malicious fabrications', generated to fulfil answers to questions posed at interview.

To reduce the inclusion of such answers, interviewees must be explicitly reminded not to guess or infer when answering. Additionally each answer provided by a witness should be clarified as to its source to further reduce the inclusion of such answer types. Removing non-memory based answers reveals an account that is a produce of memory alone. Although memory is often incorrect and distorted, results from this body of work showed that removing all non-memory answers and leaving an account based solely on memory, saw a reliable increase in overall accuracy of the account.

Further, results from chapters seven and eight show that AMs and IFAMs are equally consistent over time (at least the short time frame sampled in the studies) such that information provided at time one was likely to be present and be the same (or at least similar) to information provided in time two. This finding is in direct opposition to much previous work (Peace & Porter, 2011; Walczyk et al., 2009) which states that fabricated information is reliably less consistent over time than truthful information. More work clearly needs to be conducted to investigate what effects substantial time delays could have on truthful and fabricated memory recall. Results showed that some participants were using a technique of recalling what was said in a previous interview rather than recalling the original AM or IFAM. Efforts should be made at interview one to elicit accurate and complete information as it seems that often, what is provided at this point informs much of the subsequent given information. Additionally, it may be necessary to phrase questions at time two differently or ask questions in an alternate order to prevent interviewees from simply recalling their answers from time one rather than accessing their memory. Alternating question structure may also be effortful for those providing fabricated information and may prevent them from also relying on memory of previously given answers.

9.8 Implications for Legal Settings

Results regarding beliefs about memory have particular implications for legal settings such as the courtroom. The finding that members of the public (at least those sampled in the questionnaire) hold many inconsistent and incorrect beliefs about the nature of human memory is problematic, particularly when jury members are urged to evaluate memory-based evidence using their common sense judgements (c.f. court of appeal cases). For example, the Memory-Accuracy-Detail (MAD) belief states that the more details are included in a memory account, the more likely it is to be rated as accurate. A jury could then be easily duped by an individual providing a fictitious

account simply through the inclusion of detail. Indeed, this process has been described by Bell & Loftus (1989) as 'trivial persuasion'.

Additionally, beliefs such as the Earliest-Memory-Overestimation (EMO) posit that memories can be formed in the preverbal period, despite prevailing research suggesting that memories are not formed until around the age of three. Such a belief has huge implications for the witness who is able to 'recall' a memory from under such an age. The belief also has implications for false memory syndrome whereby individuals claim to be able to recall memories from very young ages, as according to this belief, the existence of such memories would be accepted. Understanding such facets of memory may help reduce the formation of such false memories, or at least equip individuals with the knowledge and ability to question their veracity of their own and others' memory.

Strikingly, but not unsurprisingly, results also showed that approximately 90% of the public would be more likely to form both positive and negative judgements about a defendant in court based upon external characteristics such as dress, ethnicity and perceived class. Such results suggest that anonymity should be exercised in a courtroom setting, preventing the jury from seeing a defendant and, in turn, reducing the number of prior judgements made, both negative and positive.

Additionally, results regarding perception of lies highlighted that often individuals use cues to detect deception (at least in the lies they reported in the questionnaire) that have not been supported by scientific research or that have received little support. As noted previously, individuals also believe themselves to be comprehensive lie detectors, despite research showing that lay people perform no better than chance at detecting false information (Vrij, 2000). Therefore, the use of invalid cues to

deception coupled with an elevated belief of detection ability may lead to confident but incorrect evaluations of information.

Couple unfounded character judgements with erroneous beliefs about memory and the use of invalid indicators of deception, and the likelihood of a just and accurate appraisal of an individual's memory is significantly compromised. Clearly, those judging memory accounts need informing of current scientific research, allowing them to make more informed and accurate decisions about the veracity of memory reports.

9.9 Future Directions

Although results from the present body of work have yielded some important results and implications regarding the generation, reporting and detection of truthful and IFAMs, a number of avenues for further investigation have inevitably been opened.

Future work needs to investigate different types of fabricated information; it needs to consider that often, fabricated information is generated by simply editing episodic details from an AM. Current assessment tools are simply not suitable for assessing such memory types as they are designed only for detecting entire IFAMs. New assessment techniques such as the one outlined in this thesis need to be replicated and extended and must take into account the different ways in which fabricated information can be generated. Further, future research must also consider the type of event that is recalled. As shown here, more salient events in fact altered the way in which *truthful* narratives were recalled. More work needs to be completed to assess the differences and indeed similarities between truthful and IFAMs of emotional events. Work also needs to investigate the effects of time period between recall of both truthful and fabricated accounts. Findings from this study have been in opposition to previous findings regarding consistency, and this area of research could

benefit from clarification, especially considering that in applied situations, interviewees may have to recall their memories over multiple interviews and over long time periods.

Future work may also further findings from the memory questionnaire reported in chapter four. It is important to understand whether the beliefs held by the sample are universal and therefore whether the beliefs can be said to be influencing how memories (both truthful and fabricated) are reported. It would also be beneficial to understand how, or if, these beliefs differ across different populations – a particularly interesting line of inquiry may be beliefs children hold about memory – and different socio-economic groups.

9.10 Conclusions

This work has defined processes involved with IFAM generation, demonstrating for the first time that truthful autobiographical memory is often involved in the generation process. It has also attempted to define this process, showing that AMs are often consciously edited to generate IFAMs. It has shown how this process is effortful and how this difference in effort creates measurable linguistic and phenomenological differences in memory accounts. Further, this work has investigated both entire and partial fabrications, demonstrating how differently each type of IFAM is reported. It has also shown how more salient events affect recall and in turn make distinction between AMs and IFAMs almost impossible. Finally, this work has highlighted a number of erroneously held beliefs about memory and about lying, both of which are likely to have considerable consequences for the evaluation of memory reports.

In sum, this work represents a new investigation into IFAMs, furthering, extending but also critically assessing the existing literature and research. It is hoped that the

conclusions drawn from this body of work will lay the foundations for further work investigating truthful and fabricated memories.

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Appendices

Appendix I. Cues Used in Chapter two

Typed Condition (twenty cues)

1. Going to a restaurant
2. Attending a lecture
3. Getting up in the morning
4. Grocery shopping
5. Visiting a doctor
6. Going to see a film at the cinema
7. Playing sport
8. Going to a party
9. Making a hot drink
10. Cleaning the house
11. Going to the bank
12. Making a meal
13. Doing an exam
14. Getting a train
15. Going on holiday
16. Visiting a museum
17. Going to the hairdressers
18. Going to a nightclub
19. Taking a drive
20. Getting a bus

Spoken Condition (ten cues)

1. Going to a restaurant
2. Attending a lecture
3. Getting up in the morning
4. Going to see a film at the cinema
5. Going to a party
6. Going to the bank
7. Making a meal
8. Getting a train
9. Going on holiday
10. Going to a nightclub

Appendix II. Results from cue suitability survey, discussed in chapter two

Table I. Percentages of ease of ability to recall and imagine for each cue

	going to a restaurant	attending a lecture	getting up in the morning	grocery shopping	visiting a doctor	going to see a film at the cinema	playing sport	going to a party	making a hot drink	cleaning the house	going to the bank	making a meal	doing an exam	getting a train	going on holiday	visiting a museum	going to the hairdressers	going to a nightclub	taking a drive	getting a bus
RECALL																				
Easy	92	81	72	70	81	84	50	84	58	63	69	87	74	82	82	42	75	83	67	69
Neither	5	10	11	20	10	10	23	9	11	20	16	10	14	10	10	20	10	10	14	12
Difficult	3	10	16	10	9	6	27	7	31	17	15	3	12	7	8	37	15	7	20	18
IMAGINE																				
Easy	98	88	86	81	65	89	66	83	83	72	79	89	73	85	81	47	71	87	73	78
Neither	1	4	6	13	24	8	25	14	13	20	15	8	12	10	12	23	18	6	14	12
Difficult	1	8	8	6	11	3	10	3	4	8	5	3	15	6	6	30	11	6	13	10
Total 'easy' recall/ imagine %	190*	169*	158*	151	146	173*	116	167*	141	135	148*	176*	147	167*	163*	89	146	170*	140	147

* cue received top ten highest score of 'ease of recall and imagine', selected for use in spoken study .

Appendix III. Sixteen cues selected for use in chapter three

1. Going to a restaurant
2. Attending a lecture
3. Getting up in the morning
4. Grocery shopping
5. Visiting a doctor
6. Going to see a film at the cinema
7. Going to a party
8. Going to the bank
9. Making a meal
10. Doing an exam
11. Getting a train
12. Going on holiday
13. Going to the hairdressers
14. Going to a nightclub
15. Taking a drive
16. Getting a bus

Appendix IV. Questions and statements included in questionnaire from chapter four

Question/Statement
1. How accurate do you believe your own personal memories of your everyday life to be? (how well does what you remember represent what actually occurred)
2. In general, how accurate do you believe other people's memories of their own everyday lives to be?
3. How detailed are your memories for everyday events? (do you remember a lot of details about the place you where, who you were with or do you just remember the "gist" of what happened)
4. In your view, how detailed are other people's memories for everyday events?
5. Do you believe your memories of emotional events (e.g., weddings, funerals, tragic events such as 9/11) are more or less accurate than memories for everyday events?
6. Do you believe other people's memories of emotional events (e.g., weddings, funerals, tragic events such as 9/11) are more or less accurate than their memories for everyday events?
7. Bring to mind the first memory you have. What age are you in this first memory?
8. How accurate do you believe your first memory to be?
9. How detailed is your first memory?
10. In your view, what is the earliest age someone can have a memory from?
11. In your view, how accurate would someone's earliest memory be?
12. In your view, how detailed would someone's earliest memory be?
13. The more vivid a memory is, the more accurate it is
14. The more detailed a memory is, the more accurate it is
15. A memory stays the same over time, regardless of whether our opinions or attitudes changes over time.
16. A memory is like a snapshot of what we witness or experience - it is clear and accurate.
17. Some people have better memories for their personal life events than others.
18. If two people witness the same event, their memories will be almost exactly the same.
19. There is a limit to how much we can remember about our lives.
20. The more vivid a memory from childhood is, the more accurate it is
21. The more detailed a memory from childhood is, the more accurate it is
22. A witness describes their memory of a crime in a court room and is asked how confident they are that their memory is accurate. The witness is extremely confident that their memory is accurate. Please indicate how much you agree with the following statement: The more confident someone is that their memory is accurate, the more accurate the memory probably is
23. An individual is being interviewed about a very negative childhood event in court. They can remember many minor details from the event. This person is likely to be being truthful about what they can remember.
24. A witness is being interviewed in court about their memory for a crime. They say "I don't know" to a number of questions. Are they more likely to be a truthful or deceptive witness
25. A witness is being interviewed in court and answers every question posed to them. Are they likely to be a truthful or a deceptive witness?
26. If you were a juror and a witness came into court to give evidence, before you heard anything they had to say, are there any attributes that would make you more likely to trust their evidence?
27. If you were a juror and a witness came into court to give evidence, before you heard anything they had to say, are there any attributes that would make you more likely to distrust their evidence?

Note: unless otherwise stated responses options were a 7-point Likert scale e.g. a) completely inaccurate b) very inaccurate c) slightly inaccurate d) neither accurate nor inaccurate e) slightly accurate f) very accurate g) completely accurate. The measure was changed to reflect the content of each question.

Appendix V. Questions included in questionnaire for chapter five

Question/Statement	Response Categories
Section 1: A lie you told	
Was the lie an entire fabrication or based on real-life events?*	Entire fabrication, based on real life events
Was your lie challenged? If so, how did you respond to these challenges?	Continued to lie, challenged the challenged, changed the conversation, admit the truth, not challenged
What emotions did you feel when you were lying?	Nervous, guilty, upset, excited, scared, relief, nothing
Did you notice any physiological (bodily) changes when you were lying? If so, what were these?	Sweating/blushing, increased heart rate, fidgeting/shaking, feeling sick/uneasy, no changes
Did you feel that any aspect of your behaviour was giving the lie away? If so, what behaviour?	Facial expression, lack of eye contact, what was said or how it was said, acting different, looing nervous, no
Did you feel that any aspect of your language was giving your lie away? If so, which aspects of your language?	Vagueness, stuttering, taking too fast or too much, avoiding answering, change in tone, no
How confident were you that you were being believed when you were lying?	100% confident, very confident, quite confident, 50/50, quite unconfident, very unconfident, 100% unconfident
How did you feel immediately after you had finished lying?	Guilty, relieved, nervous, fine/normal, excited/good
Question/Statement	**Response Categories**
Section 2: A lie told to you	
Did you know that the information you were being told was false or did you presume it was?*	Presumed it was false, knew it was false
If you presumed that the information you were being told was false, why did you think this?	Behavioural cues, linguistic cues, contradictory information from another source, person known to be unreliable
Did you challenge the lie? If so, what did you do?	Yes – direct accusation, Yes – indirect accusation, no challenge
Did you notice any changes in the behaviour of the individual as they were lying to you? If so, what behaviour changed?	Facial expression, lack of eye contact, what was said or how it was said, acting different, looing nervous, no
Did you notice any changes in the language of the individual as they were lying to you? If so, what changed?	Emphasis on certain words, stuttering, taking too fast or too much, avoiding answering, change in tone, no

* dichotomous response category

Appendix VI. Deleted questions from deception questionnaire in chapter five

Section 1: A lie you told

What was the lie?

Who did you lie to?

How did you communicate the lie?

Section 2: A lie told to you

Who lied to you?

What was the lie?

How was the lie communicated to you?

Appendix VII. The War of the Ghosts

One night two young men from Egulac went down to the river to hunt seals, and while they were there it became foggy and calm. Then they heard war-cries, and they thought: "Maybe this is a war-party". They escaped to the shore, and hid behind a log. Now canoes came up, and they heard the noise of paddles, and saw one canoe coming up to them. There were five men in the canoe, and they said:

"What do you think? We wish to take you along. We are going up the river to make war on the people".

One of the young men said: "I have no arrows".

"Arrows are in the canoe", they said.

"I will not go along. I might be killed. My relatives do not know where I have gone. But you", he said, turning to the other, "may go with them."

So one of the young men went, but the other returned home.

And the warriors went on up the river to a town on the other side of Kalama. The people came down to the water, and they began to fight, and many were killed. But presently the young man heard one of the warriors say: "Quick, let us go home that Indian has been hit". Now he thought: "Oh, they are ghosts". He did not feel sick, but they said he had been shot.

So the canoes went back to Egulac, and the young man went ashore to his house, and made a fire. And he told everybody and said: " Behold I accompanied the ghosts, and we went to fight. Many of our fellows were killed, and many of those who attacked us were killed. They said I was hit, and I did not feel sick".

He told it all, and then he became quiet. When the sun rose he fell down. Something black came out of his mouth. His face became contorted. The people jumped up and cried.

He was dead.

Appendix VIII. Burglar / Buyer Transcript

The two boys ran until they came into the drive.

“No one is ever in one Wednesdays, it’s a great time to skip school”, said Andrew. Tall conifers hid the house from the road and the pair walked across the large front gardens.

“I didn’t know your house was so large,” said Matthew.

“Thanks. It’s much better now though because Mum and Dad had the gardens landscaped and added a new kitchen” said Andrew.

There was a large wooden front door, and a smaller side door. The boys ran around to the side door. It lead to a garage that could easily hold two cars but currently only contained two mountain bikes and a vast array of interesting but unusual tools. They continued through the garage. It lead into a large modern kitchen. Andrew told Matthew that this side door was always left open in case him or his sister had forgotten their keys and returned home before their parents.

“Can you give me a tour?” asked Matthew. Andrew agreed, first showing the newly pained and decorated front room, it was modern but contained many antiques. Matthew thought they must be old and expensive. Andrew turned on the large stereo and bragged how he could play it loudly as the nearest house was quite far away. Matthew suddenly realised that the house was not overlooked at all, in fact he couldn’t even see the nearest neighbour.

The boys walked quickly through the enormous dining room, the table was laid with beautiful crockery and cutlery, Matthew was surprised at the grandeur. Andrew decided not to show Matthew the cellar. Not only did it spook him but it was rather musty and damp after a flood the previous year.

The boys ran upstairs and peered into Andrew’s mother’s study. The walls were lined with old books and a number of paintings, some of which Matthew recognised, were hung on the walls. “Some of those are originals, you know,” said Andrew.

The pair continued onto the bedrooms. They entered Andrew’s parents’ bedroom, where he showed Matthew the safe in which his parents kept money. “My Dad doesn’t like using banks”, said Andrew. Matthew couldn’t help but notice the dressing table. It was laden with jewels and gold; it glittered as the sun shone in through the large bay window.

There were another four bedrooms upstairs but Andrew only went in his own room. Matthew was excited by the three computer consoles and the huge number of computer games his friend owned. He was quite surprised at the décor upstairs though, it was much more dated than downstairs, and was quite in need of updating – a big job, thought Matthew.

Appendix IX. Participant instructions given in chapter six

Truthful Condition

Welcome to the second half of the experiment. In this session you will be interviewed about the activities in which you took part during the first testing session a number of days ago. We would like you to imagine yourself as a witness to these events and to act as a real witness would.

The first half of the interview will be a free recall session where you can provide an account of what you did during the test session. The second half of the interview will consist of direct questions about specific details of the session.

You will be interviewed by a researcher who knows only that you took part in two psychology tests.

Please bear in mind the following guidelines when taking part in the interview:

- You should recall as much information about the first testing session as possible.
- Please be as accurate as possible in your recall. However, it is important that you **do not guess** any details of which you are unsure or cannot remember clearly.
- It is acceptable to say that you do not know or that you cannot remember.

Fabricated Condition

Welcome to the second half of the experiment. In this session you will be interviewed about the activities in which you took part during the first testing session a number of days ago. We would like you to imagine yourself as a witness to these events and to act as a real witness would.

The first half of the interview will be a free recall session where you can provide an account of what you did during the test session. The second half of the interview will consist of direct questions about specific details of the session. Please note that you are permitted to say you do not know if you cannot think of an answer.

You will be interviewed by a researcher who knows only that you took part in two psychology tests.

However, we would like you to provide a <u>plausible but incorrect</u> account of what you did, where you were and what the room was like. Your job is to convince the interviewer that your fabricated story is in fact true.

Appendix X. Interview script used in chapter six

Welcome to the interview. Please take a seat. I am going to ask you a number of questions about what you did in the test session a few days ago.

1. Please begin by telling me about everything that you did in the test session.
2. Thank you. Do you wish to add anything else?

I am now going to ask you a number of specific questions about the test session.

1. Where was the test session?
2. When was the test session?
3. What you were wearing during the test session?
4. What was the weather like during the test session?
5. What time of day did you take part in the test session?
6. How long did the test session last?
7. How many researchers were in the room?
8. What was researcher(s) wearing?
9. What gender was researcher(s)?
10. How tall was researcher(s)?
11. What colour hair did researcher(s) have?
12. What length hair did researcher(s) have?
13. What colour eyes did researcher(s) have?
14. What age was researcher(s)?
15. Was the researcher(s) left or right handed?
16. Was the researcher(s) wearing any jewellery?
17. What ethnicity was the researcher(s)?
18. I was told that you were tested with a group of people
19. How many?
20. What were their genders?
21. What were their ages?
22. What were they wearing?

23. Please can you now draw me the room in which you were during the test session? Please indicate where you sat and any surroundings you noted whilst you were there.

Thank you for taking part, you have answered all the questions.

Appendix XI. Participant instructions used in chapter seven

Truthful Condition

In the next two sessions you will be interviewed about the events that took place in today's test session. We would like you to imagine yourself as a witness to these events and to act as a real witness would.

The first half of the interview will be a free recall session where you can provide an account of what you did during the test session. The second half of the interview will consist of direct questions about specific details of the session.

You will be interviewed by a researcher who knows only that you took part in two psychology tests.

Please bear in mind the following guidelines when taking part in the interview:

You should recall as much information about this first testing session as possible.

Please be as accurate as possible in your recall. However, it is important that you do not guess any details of which you are unsure or cannot remember clearly.

It is acceptable to say you cannot remember.

Fabricated Condition

In the next two sessions you will be interviewed about the events that took place in today's test session. The interviewer will know that you were in a test session but will only know that you took part in psychological testing. Therefore, your job is to give a **plausible incorrect** account of what you did.

HOWEVER: We would like you to **ONLY** give deliberately incorrect information about the following:

- All aspects of the researcher (the researcher was the person who ran the first session)

Please note that you are permitted to say you do not know if you cannot think of or recall an answer.

Appendix XII. Word lists used for part one of the Deese-Roediger-McDermott (DRM) test

List 1	**List 2**	**List 3**	**List 4**	**List 5**	**List 6**
Table	Hill	Thread	Smooth	Bed	Sour
Sit	Valley	Pin	Bumpy	Rest	Candy
Legs	Climb	Eye	Road	Awake	Sugar
Seat	Summit	Sewing	Sandpaper	Tired	Bitter
Desk	Top	Sharp	Jagged	Dream	Taste
Recliner	Molehill	Point	Ready	Wake	Tooth
Cushion	Peak	Prick	Course	Snooze	Honey
Swivel	Glacier	Haystack	Uneven	Doze	Soda
Stool	Bike	Hurt	Rugged	Slumber	Chocolate
Sitting	Climber	Injection	Sand	Snore	Heart
Rocking	Range	Syringe	Ground	Nap	Cake
Bench	Steep	Knitting	Gravel	Yawn	Pie

Appendix XIII. Words list used in part two of the Deese-Roediger-McDermott (DRM) test

Critical lures (those closely related to, but not presented in previous lists) are underlined.

List 1	**List 2**	**List 3**	**List 4**	**List 5**	**List 6**
Table	Anchor	Coffee	Lamp	Bed	Nice
Sofa	Hill	Bear	Gravel	Blanket	Sour
Butterfly	Plane	Thread	Key	Hole	Good
Wood	Steep	Yoga	Tough	Peace	Tail
Bench	Goat	Knitting	Science	Health	Pie
Candle	Hand	Juice	Smooth	Yawn	Staple
Chair	Mountain	Needle	Rough	Sleep	Sleep

Appendix XIV. Participant reminder instructions used in chapter seven

Truthful Condition

In this and the next session you will be interviewed about the events that took place in the first test session. We would like you to imagine yourself as a witness to these events and to act as a real witness would.

The first half of the interview will be a free recall session where you can provide an account of what you did during the test session. The second half of the interview will consist of direct questions about specific details of the session.

You will be interviewed by a researcher who knows only that you took part in two psychology tests.

Please bear in mind the following guidelines when taking part in the interview:

- You should recall as much information about this first testing session as possible.
- Please be as accurate as possible in your recall. However, it is important that you **do not guess** any details of which you are unsure or cannot remember clearly.
- It is acceptable to say you cannot remember.

Fabricated Condition

In this and the next session you will be interviewed about the events that took place in the first test session. The interviewer knows that you were in a test session but only knows that you took part in psychological testing. Therefore, your job is to give a **plausible incorrect** account of what you did.

HOWEVER: We would like you to **ONLY** give deliberately incorrect information about the following:

- All aspects of the researcher (the researcher was the person who ran the first session)

Please note that you are permitted to say you do not know if you cannot think of or recall an answer.

Appendix XV. Interview script used in chapter seven

Welcome to the interview. Please take a seat. I'm going to ask you a number of questions about what you did in the test session a few days ago.

1. Please begin by telling me everything about what you did in the test session.
2. Thank you. Do you wish to add anything else?

I'm going to ask you a number of specific questions about the test session.

1. Where was the test session?
2. When was the test session?
3. What you were wearing during the test session?
4. What was the weather like during the test session?
5. What time of day did you take part in the test session?
6. How long did the test session last?
7. How many researchers were in the room?

    Experimental Subset
    a. What was researcher(s) wearing?
    b. What gender was researcher(s)?
    c. How tall was researcher(s)?
    d. What colour hair did researcher(s) have?
    e. What length hair did researcher(s) have?
    f. What colour eyes did researcher(s) have?
    g. What age was researcher(s)?
    h. Was the researcher(s) left or right handed?
    i. Was the researcher(s) wearing any jewellery?
    j. What ethnicity was the researcher(s)?

8. Were there any other people in the room?
9. How many?
10. What were their genders?
11. What were their ages?
12. What were they wearing?

13. Please can you now draw me the room in which you were during the test session? Please draw where you sat and any surroundings you noted whilst you were there.

Thank you for taking part, you have answered all the questions.

Appendix XVI. Initial survey used in chapter eight

A woman entered the room during your test session. The following questions will be regarding this woman and her purpose for being in the room

Control Subset

1. What was the individual's hair colour?
2. What was she wearing?

Experimental Subset

3. What did she require the use of the room for?
4. When did she need the room?
5. Why did the women think she was booked to be using the room?

The following questions will be regarding the conversation that entailed between your researcher and the woman

6. How much longer did your researcher say she required the room for?
7. How did the woman refer to the researcher's behaviour - did she use any specific words?
8. Who did your researcher claim had given her permission to use the room?
9. How long did your researcher claim she thought the room was free for?
10. Did either woman apologise to each other?

Appendix XVII. Questionnaire used in sessions two and three in chapter eight

You will now be required to answer a series of questions about the study you took part in last week. If you are unsure on an answer to a question please answer 'Don't know'. Do not guess. Please do not refer to any diaries or discuss the answers with anyone.

Control Subset

1. What time did the session last week take place?
2. What date did the session take place?

The following questions are regarding the researcher (this is the individual who took you for your memory test in session one).

3. What hair colour did the researcher have?
4. What eye colour
5. How tall was the researcher?
6. What was the researcher wearing?

A woman entered the room during your test session. The following questions will be regarding this woman and her purpose for being in the room

7. What was the individual's hair colour?
8. What was she wearing?

Experimental Subset

9. Why did she require the use of the room?
10. When did she need the room?
11. Why did the woman think she was booked to be using the room?

The following questions will be regarding the conversation that entailed between your researcher and the woman

12. How much longer did your researcher say she required the room for?
13. How did the woman refer to the researcher's behaviour - did she use any specific words?
14. Who had given your researcher claimed gave her permission to use the room?
15. How long did your researcher claim she thought the room was free for?
16. Did either woman apologise to each other?

Appendix XVIII. Condition assignment information – truthful condition

You are participant number: **.** Please use this unique number in all fu sessions and correspondence with the researcher.

In today's session you witnessed a staged event in which a disagreement took place regarding a room booking - the individuals involved in the event were acting.

You will shortly be asked to answer a short questionnaire in which you will be asked today's session.

In the questionnaire you are completing today, and the subsequent two online questionnaires, you will be asked about the events that took place today. You are required to be as accurate and truthful as possible when answering the questions. Please ensure that you do not guess answers. You may answer with don't know or cannot remember.

In the next two sessions, you are required to complete online questionnaires in which you will be asked questions regarding the session today and the staged event that occurred.

Session two will take place in approximately one week's time. You must complete the study on one of the following three days: *xx/xx/xxxx*. Session two will occur a further two weeks after this, on one of the three following days: * xx/xx/xxxx *. An email reminder will be sent to you the day before the first date of each session to remind you.

Appendix XIX. Condition assignment information – continual-fabricate and fabricate-subsequent-truth condition

You are participant number: **.** Please use this unique number in all future sessions and correspondence with the researcher.

In today's session you witnessed a staged event in which a disagreement took place regarding a room booking - the individuals involved in the event were acting.

You will shortly be asked to answer a short questionnaire in which you will be asked today's session.

In the questionnaire you are completing today, and the subsequent two online questionnaires, you are required to lie about the details regarding today's test session. In particular, we would like you to give deliberately fabricated information about the individual who interrupted your session and the argument that ensued.

In the next two sessions you are required to complete online questionnaires in which you will be asked questions regarding the session today and the staged event that occurred.

Session two will take place in approximately one week's time. You must complete the study on one of the following three days: *xx/xx/xxxx*. Session two will occur a further two weeks after this, on one of the three following days: *xx/xx/xxxx*. An email reminder will be sent to you the day before the first date of each session to remind you.

Appendix XX. Altercation transcripts used in chapter eight

Session 1

11am 18th Nov

L: Hi how come you're here I'm supposed to be teaching here today

R: I'm just doing one of my tests I'll only be about 10 minutes

L: Right have you not looked on the online booking system? It's a bit irresponsible.

R: My supervisor Catriona said it would be free all day

L: No this room is never free all day. Make sure you look on the online booking system before you use the room next time, it's very irresponsible.

R: I'll literally be as fast as I can, I'll only be 10 minutes

L: Ok we'll I've got to do some photocopying anyway but I want this room free in 10 minutes.

R: Ok.

Session 2

23/11/2011

12pm

L: Hi what are you doing in this room I'm supposed to be teaching here in 10 minutes

R: I'm just doing a study but literally be finished in like 10 minutes

L: Right have you not looked at the online booking system it's a bit irresponsible

R: My supervisor Catriona said it was free all day this room

L: No this room is never free all day. Make sure you look on the online booking system before you come here next, it's really irresponsible.

R: Ok well we'll literally just be 10 minutes I'll be finished as fast as possible

L: Ok well I've got to go and do some photocopying anyway but I'll be back in 10 minutes.

R: Ok thank you.

Session 3

12pm 24/11/2011

L: Hi what are you doing in here I'm supposed to be teaching now

R: I'm just doing a study I'll literally be 10 minutes

L: Have you not checked the online booking system, this is a bit irresponsible

R: My supervisor Catriona said it would be free all day

L: No this room is never free all day you need to check the online booking system next time, this is really irresponsible

R: Ok well I'll literally be as fast as I can I'll be done in 10 minutes

L: Ok well I've got to go and do some photocopying anyway so I'll be back in 10 minutes.

R: Ok

Session 4

24/11/2011

1pm

L: Hi what are you doing in here I'm supposed to be teaching now

R: I'm just doing a study I'll literally be like 10 minutes

L: Right have you not looked at the online booking system this is a bit irresponsible

R: Erm my supervisor Catriona said that this room would be free all day

L: No it's never free all day you should check the online booking system before you use the room this is really irresponsible

R: Ok well literally I'm just finishing I'll be 10 minutes

L: Right I've got to go and photocopy anyway so I'll be back in 10 minutes

R: Ok.

Session 5

28/11/2011

10am

L: Hi how come you're in here I'm supposed to be teaching in 10 minutes

R: I'm just doing a study but I'll literally be like 10 minutes

L: Have you not checked the online booking system this is a bit irresponsible

R: Well I asked my supervisor Catriona and she said that it would be free all day

L: No this room is never free all day this is really irresponsible

R: Ok well like we're literally like 10 minutes then we'll be finished

L: Ok well I've got to go and do some photocopying anyway so I'll be back here in 10 minutes

R: Ok

Session 6

28/11/2011

1pm

L: Hi how come you're in here I'm supposed to be teaching here now

R: I'm just I'm just in the middle of a study but we'll be like 10 minutes

L: Right have you not checked the online booking system, this is a bit irresponsible

R: My supervisor Catriona say that this room would be free all day so I should just use it

L: No this room is never free all day you should check the online booking system before you come in the room this is really irresponsible

R: We'll be as fast as we can it'll be no more than 10 minutes

L: right well I'll go and do some photocopying but I'll be back in 10 minutes

Session 7

29/11/2011

12pm

L: Hi why are you in here I'm supposed to be teaching here now

R: I'm just doing a study but I'll just be 10 minutes

L: Right have you not checked the online booking system, it's a bit irresponsible

R: Erm well my supervisor Catriona said that this room would be free all day

L: No this room is never free all day you need to check the online booking system before using the room this is really irresponsible

R: Ok well we'll be as fast as we can literally like 10 minutes

L: Ok well I've got to do some photocopying anyway so I'll be back in 10 minutes

Session 8

02/12/2011

11am

L: Hi what are you doing in here I'm supposed to be teaching now

R: Erm well I'm just doing a study but we'll literally just be like 10 minutes

L: Did you not check the online booking system this is a bit irresponsible

R: No I didn't but my supervisor Catriona said that this room would be free all day today

L: No this room is never free all day you need to check the online booking system before you use these rooms this is really irresponsible

R: Right we'll literally be as fast as we can like 10 minutes

L: Ok well I've got to do some photocopying anyway so I'll be back in 10 minutes

R: Right I'm really sorry