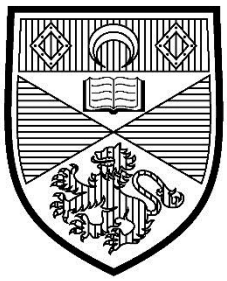
Life-story narratives, chapters, and depression

Kate Smith



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at the

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"Life is not what one lived, but what one remembers and how one remembers it in order to recount it."

Gabriel Garcia Marquez

Abstract

The structure of life-story narratives and their component chapters is of central importance to the cognitive representations and communication of autobiographical memory. While evidence points to the hierarchical role of chapters in autobiographical summations and abstractions of periods of time, and life-time periods feature as a fundamental characteristic of the most prominent model of autobiographical memory, few researchers have attempted to examine their existence as unique units of representation, and their impact on the recall of episodic events. The present thesis sets out to establish the nature of life-stories using established methods for life-story narrative and chapter elucidation and a novel paradigm for examining memory recall from within chapters. It does so by contrasting the impact of life story chapters for people with depression against non-depressed groups, and in doing so finds evidence for chapters acting as affective schema for autobiographical periods, and access to episodic events, with an overall raised access for incongruent event representations. The findings of this thesis also indicate that narrative disorder in depression is not reliably present (Studies one and two) and that chapters, while more negative in tone (Studies two and three), may not be structurally different for dysphoric narratives compared to control groups (Study two). The schematic role of chapters in the recall of episodic memories, indicates a tendency in depression to display a negative bias in dissonance reduction between negative chapters and positive events (Study four).

This thesis provides evidence that depression is linked to a negative bias in the higher-order chapter level of autobiographical memory, and that due to dissonance reduction processes, and the rehearsal of affectively congruent event-based representations, people with depression may have reduced access to positive material which would be used in mood repair and the creation of positive variation to their life-stories by drawing on specific events.

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I want to thank my family, Mum, Dad, (Dr) Emily and Joe, for whom success is always being true to yourself and happiness is a given. Finally, my partner, Vincent, and our two fabulous children Gabriel and Max – love you guys!

Contents

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Glossary of Abbreviations

ABM	:	Autobiographical Memory
AMT	:	Autobiographical Memory Test
BDI	:	Beck Depression Inventory
BSM	:	Basic Systems Model
CaRFAX	:	Capture and Rumination, Functional Avoidance and eXecutive control
CBT	:	Cognitive Behaviour Therapy
CES	:	Centrality of Events Scale
MDD	:	Major Depressive Disorder
DSM	:	Diagnostic Statistical Manual of the American Psychiatric Association
HADS	:	Hospital Anxiety and Depression Scale
NART	:	National Adult Reading Test
OGM	:	Over-General Memory
PHQ	:	Patient Health Questionnaire
PTSD	:	Post-Traumatic stress disorder
RIF	:	Retrieval Induced Forgetting
SCID	:	Structured Clinical Interview for Diagnosis
SMS	:	Self-Memory System
TEMPau	:	Test Episodique de Mémoire du Passé Autobiographique
MEQ	:	Memory Experiences Questionnaire

Chapter 1 Autobiographical memory and life-stories

1.1 Autobiographical memory

This thesis focusses on the influence autobiographical life-story structures have on the recall of autobiographical memories. Further to this, it examines how depression impacts on these effects. This literature review comprises two chapters, the first giving an overview of our current understandings of the autobiographical memory system. It goes on to link the autobiographical memory system with the concept of the life-story schema, and how component life-story chapters could influence recall of specific, event-based memories. In the second introductory chapter theory and research will be examined which provides evidence for how depresso-typic self-schema in the form of life stories could impact on autobiographical memory.

Since the early explorations of learning and forgetting by Ebbinghaus (1885) autobiographical memory has undergone periods of examination and argument in terms of definitions, phenomena, structure and function. Early researchers included Galton, (1883) who carefully described and categorised his own memory experiences, and developed a standard protocol for memory cueing. But also Freud who used naturalistic observation and theory-building to infer memory processes, in particular the process of repression and intentional forgetting of events to reduce anxiety and distress (Tambling, 2012). In 1972 Endel Tulving significantly progressed the understanding and definitions of autobiographical processes by coining the terms ‘episodic’ memory (to denote memories representing specific experiences which had occurred to the person) and ‘semantic’ memory (facts which are remembered independent of the origin of learning or experience) to represent the two forms of declarative memory i.e. autobiographical information that can be brought to conscious awareness. Episodic memory is by definition autobiographical, being memories of events which happened to the person, but while semantic memory may be information based, it can also involve information pertaining to the self and therefore may also be autobiographical. Tulving also introduced the concept of ‘autonoetic consciousness’ to describe the

phenomena, associated with episodic memory, of consciously re-experiencing events on recall (Tulving, 1985), the feeling of being there which is associated with sensory detail and the ability to 'remember' rather than simply 'know' an event has occurred (Rajaram, 1993). These early distinctions are still influential in deciding the manner in which autobiographical memory is researched, and to some extent have resulted in memory types being categorised in ways which underplays the overlap and links between them. For example any particular memory can involve a range of representations, affective, and semantic links, this is never more apparent than when examining autobiographical memory representations which comprise the consciously available, semantic, and episodic memory relating to the self.

1.1.1 Functions of autobiographical memory

The functions of autobiographical memory have been explained by a range of different models, each giving explanations for the ability to recall, (with varying levels of detail), past events and information about the self. These are proposed to include, *directive functions* e.g. problem solving, where memory serves to inform on how situations have been dealt with in the past (Bluck, 2003; Vandermorris, Sheldon, Winocur, & Moscovitch, 2013), *social functions*, e.g. retention of knowledge of social situations and relationships, and the use of descriptions of personal experience to connect with others (Bluck, 2003), and *identity functions* e.g. maintaining an ongoing sense of self (Conway, Singer, & Tagini, 2004; Conway, 2005; Cox & Barnier, 2013; Prebble, Addis, & Tippett, 2013), a final fourth function was proposed by Williams, Conway and Cohen (2008) who highlighted the *adaptive function* of memories in maintaining or adjusting mood, by recalling pleasant events, or by using information from positive memories to enable the prediction of positive future events.

Table 1.1: Key terms in autobiographical memory

Theme	Term	Definition
Autobiographical memory	Semantic	*Memory for knowledge or facts which may be independent of context*
	Episodic	*Memories for specific one-off events, usually containing sensory information such as visual, auditory and olfactory representations*
Self-memory system	Working self	*The theoretical structure which guides memory access according to current goals, maintaining coherence by modulating access to episodic memories, and impacting on encoding and consolidation of event-memories*
	Conceptual self	*The theoretical structure which guides memory access according to beliefs of self and identity*
	Life-time periods	*Theoretical clusters of autobiographical memory, including semantic information, general and extended events, and episodic memories*
	General events	*Categorical and repeated events which may have overarching scripts for what occurs*
	Extended events	*Memory for periods lasting longer than 24 hours which are interconnected by common themes or information e.g. writing a dissertation*
	Episodic memories	*Sensory-perceptual, often visual, with autonoetic characteristics, representations of specific, single autobiographical events*
Retrieval processes	Generative	*Episodic memory recall resulted from a cueing event. Thought to be a progression through general to specific representations*
	Direct	*Spontaneous or cued recall which accesses event episodic knowledge without progressing through stages of increasing specificity*

This table provides definitions of the key terms introduced in this thesis and used in autobiographical memory research

1.1.2 Models of autobiographical memory

Theoretical models of the autobiographical memory system include the Self-Memory System (SMS) first outlined by Conway & Pleydell-Pearce (2000), and the Basic-Systems Model (Rubin, 2006). The SMS is widely accepted in the literature, and theoretically useful in that it accounts for variability in the recall of memories depending on current goals and self-identity (Conway, 2005); memory deficits of people experiencing mental health problems (Hermans, Defranc, Raes, Williams, & Eelen , 2005; Williams, Barnhofer, Crane, Hermann, Raes, *et al*, 2007); and the role of narrative accounts and narrative identity as both the product and the foundations to memory maintenance (Conway, 2005; Singer, Blagov,

Berry, & Oost, 2013). The SMS provides many of the descriptive terms used in autobiographical memory theory and research found in Table 1.1. The BSM provides a systematic explanation for the functioning of the autobiographical memory system based on established cognitive systems, i.e. unlike the SMS it does not require a separate representational system within memory, but proposes that a narrative 'self-schema' which is built around established links between information systems provides structure to the system, and hence is reliant to a greater extent on the ability to form an ongoing narrative identity.

The *self-memory system (SMS)* proposed by Conway and Pleydell-Pearce (2000) is a theoretical structure composed of tempero-linear, hierarchically-structured *autobiographical knowledge base*, *working self*, and the *conceptual-self*. The autobiographical knowledge base contains collections of abstracted self-knowledge which incorporate autobiographical memories along with social knowledge, and schema for typical events. The *working-self* is a goal-directed construct which allows the prioritisation of information relating to current needs and motivations. The *conceptual-self* is a model of current self-perceptions, and is thought to bias recall in favour information that does not challenge this (Conway, 2005; Hudson & Grysman, 2011; Moulin & Rathbone, 2014). The recall of information from the SMS is thus goal-focussed in that the current priorities are favoured for access, and self-continuous in that it favours access to material which is congruent with self-perception. It has been proposed that the SMS does this through a dissonance reduction process with the subconscious decreasing access of memories which do not concord with self-image and goal, or distorting the memories of events in order to maintain coherence (Conway, 2005; Pasupathi & Oldroyd, 2015).

The structure of the SMS knowledge base clusters information according to: i) *lifetime periods*, which contain information about personal activities, situations and goals at specific times of life, for example, 'my doctoral studies'; ii) *general events* which are categorical and repeated events which may have overarching scripts for what occurs (Barsalou, 1988), for example, 'going to the beach', iii) *extended events* (Burt, Kemp, & Conway, 2003; Haque and Conway, 2001) which comprise sequenced events, such as 'my holiday in France' which are shorter, and potentially less significant, than life-time periods, and iv) *specific events* which are short and phenomenologically-rich cognitive experiences, for example, 'when I climbed the Eiffel tower' (Rubin, 1982; Schooler & Herman, 1992). Episodic memories which comprise these specific events are thought to be a separate memory

system from the autobiographical knowledge base because of the functional separation shown in cognitive deficits such as semantic dementia (Hodges & Graham, 2001). Overall, therefore, the SMS exists as a largely semantic information base but gives access to event specific knowledge in the form of episodic memories, which are sensory-perceptual, and usually visual in nature (Brewer & Rubin, 1996).

This clustered, or hierarchical, nature of memory representation has been explored both in terms of generative retrieval from the recall of general to specific events, and event 'tagging' and its priming effect. Haque and Conway (2001) examined the stages of generative retrieval, where participants were 'paused' at different stages of recall, and asked to describe their cognitive experience in order to explore the temporal process of cued recall. During generative retrieval (as opposed to direct retrieval), there was a clear progression from a general event level to the location of specific events supporting a progressive sampling model. The theoretical hierarchy within the SMS incorporates 'vertical' links between life-time periods and episodic memories and has been explored using the concept of 'tagging' or categorisation of episodic memories according to life-time periods, including studies which require participant judgements of temporal position of events (Skowronski, Ritchie, Walker, Betz, Sedikides, *et al*, 2007), the temporal sequencing of recall of specific memories (Burt, Kemp, & Conway, 2003; Betz & Skowronski, 1997), and the impact of priming cues on recall (Ball & Hennessey, 2009)

Temporality judgments for when events occurred is facilitated by priming with information on lifetime periods suggesting that contextual information is closely tied with specific episodic memories. Skowronski and colleagues (2007) used the concept of 'life-era' to explore the ability to judge the temporal sequence of specific event memories which had been recorded over five and a quarter years by 39 undergraduate students. Life–eras included semesters of education and summer breaks, so could be considered 'extended events' within the SMS. They found that participants took significantly longer to judge the temporal order of events from within era than those from adjacent eras, independent of the actual time between the events. This suggests that event memories have a 'tag' which places them within life-time periods, and that it is this tagging which facilitates temporal judgements. What this also suggests is that lifetime period creation is, at least partially, guided by socio-cultural understandings, framed as they were as standardised, and shared, timeframes.

A number of other studies examining retrospective categorisation of memories indicate that a hierarchical thematic structure is used to order events. In their diary study Burt and colleagues (2003) gave participants the experimental task of categorising memories drawn from diary records of a three-month period, or visual images of 'events' during the same period. Their results indicate that both for memories and for visual images of events, clusters of instances were ordered by theme, rather than simply temporality and 'events' were more likely to span more than one day. What this suggests is that episodic memories, which are single events of less than 24 hours, are not the key to cognitive ordering of autobiographical events, and that even interpretations of single events do not tend to map to single episodic memories, but may rather contain a 'set' of images and experiences.

Evidence for the structural role of both life-time periods and general events in estimating personal age of specific childhood memories was also seen in a study which asked participants about their inferential strategies on estimating their own age during childhood events (Arbruthnott & Brown, 2009). On examination of the inference strategies reported by 31 participants for both the primary and secondary mention of what information was being used 52.6% of primary reports used a mix of landmark events and life-time periods, 25.9% used general events, while subsequent information was drawn more from event-specific knowledge (54.6%). This indicates that life time periods are favoured as important markers, or tagging information for childhood memories, rather than the use of general events, and are often used as the point of entry in to the autobiographical memory store (as was suggested by Conway and Pleydell-Pearce (2000) in the SMS). In support of hierarchical priming a study by Conway and Bekerian (1987) used life-time periods, and life-history events defined by undergraduate participants to prime memories cued by activity, action and object cues. Memories were recalled under primed and non-primed conditions and results indicate that priming with personally defined periods significantly shortened recall time. Similarly, Mace and Clevinger (2013) compared performance of memory recall using life-time period cues, their results indicate that cued recall of memories for a particular period acts to prime other memories from this period in free recall tasks. This shows that memories for particular life-time periods mutually activate memories from the same life-time period, i.e. horizontal priming.

Evidence for the categorisation of memories in to life-time periods has thus been obtained by the vertical (life-time periods prime recall of constituent memories) and

horizontal priming (memories from a single life-time period prime memories from the same period). Supporting the structural hierarchy proposed for the SMS, however these results can also be explained by another, somewhat less well-known model of autobiographical memory.

In contrast to the internally fixed model of the SMS, where variability of recall is attributed to processes influenced by self-concept and current goals, but that a temporally stable hierarchical structure frames information, the Basic Systems Model (BSM) (Rubin, 2006) explains autobiographical retrieval as being an essentially constructive processes, and representation of past events as more fluid than the SMS. This model proposes that associations between pre-existing information systems allow the creation and recreation of autobiographical memory experiences without calling for a memory store, and that memories are created *in situ* as a result of associations rather than fixed links. The BSM also provides explanations for memory experiences in emotional disorders (Rubin, Dennis, & Beckman, 2011; St Jacques, Botzung, Miles, & Rubin, 2011), and the impact of motivational states and goal-directed behaviour (Rubin, Schrauf & Greenberg, 2003).

In essence, Rubin proposes that autobiographical memory is enabled by three neurological systems, the hippocampus which facilitates the binding of information from the event itself, which will ultimately be recalled; the amygdalic system which co-ordinates the binding and re-binding of information as a result of the emotional content, and the frontal cortex which, in response to cues, will lead the search and retrieval process, and locate components relevant to the task while simultaneously inhibiting others (Moscovitch & Melo, 1997; St Jacques, *et al*, 2011). Once retrieved the visual areas of the frontal cortex may maintain and elaborate memories which can then be experienced as episodic memories. Thus different information, or 'kinds of memory' will be retrieved depending on cues and motivational state.

While in its early stages of development, this explanatory model functionally separates the encoding of memories (an area somewhat neglected by the SMS) with the process of reconstructive recall, which allows changes to occur in the related elements of a memory experience. Rubin proposes that each autobiographic memory is composed of elements of information, including systems which support olfaction, spatial imagery, language, motor output, explicit memory, emotion, narrative, and search and retrieval. Each

of these systems can be considered ‘stand alone; in that they have neural substrates, processes, structures and characteristic schemata.

The Basic Systems Model allows for the construction of different autobiographical-like experiences, including future imagining, false-memories and intrusive or ‘flashback’ memories. It also presents the ‘self’ as a fluid system related to the available information. In contrast the Self-Memory System (Conway & Pleydell-Pearce, 2000), presents autobiographical memory as a more coherent structure, with a fluidity of self-knowledge being reliant on current goal-directed demand, and suggests that links between the information comprising memories are stable.

The BSM requires no fixed hierarchical structure to enable recall, and thus does away with the requirement of memories to be theoretically categorised, for example in to semantic, general, and specific. The role of temporally structured narratives are considered by Rubin to provide a key schema through which information is linked to create a sense of self-identity. This difference, that the SMS suggests an indirect role of narrative in memory re-construction, for example through its role in narrative identity, while the BSM allows for direct influence of narrative schema in the creation of system-links and reconsolidation processes, underlies the perceived role of culture and society, and interactions with others in autobiographical memory.

To some extent rehearsal is predicted by both models to impact on subsequent recall. In the BSM rehearsal can increase activation of memory components associated with recall, and also therefore other memories with overlapping components e.g. those with associated narratives, similar sensory details, or contextual information. The SMS would predict that memory recall would raise the availability of memories with overlapping information, but that this would be influenced by the SMS structure itself, for example, the life-time period in which the memory is recalled might be overall, raised in activity, and this would account for the results of life-period priming research. Ultimately, however, this does not preclude a similar pattern of activation in the BSM, but a difference would be seen in the relative influence of other system factors, such as valence, becoming the ‘common feature’ influencing activation.

Whichever model best represents autobiographical memory, it is a dynamic system and changes to the representation of events and information occur over time. During

encoding events are attended to differently according to personal relevance (Klien & Loftus, 1988; Rogers, Kuiper, & Kirker, 1977), they then enter the long term memory for reasons of importance (Berntsen & Rubin, 2006), and emotionality (Talarico, La Bar, & Rubin, 2004). The formation of links between memory representations which are thematically similar events occurs through categorisation and semantisization. Linking patterns within the autobiographical memory base may be based on temporality i.e. the events occurred at a similar time in a person's life (Mace & Clevinger, 2013; Mace, Clevinger, & Bernas, 2013), or due to similarity in event e.g. job interviews, or emotional content (Berntsen & Rubin, 2012). Over time autobiographical memory shifts, usually within a fairly short time-frame, from details of specific experiences, including sensory details, to more semantic and knowledge based information (Conway, Gardiner, Perfect, Anderson & Cohen, 1997; Robinson & Swanson, 1993). Ultimately resulting in cognitive representations in the form of both semantic and episodic knowledge (Piolino, *et al*, 2009; Westmacott & Moscovitch, 2003). As a result the ease at which episodic events are accessed, or come to mind, depends on the event recency (Rubin, 1982), the importance to self (Ritchie, Skowronski, Wood, Walker, Vogl, & Gibbons, 2006), uniqueness (Winograd & Neisser, 2006), and also emotionality (Reisberg & Heuer, 2006). Once established within long-term memory the forgetting process too is not standardised in terms of time taken to forget, for example, events experienced between the ages of 15-30 are better remembered, resulting in a 'reminiscence-bump' (Jansari & Parking, 1996).

One of the key aspects in the maintenance of episodic details of autobiographical memory is rehearsal. Memory rehearsal is the repeated access of memory details over time, at a conscious level it can occur through social (through discourse and narrative) or private (contemplation or rumination) 'going over' of events. Vogl, Ritchie, Walker, Collins, and Skowronski (2009) suggested that there are five types of memory rehearsal which serve different functions and that these also differ depending on whether they are of negative or positive events. These rehearsal types are involuntary recall; maintenance of details; to re-experience emotion; for social communication and to create meaning or understand the event. Rehearsal of events also has a differential impact on event memories, with internal rehearsal and rumination generally found to enhance phenomenological details, while external rehearsal in the form of narrative communication and repeated experiencing of similar events increases semanticization (Nadel, Campbell & Ryan, 2007; Rubin & Kozin, 1984). The emotional content of a memory differentially impacts on rehearsal in a number of ways, for

example, negative memories may be rehearsed by healthy individuals to act as instructions for avoiding similar situations (Berntsen *et al,* 2011*;* Bluck, 2003; Pillemer, 1998, 2003) or as reference for future goals (Csikszentmihalkyi and Beattie, 1979), while positive event memories may serve to improve mood (Gilliahn, Kesslet, & Farah, 2007; Rusting & DeHart, 2000)

1.1.3 Experimental autobiographical recall methods

The methods by which autobiographical memories are examined can inform the development of theoretical memory systems, in particular the propensity to focus on discrete units of memory, such as episodic events. Research in to autobiographical memory recall began to be carried out by Galton, who used word cuing techniques (Galton, 1883) to induce the production of his own, and other peoples' autobiographical event recall. In response to a single cue word an individual may recall any combination of personal information such as: specific events, autobiographical facts, generic personal memories, semantic memories, and sensory information (Brewer, & Rubin, 1996) but Galton began a tradition of assuming recall of specific events as being an indicator of 'true' past experiences. These units have lent themselves to researchers as they endow a binary system with which to judge memory representation, i.e. an event is recalled, or not recalled under specific circumstances.

As a measure of event access and availability traditionally researchers have timed recall of episodic memories, and used this as an objective judgement of accessibility (Thompson, 1996), but alternatives to timed recall have been used e.g. the sentence completion task (Raes, Hermanns, Williams, & Eelen, 2007), and participant reports of difficulty of recall are also a reliable measure of accessibility (Ritchie, Skowronski, Walker, & Wood, 2006). Each of these methods works on the assumption that a recall goal is the crystalisation, in the mind's eye, of an image or coherent piece of information which constitutes a single memory, representative of a single event, entering conscious awareness. The process of accessing episodic autobiographical information may be either g*enerative*, in that the cue is considered and information is retrieved with increasing accuracy until something reflecting the required goal e.g. a specific autobiographical event, or can be subject to '*direct recall'* (see Table 1.1) In both experimental and naturalistic settings there may be phenomenological differences between these voluntary (generative) and involuntary (direct) recall experiences (Berntsen & Hall, 2004) but they are usually considered to be different means of access to similar cognitive structures i.e. episodic memories.

It is important to acknowledge that while the neurological process of recall can be tracked (e.g. Addis, Wong, & Schacter, 2007; Eichenbaum, 2004), participant reporting of recalled events is difficult to 'standardise' in practice. It is a subjective experience reported through a narrative in itself a 'meaning-making' process whereby what is reported may not be a direct reflection of what is experienced. For example, people will provide event memories with pre-amble contextual information, and post-amble justification. This reflects more contemporary models of autobiographical memory which preclude the differentiation between event-specific knowledge (such as time, place and event), with semantic self-and socio-cultural knowledge (Conway, Singer, & Tagini, 2004). Other researchers have questioned whether memories about the self are, in fact, different in nature to other memory types because of this peripheral knowledge (Bower & Gilligan, 1979; Greenwald & Banaji, 1989). Features of specific autobiographical memory recall which have been experimentally examined, and compared between populations include, accessibility, (usually reflected in the time taken to recall specific autobiographical memories), and phenomenological features of the memory event, such as vividness, emotional impact of recall, and sensory (usually visual) detail (Tulving, 1983). Specificity of autobiographical memories as defined by information on what, where and when, may be judged by the researcher on the description provided by participants, or rated by the participants themselves (Conway, 2009).

The standard method of cuing recall of autobiographical memories is the Autobiographical Memory Test (AMT: Robinson, 1976; Williams & Broadbent, 1986), which requires participants to report memories cued by single words presented by a researcher. This method induces both semantic and episodic memory details (Levine, Svoboda, Hay, Winocur, & Moscovitch, 2002), and some populations, for example people with depressive disorders, have been found to be significantly less likely to recall episodic details, with a preponderance of semantic details (McBride, Segal, Kennedy, & Gamar, 2007; Sumner, Griffiths, & Mineka, 2010). In the Autobiographical Memory Interview (AMI: Koppelman, Wilson, & Baddeley, 1989) subjects are asked to describe events within an interview discourse, and memory narratives are scored for characteristics of specificity such as sensory detail and event-specific knowledge. Similarly, the Autobiographical Interview (AI: Levine, *et al*, 2002) aims to separate out semantic and specific autobiographical memory components, giving an overall comparison between these two aspects of the memory narrative. The *Test Episodique de Mémoire du Passé Autobiographique* (TEMPau: Piolino, Desgrandes, & Eusache, 2009), incorporates a number of details of the memory experience,

including a judgement of remember (episodic) and know (semantic) based on Tulving's original recollective distinctions (Tulving, 1985). As well as establishing the event within a spatio-temporal context, the TEMPau also asks for sensory-perceptual-affective-cognitive details, along with a judgement of visual field or observer perspective. This final quality, not included in any of the other autobiographical memory tests, is based on the work of Nigro and Neisser (1983) who examined the role of the visual perspective on memory recall. The study of perspective-taking in people with depression has suggested that the observer perspective is more common in people with depression (Kuyken & Howell, 2006), and in an AMT study of 123 participants with recurrent depression the observer perspective was found to be significantly linked to negative self-evaluation and avoidance (Kuyken & Moulds, 2009). Of the methods used to cue recall of episodic memories, the TEMPau procedure best accounts for the phenomenological factors in memory recall, and sets the criteria for assessment of specificity from both an objective (researcher) and subjective perspective. Reported events are recorded as episodic if they are found to contain specific one-off details, of short duration (<24hours), to be factual (what happened), set within a defined spatio-temporal location i.e. in a particular place and time, and be phenomenological. Defining features from a subjective perspective are that the person has some sense of visual field (within the dimensions of field to observer); would remember details (rather than simply know they occurred); there would be a sense of autonoetic consciousness (travelling back in time); vividness; emotional intensity; and an aspect of having rehearsed the event prior to recall at test. The TEMPau has been used to effectively examine autobiographical recall in subjects with MDD over the lifespan (Lemogne, Piolino, Friszer, Claret, Girault, *et al*, 2006; Piolino, *et al*, 2009).

In addition to these standard sampling methods, a number of interview techniques have been used to retrieve episodic memories from within defined lifetime periods, and are therefore pertinent to an examination of the role of higher-order organisational structures in recall. Borrini, Dall'Ora, Della Sala, Mannelli, and Spinnler (1989) used the three periods of adolescence, early, and late adulthood to elicit memories from 157 non-depressed older adults (over 55 years). They aimed to remove the barrier to ABM access of current relevance, by limiting the time period from which memories could be sampled, and by requesting a specific memory, and allowing subjects to narrate until specific details were revealed. The researchers concluded that memory recall is more likely to be accurate (as verified by a follow-up recall event detailing the same information) if there are no time-limits given to the

recall process, and if memory retrieval is generative i.e. progressing through contextual cueing to increasing event-specific detail. Similarly Ivaniou, Cooper, Shanks, and Venneri, (2006), deployed an interview technique to examine patterns of memory deficit in elderly dementia patients with mild to moderate memory loss, using free- and cued-recall over four life-time periods childhood, early adult hood, late-adulthood and 'recent'. In cued recall each memory was defined in terms of 'what', 'when', 'where' and 'who', and these details were used to judge the degree of specificity by quantity of details available. In the free-recall test two minutes were given for subjects to recall in minimal detail memories from the given life-time period, and these were subsequently used to gather more detailed accounts of events which were then scored for details. Koppelman, and colleagues, (1989) used similar lifetime period sampling in amnesia patients. The use of life-time periods in each of these studies serves to control for the distribution of sampling across the lifespan, and as a result may increase the ecological validity of recall, mitigating against the demand characteristics of cuing tests based on the AMT, but they did not examine the impact of life-time periods on recall, and all of the studies neglected the elements of phenomenological 'reliving' experiences which have come to represent episodic memories, relying rather on information such as the 'what, when and where' of narrated events to account for specificity. This experience-near or 'reliving' is predicted by sensory experience (Rubin, Schrauf, & Greenberg, 2003; Tulving, 1983), and is an important aspect of specificity as it is thought to verify the personal experience of the event occurring.

A further aspect of memory phenomenology is the perception of self-relevence, and self-defining features of event memories (Blagov & Singer, 2004; Singer & Moffit, 1991; Singer & Salovey, 1993). Self-defining memories are enduring memories which are felt to be important or essential in defining the person of the reporter. They are described as vivid, emotional, and highly accessible personal memories which are related to goal-achievement. Empirical evidence indicates that the importance of a memory will rely on its relevance to life-goals both at the time of the event, and subsequently (Singer & Salovey, 1993). The key to self-defining memories is the continuation, over time, of their relevance to the self, Singer and colleagues (2013) conceptualised them as being a result of the perpetuation, over time, of representations of events which combine experience, with critical goals of the life-time period in which they occurred. They also proposed that repeated themes within self-defining memories, for example being the victim of unjust actions, become narrative scripts for cognitive-affective processing. The measuring of self-importance in research has been

carried out using the centrality of event scale (CES: Berntsen & Rubin, 2006), which requires participants to score episodic events according to statements such as 'This event has become a reference point for the way I understand new experiences.' On a five-point scale from totally disagree: 1, to totally agree: 5. The original design of the study resulted in a 20-item scale with a Cronbachs' alpha reliability score of 0.92, and a shorter 7-item scale with a reliability of 0.88. Originally used to explore individual differences in PTSD, the scale has been applied more broadly to examinations of the relative perpetuation of some memories over others (e.g. Thomsen, Jensen, Holm, Oleson, Schneiber, & Tønnesvang, 2015).

1.2 Life-stories

There is a boundary that exists between our understanding of the cognitive representations which constitute autobiographical memory, and the ways in which this structure is used to incorporate and represent autobiographical material to the self, and others. The autobiographical memory base requires a framework for linking experience, semantic and episodic knowledge coherently. The two leading theories both incorporate this structural framework, but position its origin and key functions slightly differently. The SMS (Conway & Pleydell-Pearce, 2000; Conway, 2005) relies on a metaphorical 'life-story' structure created from experience (temporality being the key guide), current goals, self-identity, and the demands of coherence and correspondence. Contrastingly, the BSM requires, and emphasises, the life-story narrative framework, using culturally understood patterns of thematic links and cause and effect. These structures are not mutually exclusive, and differ in terms of the cultural impact of narrative construction and a reliance on a 'storyline'. Either way, from the research it appears that there are three structures which endow this continuity and linkages between autobiographical memory (as internal cognitive representations of self-relevant material), the sense of self, and the construction of an autobiographical 'life-story' narrative which can be internally rehearsed and socially deployed. These are the life-story narrative (McAdams, 1993; 2001), life-story schema (Bluck & Habermas, 2000; Habermas & Bluck, 2000), and cultural life-script (Berntsen & Rubin, 2004), which are illustrated in Figure 1.

The following section will present the theoretical and empirical evidence for life-stories, life-story schema, and life-story narratives highlighting their role in creating representative narrative schema within which autobiographical memories are accessed.

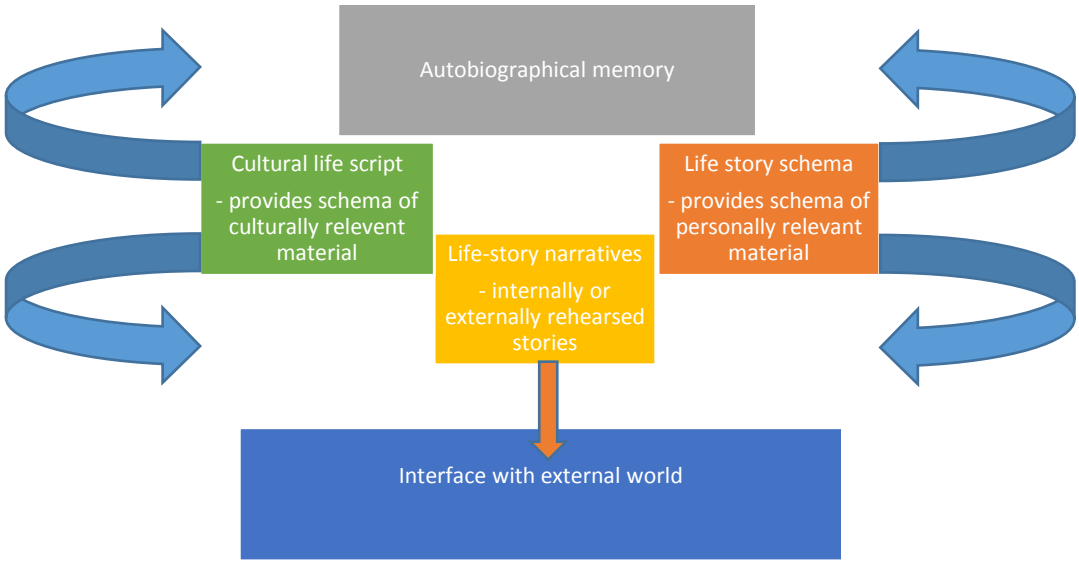

Figure 1-1: Relationship between life-story schema, narrative, and life-script*: Autobiographical memory and life-stories are proposed to have a interactional effect on one another, and as a result cognitive representations in autobiographical memory are mediated through life-story structures prior to being expressed*

1.2.1 Life-story schema

According to the 'Life-story schema' model proposed by Bluck and Habermas (2000) individuals maintain an internal abstracted cognitive self-concept which is used to organise autobiographical memory and which in turn influences life-story narratives. The schema is analogous to the life-story of the SMS, but differs in that it provides a greater flexibility at the level of temporal coherence. The SMS is proposed to allow variability and fluctuation in recall according to current goals and the 'working self' which, in theory means that self-perception can change according to circumstances and motivations (Conway *et al*, 2004). Although deviations from this may occur in extreme cases, for example in those with neurological damage (e.g. Schacter, Curran, Galluccio, Milberg, & Bates, 1996), more commonly individuals have life-long autobiographical coherence which, according to Bluck and Habermas, is provided by the life-story schema. In addition, the life-story schema is not so limited by the 'life-time period' hierarchical structure of the SMS, allowing for life-themes

to span temporal periods, for example, 'my relationship with my mother' which is a lifelong categorisation.

While it is proposed that life-stories develop by using a framework derived from childhood, on-going experience, and social context, the process of development is less clear. In their account Habermas and Bluck, (2000) describe the dynamic process of *autobiographical reasoning* which is the activity of thinking about the past to make links to the self, which results in a synchronic (reflects the current self) and diachronic (reflects the continuity of self over time) narrative. This process is analogous to that of elaborative rehearsal, whereby event representations within working memory are transferred to long-term memory by the creation of links with existing representations allowing us to make sense of experience by drawing semantic knowledge from individual (episodic) events (D'Argembeau, Cassell, Phillips, Balteu, Salmon, Ven der Lindon, 2014; Habermas and Bluck, 2000; McAdams, 1985; McLean, 2005).

Lilgendahl and McAdams (2011) conceptualised autobiographical reasoning according to two narrative processes evident in accounts of 88 mid-life adults. These were the propensity to evaluate events positively, and the generation of events as having a number of positive impacts on personal growth. Overall good mental health was associated with positive reasoning processes. A number of other studies have used evidence for drawing positive conclusions from events as being representative of autobiographical reasoning (e.g. McLean & Pratt, 2006; Singer, Rexhaj, Baddeley, 2007). The nature of the reasoning process itself has not been substantially explored but one study gives insight in to the dual cognitive process which appears to allow reasoning to occur. Autobiographical reasoning is proposed to involve two cognitive activities: the recall of episodic events, and the generation of semantic links which create a broader personal significance and meaning between these events, and both essential to the formation of life-story schema. Using methods which differentiate between neural activity during these stages, D'Argembeau, Cassol, Phillips, and Colleagues (2014) asked 24 young adults to recall self-defining memories during fMRI scanning. Participants were instructed to recall events in two ways, either by concrete recall and re-experiencing of events, or by reflecting on the events, their implications and impact. The reasoning process which occurred during recall was associated with different brain areas involved in semantic processing, whereas the concrete re-experiencing recall was not. This suggests that what we know about ourselves can be drawn from individual experiences, along

with our ability to draw semantic and self-relevant conclusions from them. But also that the use of these individual experiences depends on the context, i.e. what was also happening at the time, or how events are linked together. This is important because if our semantic knowledge about ourselves is drawn from generalisation and integration of individual events, the ways that we perceive and recall these events will have broad ranging implications for our psychological well-being.

Evidence cited for the existence of a life-story schema includes the findings that longer-term self-concepts influence memory encoding and recall (Rathbone & Moulin, 2014; Rathbone, Moulin, & Conway, 2008; Rathbone, Conway, & Moulin, 2011), and that autobiographical reasoning increases following both major life events and traumatic experiences (Lieberman, Meek, & Cohen, 2010; Suedfeld, Steel, Wiebe, & Krell, 1997; Suedfeld & Cassel, 2006). This increase in autobiographical reasoning indicates that integration of events with the self-concept takes longer when they are dissonant, or less congruent with the current self. In addition observations of the reinterpretation processes surrounding events and emotions (Levine & Newcome, 1997), and attitudes, indicate the tension between current self-coherence and past experiences, and events which are challenging to integrate, for example trauma, may demand to be internally or externally narrated resulting in a positive and agentic self-schema (Beike & Landoll, 2000; Suedfeld, Steel, Wieber, & Krell, 1997). The process of autobiographical reasoning is analogous to that of 'meaning-making' in contemporary psychological talking therapies. Essentially the same process is facilitated by a therapist in order to bring about acceptance of past events, and the creation of understanding and closure. Meaning-making processes are common in narrative therapies (Brown & Tod, 2007; Caldwell, 2005), cognitive behavioural therapies (Holland, Chong, Currier, O'Hara, & Gallagher-Thomsen, 2015), and those working from a less 'interventionist' perspective (Thorne, Mearns, & McLeod, 2013)

The function of the life-story schema, in acting as a template for memory, identity, and self-hood, requires the narrative of the life-story to have coherence, and a logical sequencing of both events and, as with the self-memory system, a conceptual self. This appears to be something which is established in childhood, and evidence for life-story schema coherence being a developmental process which is independent of the ability to create coherence in narratives generally comes from studies which examine the production of narratives from different age-ranges. Bohn and Berntsen (2013) examined the life-story

narratives of 110 Danish children aged between 9 and 15 years, and found a strong correlation between age and coherence within the narratives. Third-grade children of a mean (SD) 10.2 (0.1) years showed narrative coherence within their accounts of single neutral or moderately positive events, but were unable to narrate a coherent life-story (in this case from birth to the present day), the eighth grade of a mean (SD) 14.6 (0.3) years were able to produce a coherent life-story. This result was independent of their ability to narrate a coherent single event once age was controlled for, suggesting that a 'conceptual' life story i.e. life-story schema, is required as a framework for the life-story narrative over and above linguistic competence. Indeed the researchers found that life-story coherence was correlated with the typicality ratings, of events proposed by the children, the typicality of an event was scored by the number of times it was mentioned in prospective life-stories produced by participants, e.g. an event 'Beginning school' being mentioned 97 times in at total 111 life-stories would hve a typicality score of 97.. While accuracy in predicting the timing of typical life events developed concurrently to knowledge of the events themselves. In accordance with these findings, autobiographical accounts of the whole life-story narrative are thought to be possible from adolescence (McAdams, 1993), and there are parallels between early autobiographical memory development and the development of this narrative ability (Fivush, Habermas, Waters, & Zaman, 2011), suggestive of the interlinking roles of the schema, narratives and autobiographical memory proficiency.

Elucidation of the differences between aspects of life-story schema and narrative has been neglected both in the theoretical work, and in research. Theoreticians generally conflate the ability to produce a life-story narrative i.e. an account of the person's life to date, with the existence of a life-story schema, and apart from the work carried out by Bohn and Berntsen (2008; 2013), this distinction has received little research focus. A theoretical divergence between them is important when considering the role each plays in autobiographical memory. The importance of the schema is that it serves as a guide for experience and remembering, whereas the life-story narrative functions to present the story of the schema.

1.2.2 Cultural life-script

The development of the life-story schema, and life story narratives relies on the external, learning context of the person. Life-stories schema are constructed with reference to culturally defined life-story script. The role of which is to guide recall according to culturally defined principles, and was first suggested by Berntsen and Rubin (2004). Cultural

life-scripts include major events such as starting school, getting married, having children etc. with defined times when a person would be expect to experience these events. The events within the cultural life script can be both single events, analogous to episodic memories, but also expected life-time periods such as 'teenage', or 'university'. Cultural life scripts are elicited in research by asking participants to report events which are thought to be typical of the life course of someone (often of the same sex) in their culture. On developing this concept Rubin and Berntsen (2004) found 35 life-events which were felt to be typical of both Danish and American life-stories, subsequently researchers have found both similarities and differences in life scripts between cultures (Alea, Ali, & Mercano, 2014; Berntsen & Rubin, 2004; Erdogan, Barban, Avlar, Tas, & Teckan, 2008; Rubin, Berntsen, & Hutson, 2008; Scherman, 2013).

Events which are common in the cultural life-script are also common in life-story narratives (Thomsen & Berntsen, 2008) and this appears to be as a result of learning expectations within the context of one's own culture, for example what is of importance, what is of interest to others, and what should be seen as positive or negative (Zaragoza-Scherman, Salgado, Shao, & Berntsen, 2015) and cultural comparisons have allowed sampling of autobiographical recall to illustrate the differences this makes. The internalisation of a cultural life-script during late childhood and early adulthood is evidenced by the study by Bohn and Berntsen (2013) discussed above, as it indicates the existence of an understanding of typical events from one's culture, and that this is influential in deciding what kinds of events are encoded and recalled. The younger cohort in this study were significantly less likely to produce accounts of personal events which reflect cultural norms compared to the older groups.

Overall, cultural life-scripts provide guidance on culturally significant events, influencing the life-story schema, and thereby indirectly, encoding and recall, and show good evidence of impacting on recall of events in terms of long-term cultural expectations (Berntsen & Rubin, 2004), but also as shorter-term and priming influences, e.g. Wang (2013), who found that cultural goal-directive influence encoding and recall of memories.

1.2.3 Life-story narratives

While the cultural life-script and life-story schema lay out self-referenced expectations and structures for autobiographical memory, it is the production of a life-story

narrative, which enables the telling of this story to the self and others. While content of narratives is both experience- and culturally-defined, incorporating and selectively mobilising memories, a further aspect which influences their role in maintaining a consistent sense of self is the style of narrative expression used. Evidence indicates that characteristics of life-story narratives are a result of social learning, as there are strong links between children and parents for elaborative style (Fivush, 2007; Fivush and Nelson, 2006; Reese, Haden & Fivush, 1993), and structural scripting of narratives (Fivush, 2007; 2010; Fivush, *et al*, 2011; Reece, 2002), which is itself linked to a more coherent sense of self (Fivush, 2011).

Overall, the production of a life-story narrative relies on the ability to respond to cultural expectations of narrative stories (how stories are told), and to require a schematic framework to structure autobiographical experience (life-story schema). McAdams (1985) suggests that life-story narratives result in narrative identity by being both 'synchronic', meaning they bringing together of all the bits of the self and experience even when they are disparate and contradictory and 'diachronic' because they endow the ability to provide causal accounts. Singer and Bluck (2001) propose that they are developed through *narrative processing*, that being the stringing together of images, plots and goals to form a coherent story, which is itself reliant on *autobiographical reasoning*, involving the interpretations and evaluation of events according to the existing self-narrative. These ideas are supported by research which has shown that autobiographical narrative accounts are composed of both information on events, but also evaluations and conclusions drawn from them (McAdams, 2006b).

Life-story narratives have been examined theoretically and empirically from a number of perspectives (McAdams 1993; 2001). Researchers have used life-story construction and characteristic themes and structures to draw conclusions on the ways in which different groups of people and personalities represent themselves through narrative (McAdams, 2006a, 2006b), developmental processes (McLean & Pratt, 2006; Pasupathi & Wainryb, 2010); quality of life and wellbeing (McAdams, 2001), and mental health (Adler, Turner, Brookshier, Monahan, Walder-Biesanze, *et al*, 2015; Angus & Greenberg, 2011).

What has been indicated is that narratives have consistent canonical features which frame content and may be temporally stable, while focal subjects fluctuate according to experience and context. These features include: coherence, and the ways in which narratives are structured in to characteristic 'types' of story such that the events retold are varied by the

themes, for example, that ‘facing challenges head-on pays off’, or ‘things work out for everyone but me’. Evidence for these and their link to psychological well-being is discussed in the next section.

1.2.4 Life-story and psychological well-being

The ability to construct a coherent autobiographical account or accounts has long been seen as a vital stage in development and essential for psychological well-being. Erikson (1971) described it as the essential developmental step for adolescence, while Freud (Tambling, 2012) conceptualised narrative jumps, and non-sequiturs in communication of personal stories as evidence of defence mechanisms. Coherence of life-story narrative accounts is measured by narrative features, such as organisation and logical sequencing of events, narrative description, and at the highest level a characteristic tellability pattern.

Narratives are far more than verbal representations of experience, they contain information on past events, evaluations, comparisons, and conclusions. They also function, in parallel with the social function of autobiographical memory (Alea & Bluck, 2003), to create social links with others, through shared understandings, and even in that they create a shared framework for ‘telling’ of events. The use of schematic ‘master narratives’ has been suggested to serve as culturally defined story frameworks to guide the presentation of autobiographical stories (Boje, 1991; Thorne & McLean, 2002; Westrate & McLean, 2010). To compensate for the difficulties in telling some stories, structuring of negative events within master narratives can provide socially acceptable ways of relating autobiographical events, for example Thorne and McLean (2002) defined three forms of master narrative for trauma memories, these being: John Wayne, Florence Nightingale and Vulnerability, each of which defines a narrator position and gives context for the emotional response to the events. Master narratives linked to psychological well-being have been identified in a number of studies, for example the ‘Redemption’ and ‘Contamination’ sequences elucidated for narratives of older US adults by McAdams and Colleagues (2001). Redemptive (negative events reveal positive outcomes) are related to both well-being and generativity in middle-age, while contamination sequences (positive events reveal negative outcomes) related to a significantly lower reported level of well-being and generativity (Lilgendahl, *et al*, 2011). A series of studies the master narratives of key-scenes from life-stories gained from 74 mid-life adults (ages 35-65) (using McAdams 1985 interview technique) revealed that contamination sequences were negatively correlated to self-rated scales of life satisfaction, self-esteem,

along with narrative coherence, and positively correlated with self-reported depression symptoms. Redemption sequences were positively correlated with life-satisfaction, self-esteem and narrative coherence, while negatively correlated with depression symptoms (McAdams, *et al*, 2001).

That memory recall and narrative structure is independent of the episodic content of what is recalled and retold was further explored in a longitudinal study carried out by McAdams (2006b) undergraduates who were asked for 10 key scenes from life stories, only repeated 28% of these 3 month later and only 22% (of the original) were repeated at 3 years. Despite the apparent transience in events reported there were stable characteristics of the narratives, he found continuity in narrative complexity, and positive (versus negative) emotional tone and moderate but significant continuity for themes of agency and growth. McLean and Thorne (2003) looked at accounts of young adults important memories about interpersonal relationships, after a 6 month gap they found only 12% were exactly the same at follow up, but they found significant stability for emotional and motivational themes. In a qualitative study looking directly at the narratives of people who perceived themselves to be 'struggling with depression', (Robertson, Verner, & Botha, 2005), ten adults were asked 'would you please tell me the story of your life?' This study attempted to look at the psychological meaning of depression as expressed in narrative in terms of meaning attribution; language use; use of socio-political narratives and ways of dealing with depression. Although this paper is written from a strictly social constructionist perspective it gives some insights in to the narratives of people with depression. For example people with depression tended to make 'Monolithic summations' of experiences e.g. *I have a very sordid life I'm afraid;* have a narrative style of explanation and attribution indicating a mind-set that is 'stuck in the past' instead of 'letting go and moving on'; made negative interpretations, showed negative discounting, and non-hopeful meanings to expected future experiences (which might indicate underlying problems with future problem solving); used language which was limited and negative, and often made negative generalisations (some in the face of contradictory evidence). This study looked at what the participants were talking about rather than specific narrative features and but features such as a negative bias, were considered one way by which competing narratives are locked out.

The early development of, and existence and reliance on, narrative structures which have variable content in terms of autobiographical detail suggests that narratives themselves

are schematic. A potential schematic feature of narratives which has been linked to mental health and well-being is structural coherence. Reese and colleagues (2011) have developed a method for scoring three key aspects of coherence, theme, context and chronology, and a comprehensive study by Waters and Fivush (2015) used this method to examine narratives of episodic events (termed nuclear episodes) and generic autobiographical events of 103 undergraduate students (mean age 18.87, range 18-28 years). The transcripts were coded for coherence and identity features (using Waters, 2014 Self-function scale), and three different well-being scales (including the satisfaction with life scale, Diener, Emmens, Larsson, & Griffin, 1985; the Rosenberg well-being scale, Rosenberg, 1965; and the Psychological well-being scale, Ryff & Keyes, 1995), were entered in to a component analysis of 17 sub-scales. This analysis revealed three main components to the subscales (purpose and meaning; positive self-view; positive relationships), which were then correlated with narrative coherence. Results indicated that when levels of narrative ability are controlled for, coherence of specific events narratives was significantly correlated with purpose and meaning, and positive relationships. In addition, results revealed that the identity function of the narratives moderated the relationship between coherence and sense of purpose (but not the other two components). The authors propose two mechanistic accounts for these relationships. The first being that emotional dysregulation associated with an absence of well-being, prevents the construction of coherent narratives. The second is that once personal episodes are processed in to coherent narratives they become stable, and are no longer cognitively and emotionally demanding and thus lending stability to the sense of self and concurrent well-being.

1.2.5 Life-stories as schema

The three aspects influencing life-story structures detailed above are proposed to influence memory recall in different ways. Life-story narratives influence recall by providing context, and can be adjusted according to current goals, social situation, and mood, but maintain structural features such as complexity, coherence, and thematic scripts like ‘contamination sequences’ which may repeat within the narratives presented (McAdams, Reynolds, Lewis, Patten, & Bowmen, 2001). Life stories are structured on cultural life-scripts and endow relevance to events using the context of the ‘self’, and filter information which will become part of long-term memory and self-knowledge to ensure coherence with underlying themes. The use of the term life-story schema has implications for its function in

memory including the impact on episodic memory characteristics such as typicality, expectation, and rehearsal.

Schema are a broad concept to describe cognitive frameworks for understanding experiences, they serve to 'fill-in' absent information about events using knowledge of typicality, once constructed a schema will endow rules of expectation and generalisation for schema-linked information (Bartlett, 1932). An associated concept, *Scripts* are schema for routine, often culturally typical activities, and are semantic representations of sequences of events, actions, causal connections and roles, which allow effective navigation of common experiences and scenarios such as going to a restaurant (Schank & Abelson, 1977) and are analogous to general events with the SMS.

Schema can be based on both semantic knowledge of culturally significant concepts such as the contents of rooms, crime scenes, common scenes, and stereotypes (Pezdek, Whetstone, Reynolds, Askari, & Dougherty, 1989), usually on the basis of schema consistent and inconsistent information. But have also been examined, to a lesser extent in terms of memories for cultural life-scripts with a similar focus on typicality, and atypicality. While theoretically indicated by their role in autobiographical memory being influenced by self-identity (e.g. work following Markus, 1977), to date the concept of schema have not been examined explicitly with respect to life-story schema and life-story narratives. The problem may be one of operationalisation of the life-story schema to enable features of the schematic representation to be fixed, and thereby predictive of expectation, schema-typicality, and schema-consistency of information. A more detailed examination of the research literature concerning schema will now highlight how this enquiry could take place.

In general, schema provide information on expectation, information which is schema consistent is expected, whereas schema inconsistent information is not. This typicality factor can influence both encoding and recall by combining schematic with episodic information, guided by the overall match between a particular experience or piece of information with the schematic understanding of the context. This in turn has led to an examination of expectation, typicality and relevance in terms of schema consistency and inconsistency on memory for objects, events and characteristics.

Expectation or typicality reflects the degree to which a particular feature is likely to be present within a schema, and relevance is the degree to which a feature is essential to the

schema. So a schema for a library may contain books and a window, the former would be typical and relevant, whereas the latter would be merely typical. Evidence points to enhanced recall of high schema-relevant items when compared to low schema relevance, when relevance is experimentally manipulated on encoding (Goodman, 1980), but for atypical events if typicality is manipulated on encoding there is a both a recall and recognition bias (Pezdek, *et al* 1989). This means that items which are considered typical of the schema tend to be more likely to be recalled, possibly due to the established links between similar information raising accessibility, but that atypicality on encoding has the effect of making representations more available. The reasons for this are unclear but accounts of the role of atypicality within scripts have resulted in a number of explanations. Similar to schema, memories of script events also tend to be biased in that deviations from established scripts tend to be more memorable (Bower & Gilligan, 1979; Graesser, Gordon, & Sawyer, 1979; Mandler, 1984). This is associated with a number of script models for memory including Schank's (1982) Dynamic memory model where atypical events decrease script coherence, and remain more memorable due to processing demands (Hastie, 1980; Srull, Lichtenstein & Rothbart, 1985). The 'Script pointer plus tag' model which posits atypicality with the need to encode in more detail, as the script cannot be relied on to provide appropriate information. A third theory for why atypicality endows memorability is that it is a form of the von Rostdorff effect (Koffka, 1935) which suggests that the similarity of background information, such as lists of similar items, impacts on the memorability of items which are different, for example 'peach' in a list of vegetables.

The relative memorability of events as typical to scripts has also been examined in terms of standardised stories, which relate 'typical' events such as washing a car, along with atypical aspects of the events. Lampinen, Fairies, Neuschatz, and Toglia (2000) used this paradigm to examine the recollection of 37 undergraduate participants of a story based on six scripted critical events, each of which contained two typical and two atypical aspects. Events were presented either immediately following the story, or 24 hours later and remember, know (Rajaram, 1993) or inferred (based on plausibility) judgements made. Remember judgments were also linked to whether this was based on perceptual, cognitive or emotional information. Typicality of information had a significant impact on recognition, and both remember and know judgements. With atypicality being more memorable overall at immediate and 24 hour test conditions, and associated with more details of the occurrence.

In the only published paper which has explicitly examined the role of life-stories as schema which influence memory recall and recognitions, Koppel and Berntsen (2014) carried out three studies which used a cultural life-script as a schema for which events in a life-story narrative could be judged as consistent, or inconsistent. This consistency judgement was based on the idea that some events are uncommon and/or infrequent within a prototypical life-story, while others are expected and frequent. The events were tested under recall or recognition conditions for presented information. In their first study 48 female Danish students, with a mean age of 22.8 years were presented with a life story containing nine critical life-study events (drawn from the cultural life-script of Danish people developed by Bentsen and Rubin, 2004). Of these events six were schema consistent, in that they were narrated with the expected emotional valence, while three were narrated with an inconsistent emotional valence. The critical life-script events were chosen on merit of being strongly emotional in the 2004 study, and this allowed a clear conversion of the emotional content, for example, one schema inconsistent event was a divorce presented as a positive event. Three versions of the story were used, containing the same events but counterbalancing the inconsistent event valence, with a number of filler items which did not differ between stories. During presentation participants were asked to rate critical events as either schema consistent or inconsistent, and also give positivity ratings for events. Participants were provided with one life-story and tested for recognition of events from the story, and give a remember/know judgement (Rajaram, 1993). Two delay conditions occurred after presentation of the life-story, half were given a 20 minute distractor before the test phase, and half returned after one week. Results of Study one revealed an affective dissonance reduction effect, in that inconsistent events were rated as less positive when the expectation was that they would be negative, and vice-versa, but that expectation consistency had no impact on recognition. The expected life-script frequency of events, as defined by Berntsen and Rubin (2004), impacted on the correct recognition of events in the week-long condition, indicating that in the longer-term the cultural life-script acts as a schema for memory of events, and that the valence of incongruent events are adjusted to fit the schema on recognition. In Study two, the cognitive demands of the task were increased, 24 female student participants (mean age 23.7 years) underwent the same life-story presentation procedure as Study one, but were not given the opportunity to rate the events presented (as this represented an opportunity for rehearsal in Study one), they were then tested for *recall* of items and asked for a remember/know judgement. Expected frequency had no impact of recall, although the latter results suggested a trend towards recall of high-frequency events. However, for inconsistent events,

judgements were more likely to be reported as 'remember', than 'know', again indicating that unexpected or atypical information is more likely to be remembered. Similar to Study one, schema-consistency had a significant impact on judgements of event positivity, whereby participants aligned their ratings with schema expectation rather than presented valence. In addition it appeared that temporality of the event (start to end of the life-story provided) impacted on recall more than recency, frequency or consistency i.e. events were recalled in the order they were presented, and therefore conformed to the expected life-story progression. Study three examined the impact of expected life-script frequency of events on recall by 30 female participants (mean age 22.8). The life-story presented included 30 critical events, (10 high frequency, 10 low-frequency and 10 non-life-script events all matched for valence), with a single one week delay condition, followed by free recall of story events. Results revealed a significant effect of life-script expectancy on recall accuracy, and as with Study two a recall order which matched the temporality life-story.

While not examining memories for autobiographical events, and instead focusing on narratives of events in the life-stories of others, this study is one of the few which have specifically linked the structure of the cultural life-script with memory recall, the manipulation of the valence of event to create atypical representations gives good evidence for the interaction between expectation and recall and recognition. In addition to this, it accounts for the links between internal schema of life-stories which influence patterns of recall, in terms of consistency and expectation with life-script. The impact of atypicality is revealed by the events being given 'remember' rather than 'know' judgements (remember being recall or recognition of an event memory which includes some episodic detail, whereas know is the recall or recognition of events without such detail, the latter therefore being based on the belief that events have occurred), and in that it influenced judgements of the emotional content of events by bringing the valence in to line with expectations.

Taken together this points to an aspect of recall which favours atypicality from expectation during encoding, but during recall events may be adjusted to align with schematic representations, and the Koppel and Berntsen study has extended this concept to include expectations of life-story events using cultural knowledge. This empirical evidence which indicates that cultural life-scripts are used as cognitive schema supports the suggestion that life-story schema may also fulfil a similar role on an individual level. The function of schematic or semantic event knowledge and expectation has been examined in terms of

typical and atypical life events, but also in terms of life events typical to the individual, the latter as a part of Becks schema model of depression (1967) which is examined in Section 2.2.1.

In order to operationalise predictions that the life-story schema functions to create expectations of events which are potentially influential on encoding, and on recall of personal memories, it is necessary to explore the structure of the life-story schema. The following section details research on the structure of life-story chapters, a component of life-story narratives, and life-story schema which occur at a mid-level. These are predicted to play a fundamental role in the structural schema used to access autobiographical information.

1.3 Life-story chapters

The next section will discuss the evidence for temporal organisation of autobiographical narrative information in the form of life-story chapters, similar to the life-time periods, and extended events of the SMS (Pillemer, Krensky, Kleinman, & Goldsmith, 1991; Schooler & Herrman, 1992; Thomsen & Berntsen, 2008) which themselves have an organisational role in memory (Burt, Kemp, & Conway, 2003; Conway & Bekerian, 1987; Skowronski, *et al*., 2007). Life-story chapters, are a clustering of related events and information within autobiographical reports, which are thought to represent the underlying structure of autobiographical memory. They are proposed to contain information about temporality of events, typical events within a given time period, goals, place, plans and emotional tone (Thomsen, 2015). The creation of autobiographical life-story chapters reduces the requirement to choose from a vast number of specific events in favour of summary periods, and within a life-story, and enable the creation and maintenance of a sense of self-coherence (Habermas & Bluck, 2000).

Figure 1-2 shows the theoretical structure of the life-story narrative and life-story chapters. Within this illustration, chapters may be represented as periods of years, but more significant sets of events may cover considerably shorter periods, resulting higher and lower-order chapter structures. Different studies indicate that chapters may be formed either occur as a by-product of goal pursuit (Brown & Schopflocher, 1998; Shank, 1982) in that over periods of time events spent with the same aim or outcome in mind will be linked; by the retrospective cognitive reviewing of past events (Barsalou, 1988), or a combination of both. The process of life-period reasoning suggested by Thomsen (2015) to be the mechanism of

retrospective life-story chapter creation, has yet to be explored, but it is reasonable to assume that it follows a similar two-phase process to autobiographical reasoning. It may also be that this process occurs hierarchically with an emphasis on chapter-level processing, followed by life-story processing. For example, as outlined in Section 1.2.1 the reasoning process begins with the systematic recall of autobiographical episodic memories pertaining to a particular period or theme, and this information is then linked by extrapolated self-knowledge, justification, and rationalisation. That this is occurring at a chapter level, and subsequently at a life-story level would increase internal coherence of extrapolations e.g. 'I was a shy child', rather than longer term extrapolations and narrative links, e.g 'I was a shy child but then became more confident at university'.

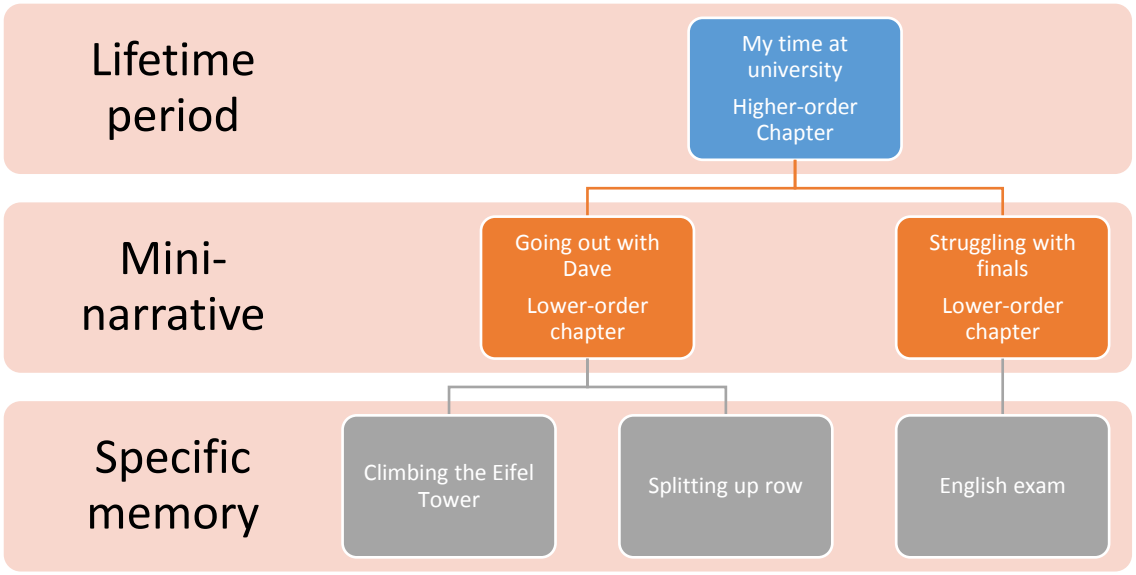

Figure 1-2: Hierarchy of chapters in autobiographical memory *Illustrating the clustered hierarchy and relationship between longer and shorter time periods for autobiographical memory*

The difference between the life-time period/extended events structures of the SMS, and the definition of life-story chapters has not been made clear in current literature. Most researchers do not define any difference, and those working from an autobiographical memory perspective use the terms interchangeably, with work exploring the role of chapters using that of lifetime periods, general events and extended periods provided in narrative accounts as evidence of chapters (Thomson, 2015).

It is worth noting at this stage therefore, some disparity between the apparent clustered structure with life-time periods as a higher order structure and general events as lower-order, for example a general event such as 'going to the cinema' could not be thought of as strictly belonging to a particular life-time period unless further perceptual information was provided to evidence this, and as such would be more classifiable as a script for an activity rather than an autobiographical event. While the concept of general events creates problems for the SMS, it is less so for narrative accounts which may be structurally bound by semantics, it seems logical to assume that consideration of a particular event such as going to the cinema will be communicated to others either with some contextual information such as general information about when and where, or as a semantic understanding which would be presented in the abstract e.g. 'when you ('one') goes to the cinema'. In schematic terms the difference between general events and life-time period/extended events is less pronounced, however general events are more representative of scripts, while chapters are more representative of temporally defined schema.

Links between the structure of life-story chapters, and that of the autobiographical memory store have been suggested by a number of researchers, but these connections have been analogous rather than explicitly defined. For example Thomsen (2009; 2015) examined life-stories in order to categorise the elements of the self-memory system (Conway & Pleydell-Pearce, 2000), relating to life-time periods, extended events. According to Thomsen, narrative and conceptual chapters are representative of this mid-level categorisation of semantic autobiographical knowledge (Thompson, 2009)

This suggests a dual role of life-story chapters as schema which lies in their influencing role in providing information on typicality which in turn influences recall, and potentially subsequent narration, which feeds back in to the schematic representation. As a result, narration of personal events, either through individual rehearsal (thinking about experiences), or through interpersonal exchange (talking about experiences) has been suggested as the way in which cognitive schema are created and maintained, through autobiographical reasoning (Habermas & Bluck, 2000; Thomsen, 2015), with narratives interlinked with cognitive representations.

1.3.1 Research evidence for life-story chapters

While there are considerable overlaps between the research carried out on the impact of life-time periods on memory recall, there is a separate tradition of research in to role of chapters as a structuring component of narrative accounts, as defined by either participants or researchers, or interpretation of characteristic prose in narrative texts. The following section will discuss the research which has used chapters, of these, five studies (Burns & Leonard, 2005; Dalgleish, *et al*, 2011; Pillemer *et al*, 1991; Thomsen & Berntsen, 2008; Thomsen, Pillemer, & Ivcevic, 2011) explicitly asked participants to report life-story chapters, while a number of others (Malley & Stewart, 1991; Pillemer, Sanborn, DiDonato, & Wink, 2003; Thomsen, 2009) have relied on researcher interpretation of narrative accounts.

Of the five studies eliciting participant defined chapters only three have a specific focus on autobiographical memory in terms of distribution of content episodic memories, others looked at the inclusion and characteristics of events which occur within the cultural life-script; thematic similarities within and between chapters, and changes to structure over time and gender. Pillemer and Colleagues (1991) asked participants to define chapters after eliciting a narrative of the first year of undergraduate study in 30 students, and examined the differences between men and women in chapter categorisation, along with the distribution of memories within the chapters. Thomsen and Berntsen (2008) and Thomsen and Colleagues (2011) looked for links with the cultural life-script and to establish a pattern of chapter distribution analogous to the reminiscence bump, while Dalgliesh and Colleagues (2011) aimed to examine biases in chapter attributes occurring in participants current and recovered depression when compared to never-depressed controls; and Burns and Leonard (2005) examined the narrative chapter structures for developmental progression in response to the idea that, for women, life is over at 40.

Procedures for elucidation of chapters are generally similar, with instructions being some variation on the following request:

> *'Imagine that your life story is a book, and that within this book there are chapters. You can have as many chapters as you like, and they can be of any length. The chapters should include your entire life (or since 10/11 years old). There is no right or wrong way of dividing up one's life, so you can do it in any way you choose'*

Of the four studies which asked participants to title their chapters, all resulted in labels which summarised one or two important themes. In a study of older adults (aged 49-75 years), who were asked to narrate their life-stories and subsequently produce chapters for them, participants reported chapters within recognisable themes, as might be representative of *life-periods* e.g. childhood, early adulthood; *work/education* themes e.g. 'primary school', 'retirement' and *relationships* e.g. 'marriage', 'young children' (Thomsen, *et al,* 2011). Using a similar procedure Dalgleish and Colleagues (2011) asked participants (aged between 40 -60) with current MDD, remitted MDD and never depressed controls to report chapters for their past and future lives and provide a short description or name for the period. Examples of chapters from the past included 'school days', 'depression', 'Grandparents death', 'marriage', with future chapter titles being relatively similar but age-appropriate, for example, 'grandchildren' and 'new career'. When comparing chapter narratives of women between 40-45 with those of women between 60-65 for themes, Burn and Leonard, (2005) noted while many chapters were given formal titles, such as 'Bob's retirement', others were more emotionally compelling, e.g. 'Disaster time'. A gender difference was reported in only one study (Pillemer, *et al*, 1991) who found that male participants tended to describe chapters using themes, while women tended to define chapters by emotional tone.

One area of research has specifically linked chapter-based memories with the schematic structure of autobiographical memory has examined participant-defined chapters and their associated specific memories as analogous to the autobiographical memory 'reminiscence bump' (Jansari & Parkin, 1996). Thomsen and Berntsen (2008) examined the recall of specific memories considered 'central' the life-story in 59 older adults (60-70 year olds), and also the distribution of life-story chapters. Their results suggest that the cultural-life script has an organisational role in linking the recall of events and the structure of chapters, with the relationship between specific memories and the start of chapters, with life-script events and a 'reminiscence bump' clustering around the 20-30 year age bracket. Later research has found evidence that the distribution of specific memories was more common at the beginning of chapters, and that positive but not negative chapters showed a chapter-level reminiscence bump for specific memories (Thomsen, *et al,* 2011). In this study adult participants (mean 59.5 (6.5) years) were asked to section their life stories in to personally meaningful chapters, and the most positive and negative were selected, and each used to cue recall of a specific memory. Results from these studies suggest that chapters show a their own 'reminiscence bump' with specific memories tending to be recalled from the start of

chapters, and that chapters themselves cluster through the life-course in the same ways as specific memories, with an associated positive memory bias. These results cannot be explained by the biological, account of reminiscence-bump causation which proposes an evolutionary advantage of recalling novel events (Schrauf & Rubin, 1998), along with raised cognitive performance at late adolescence/early adulthood. Favouring instead a conclusion which is conducive with either a cognitive account which emphasises that memories recalled from the bump are more likely to be 'first-time' events (Berntsen & Rubin, 2002); and the narrative identity account which related the preferential recall to their having occurred during a period of identity schema formation (Demiray, Gülgöz, & Bluck, 2009; Glück & Bluck, 2007; Rubin, Rahhal, & Poon, 1998). The authors conclude that chapters have a role in the specific memory reminiscence bump as a result of the higher number of 'new' chapters at this age, or that higher numbers of culturally significant (life-schema) of novel events, which would be more memorable (for the latter) or more likely to be recalled and rehearsed (for the former), in addition there may be a greater number or degree of shifts in self-perceptions or goals which delineates new chapters (Glück & Bluck, 2007) at this age. While it is not clear whether the clustering of memories create chapters, or chapter structures define the memories which are recalled, and whether these factors interlink the process appears to be a smaller-scale version of the creation of the life-story.

As outlined above, specific links between SMS structures of lifetime periods, and general events, have been drawn to evidence cognitive representations analogous to chapters. This is not unreasonable given the similarity in definition, but to date only one study has matched researcher interpretation of chapters i.e. the ways in which narrative is thematically sectioned in to life-story chapters, with those reported by the person i.e. how the person recalls their lives (Pillemer, *et al*, 1991), and while authors reported a good level of similarity between participants and researchers, this study only examined the story narrative of a single year in participants lives. This limited time-scale could have led to a degree of convergence, without providing strong evidence for the idea that researchers can predict how memories are clustered from an external perspective, for example by categorising narratives.

Studies which have examined chapters from the perspective of researcher interpretation can be categorised in to those examining autobiographical memory, including those previously mentioned in Section 1.1.2 within the categories of 'life-time periods',

'extended events' (Conway, 1996; Conway & Pleydell-Pearce, 2000) of the self-memory system, and those examining narrative accounts.

When examining the narrative, rather than the specific, memory-linked, role of chapters, Thomsen (2009) elicited life-story narratives from 30 elderly Danes aged a mean (SD) 79.3 (3.4) years, with life-stories lasting around 45 minutes (as requested by the interviewer). A comprehensive component analysis was carried out, to examine the structure and categories of information which were communicated by the narratives. Results indicated that that chapters are the most frequently used structural component of life narratives with a mean (SD) 33.13 (20.2) chapters per life-story, while specific memories occurred a mean (SD) 7.80 (7.4). Similarly, Mackavey, Malley and Stewart (1991) carried out a content analysis on 49 published accounts of psychologists' lives for autobiographically consequential events which occurred as both specific and extended narrative forms, with episodic memories accounting for less than a third of reported autobiographical descriptions. A further two studies have examined the distribution of specific event narratives found that they were more common early on in stories as suggested by the reminiscence bump recall studies by Thomsen, and Berntsen (2011), and that women tended to include a greater number within their narratives (Pillemer *et al*., 1991; Pillemer, *et al*, 2003; Pillemer, *et al*, 1988). Thus it appears that in order to communicate our life stories we speak at a chapter-level more commonly than event-level.

1.3.2 Role of life-stories in autobiographical memory

A life-story narrative is a form of representation of the content of autobiographical memory, structured around what individuals learn and understand about culturally significant events, and what is worth telling (Bohn, 2011; Bohn & Berntsen, 2013; Fivush, Habermas, Waters, & Zaman, 2011; Koppel & Berntsen, 2014; Rubin, Berntsen, & Hutsen, 2008) and influenced by the context of 'telling' and the audience (Pasupathi, McLean, & Weeks, 2009). The structure of the narrative is not simply a representation of events which have happened to a person, but also a result of autobiographical reasoning (Habermas & Bluck, 2000, Thomsen, 2015), the process by which life-period events are connected in personally meaningful ways to a temporally and thematically structured whole. As a result of the temporal magnitude of life-stories, which by definition span the lifetime, there is a significant role to play of mid-level structures in enabling the organisation, contextualisation, and economy of communication of events. Despite the current pre-occupation in research with

the phenomena of episodic memory recall, and the proposal that specific events are the building blocks of life-stories (Bluck, 2003), Thomsen (2009; 2015) has argued that autobiographical chapters are an under-explored, but essential, aspect of the life-story providing a framework for autobiographical memory recall, and through this a person's sense of self. Suggestions for why life-story chapters are a neglected area include that there have been definitional difficulties in deciding what they constitute. They are not, for example, represented within Tulving's (1985) definitions of memory categories 'episodic' and 'semantic', as they include a range of both types of information, i.e. an autobiographical semantic memory (Thomsen, Oleson, Schneider, & Tønnesvang, 2014). Differences in the ways that chapters are described within the literature also add to the confusion, for example, 'extended event timelines' (Barsalou, 1988), 'life-time periods' (Conway & Pleydell-Pearce, 2000), 'mini-narratives' (Robinson, 1992), 'autobiographical periods' (Brown, Hansen, lee, Vanderveen, & Conrad, 2012), event-clusters (Brown & Schopflocher, 1998), and 'life-story chapters' (McAdams, 2001) all appear to indicate the same phenomena. While it could be argued that this definitional difference could indicate a loosely defined concept, contemporary evidence points to neural correlates of personal, autobiographical semantic memory being distinct from episodic memory (Renoult, Davidson, Palombo, Moscovitch, & Levine, 2012), and both that semantic and episodic information contributes to temporally extended personal events (Prebble, Addis, & Tippett, 2013).

Thomsen (2009; 2015) proposed that life-story chapters should be defined as memories for different activities and episodes stretching over an extended periods of time and relating to the same higher order activity, and they are often, in practice likened to the chapters of a book, containing a temporal narrative, and connective event links along with information and evaluations. As a result of the need to represent real-life events, in combination with the need to create an autobiographical 'sense' to life-stories, chapters can be of various lengths and incorporate definitions such as 'mini-narratives', and 'extended events', all of which are analogous to components of the self-memory system, for example the lifetime period, 'my time in the army' or extended event 'our summer in Italy'. Thomsen's later work proposes the title 'autobiographical periods' apparently in order to span the research in to autobiographical memory, and narrative construction, the latter of which tends to rely on this 'book chapter' metaphor in research (Thomsen, 2015). For the purposes of this thesis the term 'life-story chapters' or 'chapters' will be used as this draws on the tradition of narrative research.

The role of chapters in life-stories is reflected in everyday interactions where recollective experiences rely on personal semantics and life-story chapters which are frequently used to contextualise and create temporal reference points (Brown, Sheval, & Rips, 1986; Friedman, 2004; Shum, 1998). Research has pointed to the use of chapters as being frequently mentioned in tasks where extended periods are related to others (Barsalou, 1988; Habermas & Diel, 2013; Mackavey, Malley, & Stewart, 1991; Pillemer, *et al*,, 1991; Robinson & Taylor, 1998; Steiner, Pillemer, Thomsen, & Minigan, 2014; Thomson, 2009), when autobiographical memories are cued by music (Ford, Addis, & Giovanello, 2011), or narrative-based sentences for past and future (Anderson & Dewhurst, 2009). Thus in research settings there is a preponderance of chapter-like recall, comprising autobiographical semantic knowledge which stretches over temporal distances greater than the notional 24 hour period which delineates episodic memories.

A further aspect of differentiation between chapters and episodic memories are that in practice episodic memories which are retained for significant periods are often self-defining (Pillemer, 1998; Singer & Salovey, 1993); emotionally potent, or relating to life transitions (Thomsen & Berntsen, 2008) or cultural events (Harris, Barnier, Sutton, & Kiel, 2010), and so potentially serve to illustrate significant points in the life-story, but these are by definition not representative of life in general. The day to day story of life is less defined, containing clusters of events, and periods which are semantically distinct from others. Personal narratives themselves also tend to comprise a variety of autobiographical features, along with explanatory and contextualising components which are a result of a chapter-level autobiographical reasoning process described as 'life-period reasoning' (Thomsen, 2015).

Overall it is clear from reviewing the literature on life-story chapters, that as a result of approaching the concept from two directions, these being from autobiographical memory, and from structures of narrative accounts, the nature of chapters themselves is confused. If chapters are in fact the same as life-time periods, or general/extended events, why use a new term? Also, if they are narrative representations of time periods of varying lengths, should the SMS be adjusted to accommodate this variability? Alternatively, could they be considered constructed narrative devices for representation of clusters of events of similar nature? Examining participant-created chapters has directly revealed in only one study (Thomsen, *et al*, 2011) that they may relate to the theoretical structure of autobiographical

memory and the self-memory system (Conway & Pleydell-Pearce, 2000). Other studies have either inferred the links between autobiographical memory and narrative construction, or remained indifferent. In practice the concept of chapters has ecological validity, in that they are easily identified by participants and by researchers in transcripts and published narratives (Pillemer, *et al*, 1991; Schooler & Herrman, 1992; Thomsen, Pillemer, & Ivcevic, 2011; Thomsen & Berntsen, 2008), but their relationship to cognitive autobiographical representations has not been fixed.

The research discussed in this section highlights one of the perennial problems of autobiographical memory research, that being the tension between reported experience and narratives, and internal representation. As discussed in the section on autobiographical memory, there is good evidence from priming studies for a hierarchical clustering of autobiographical information, and as metaphorical 'chapter' structures are suggestive of life-time periods, or extended narratives, they are a useful proxy in research as they appear to make 'common sense' to research participants. As yet research has not effectively addressed the question of whether matching of internally (participant) defined chapters, when compared to externally (researcher) defined chapters is possible as only one study has examined this (Pillmer, *et al*, 1991). In particular the research by Thomsen (2011; 2015) which evidenced the ubiquitous nature of chapters in narratives used a broad definition and did not differentiate the use of chapters as a narrative device to make stories more coherent, and the underlying structure of memory representation. Despite this, if chapters are approached as schematic representations, specific predictions can be made about the relationship between chapters and the memories which might be cued by them by using participant interpretations. For example, because chapters appear to be both constructed with reference to cultural knowledge (life script),narrative identity (life-story schema), and the demands of communication, but also relate to actual events it could be predicted that there are specific events which actually occurred to the individual, but are also used as exemplars for chapters e.g. for a chapter about 'life as a soldier' a specific memory could be 'the day I was send to Afghanistan', and that these would be rehearsed to a greater extent than those which correspond less to the chapters theme, recall-ability would therefore rely on how relevant the specific memory is to the cuing chapter.

1.4 Summary of Chapter 1

This introduction has concerned itself with examining the suggested role of life-story schema and life-story chapters in the structure of autobiographical memory. The existence of the life-story schema as a cognitive framework for underlying autobiographical memory is suggested by studies which show a link between the patterns of recall over the life-time and the ways these are structured within the life-story. Evidence points to life-story narratives relying on schematic representations internalised during childhood (Bohn & Berntsen, 2008), and that memory narratives are guided by learned cultural patterns from the cultural life script (Berntsen & Rubin, 2004).

In addition, the two theoretical models of autobiographical memory both rely on a life-story template to guide self-knowledge, the SMS uses an abstracted 'life-story' as the entirety of autobiographical knowledge, while the BSM uses the structure of a narrative schema to provide a guide for meaning and relevance throughout the autobiographical memory system. Life-story chapters, are sub-sections of the life-story narrative, and this suggests is that chapters are narrative-based sub-structures of the life-story schema. They are thematically linked clusters of autobiographical information, which have abstracted attributes; are identifiable in life-story narratives, and easily defined by participants under experimental conditions, and occur more frequently in narratives than other components (Mackavey, Malley, & Stewart, 1991; Pillemer, *et al*, 2003; Thomsen, 2011)

The difference between a life-story chapter, and a representation in narrative of a life-time period (the theoretical structure from the SMS), reveals an overlap but some differences. Although it is common for chapters to be temporally represented, this is not always the case (Burt, Kemp, & Conway, 2003; Burt, 2008), and this suggests that they are more akin to the BSM which would rely on a narrative chapter structure which reflects fluidity and thematic linking seen in a few studies. Despite this the best evidence for a hierarchical categorisation in autobiographical memory does emerge from the use of life-time periods, or chapter-like structures acting as priming clusters (Conway & Bekerian, 1987), and for use in temporality judgements (Arbruthnot & Brown, 2009). The temporal stability of life-story chapters has not been explored, but is indicated by priming studies, and that many chapters match culturally defined life-periods, such as marriage, university life, etc. (Burns & Leonard, 2005; Dalgliesh, *et al*, 2011). In addition they appear to be formed and structured in temporal

patterns which reflect those found for autobiographical memory recall, as shown by evidence for a reminiscence bump of, and for, chapters (Thomsen & Berntsen, 2008).

That chapters are schematic in nature, i.e. create a template for the recall of events with a particular subsection or period of a persons' life is predicted by a number of characteristics. The first is that they comprise not simply clusters of episodic memories, but also abstracted knowledge and summative conclusions from the period in question, and also research in to the process of autobiographical reasoning, and narrative processing (McAdams, 2006; Singer & Bluck, 2001). Effective processing of events creates a closure on the narrative story which represents them, and this crystallisation of chapters reduces opportunities for variability, re-interpretation and change, while the entirety of the life-story schema must remain 'open' throughout life, life-story chapters can close. The role of autobiographical reasoning in the establishment of life-story schema is suggested by increased reasoning following challenging events, a synchronic-diachronic challenge. Life-period reasoning has not been explored, but likely to follow the same two-stage process as autobiographical reasoning. What we still don't know is how the proposed chapter schema would influence the recall of material which was dissonant, or incongruent with the content of the chapter in question. Questions also remain concerning the use of chapters in research, because of the variability in definition, and the interchangeability of life-time periods (as cognitive structures), and life-story chapters (as aspects of narrative). Does the structure of the life-story narrative and component chapters, match the life-story schema, and if so do differences in narrative structure represent differences in schema?

In order to explore these questions this thesis looks to compare the life-story narratives, and life-story chapters of people with depression with non-depressed groups. People with depression are reported to produce narratives with reduced coherence, more negative motifs and summations, and may be impeded in their ability to undergo autobiographical reasoning as a result of cognitive difficulties and impeded rehearsal. The following chapter outlines these in detail and puts forward the argument that a breakdown in the chapter structure for people with depression may be a diathesis which impacts on their sense of self, and ability to engage in therapeutic interventions aimed at addressing their condition.

Chapter 2 Depression and Memory

2.1 Occurrence of depression

Worldwide, depression is believed to affect over 350 million individuals at any one time, and occurs across countries irrespective of cultural and economic status (Marcus, Yasmay, van Ommeran, & Chisholm 2012). In a recent survey of 17 countries, the World Health Organisation (WHO) found that on average 1:20 people had experienced a depressive episode in the previous year (Marcus, *et al*, 2012). Depression tends to occur early on in life and is likely to reoccur, and has been established as a chronic and life-long condition (Gotlib & Hammen, 2009). Daily 3000 people worldwide with a diagnosis of depression complete suicide, with 20 attempters to every completer (Marcus, *et al*, 2012).

The term 'depression' can refer to a range of diagnosable experiences of mental distress, all relating to a central cluster of negative emotional regulatory symptoms such as dysphoria or prolonged sadness. The nature of this disorder has been examined in terms of its symptoms, course, epidemiology and aetiology, and the ways in which we understand and prioritise these features impacts on our approach to its treatment and anticipated outcome.

2.1.1 Dysthymic and major-depressive disorders

All depressive disorders share similar features, but this thesis concerns itself with the experience of both dysthymic-, and major-depressive disorder, the onset, maintenance, recurrence, and relapse of which have been examined in detail by Gotlib and Hammen (2009). Features of the disorders include: dysphoria or sustained sadness; anhedonia (an absence of emotional responsiveness); weight or appetite disturbance; sleep disturbance; psychomotor agitation/retardation; fatigue and loss of energy; feelings of worthlessness/guilt; diminished concentration, and thoughts of suicide or death.

Diagnosis of depressive disorders involves the observation or reporting of symptoms according to criteria established in psychiatric guidance such as the Diagnostic Statistical Manual of the American Psychiatric Association (DSM: American Psychiatric Association, 2013). Explanations and causative models for depression are given at the both general and

specific levels, and these include risk factors, including familial patterns of occurrence (Weissman, Wickramaratne, Nomura, Warner, Verdeli, *et al*, 2005) and genetic markers (Flint & Kendler, 2014). Cognitive factors such as subjective emotional experience (Bylsma, Morris, & Rottenberg 2008), thinking style e.g. rumination (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), diminished cognitive control (Roiser, Blackwell, Rock, & Riedel, 2014), attentional bias (Gotlib, Krasnoperova, Yue, & Joormann, 2004; Pyszczynski, Hamilton, Herring, & Greenberg, 1989) and impaired memory function (Dalgleish & Werner-Seidler, 2014). Along with biological and neurological markers of the condition such as neuroendocrinology (Checkley, 1996; Ströhle, 2003)

Proposed external factors which influence the incidence of depression include socio-economic status, familial and social context (Burcusa & Iacono, 2007; Gilman, Kawachi, Fitzmaurice & Buka, 2003; Lorant *et al*., 2006; Wille, Blettner, & Lemstra, 2008), and features which exist on the boundary between internal and external factors, such as social-interpretive bias, and interpersonal function (Beck, 1967; Joiner & Tommons, 2013). This final feature of depression is one which has been minimally explored, but as people with depression are as embedded in the shared interpersonal context as the rest of humanity, it bears merit to consider how aspects of communication might affect the experience of their condition.

Depression is a syndrome which cannot be effectively diagnosed without the reporting, by the individual, of behavioural and experiential symptoms, or close clinical observation. Depression diagnosis is carried out by a trained clinician using interview techniques such as SCID-II (First, *et al*, 1997) (Appendix 12), which allows the systematic evaluation of DSM-specific criteria for depressive disorders. Criteria include at least one of the following to be currently interfering with the person's life most of the day, nearly every day, for at least two weeks: abnormal depressed mood most of the day, or abnormal loss of all interest and pleasure most of the day, or, if 18 or younger, abnormal irritable mood. Along with at least five of the following symptoms, present during the same two-week depressed period: abnormal depressed mood (or irritable mood if a child or adolescent); abnormal loss of all interest and pleasure; appetite or weight disturbance; sleep disturbance, either abnormal insomnia or abnormal hypersomnia; activity disturbance, either abnormal agitation or abnormal slowing (observable by others); abnormal fatigue or loss of energy; abnormal self-reproach or inappropriate guilt; abnormal poor concentration or indecisiveness;

abnormal morbid thoughts of death (not just fear of dying) or suicide. As a number of these are largely subjective, diagnosis requires the person or someone who has been in close contact with them to report these symptoms, in addition a number of them are reports of 'change', being the reduction or increase from normal levels, which can also lead to variability in the perceived severity of the condition.

Rating measures for depression are used, not for diagnosis, but to monitor symptom severity, for example the Hospital Anxiety and Depression Scale, (HADS: Hamilton, 1967); Beck Depression Inventory (BDI-II: Beck, Steer, & Brown, 1996), and the Patient Health Questionnaire (PHQ-9: Kroenke & Spitzer, 2002). As a result of this variety in symptoms, and diagnostic criteria, problems are seen when trying to establish a match between diagnosis of mild depression by the presence of absence of symptoms, and the use of boundary scores on established mood rating measures, and there remain critics of the assumption that mild- moderate- and major- depression exist upon a continuum of symptom severity (Hegerl, Allgaier, Henkel, & Mergl, 2012)

The merits of diagnostic assessments such as the SCID-II (First, *et al*, 1997) which is based on the criteria laid out in the DSM, is that the experience of the person is closely examined and both presence/absence of a symptom is established, with concurrent assessment of severity, and the length of time each symptom has been experienced. Thus assessment interviews are more stringent in ensuring there are no 'false' positives and negatives. Self-report scales such as the HADS, PHQ-9 and BDI-II are tick box short measures which allow the person to rate the presence, absence and severity of the key symptoms of depression without obtaining a full history. As a result of the summative scoring of the scales, the scales do not require the presence of the standard DSM-V diagnostic criteria for depressive disorder, neither do they allow the differentiation between the various depressive conditions. These scales are thus less time consuming, and may be used to track depression severity over time, they are not however diagnostic of depression. In research the term *dysphoria* is used to denote symptomatology of moderate- to major-depressive disorder in the absence of clinical diagnosis.

2.1.2 Causes and treatment of depression

The primary causes of depression are not conclusively established but evidence points to a number of risk factors which predispose individuals to developing depression. In

therapeutic and mental healthcare practice, the most useful theoretical model for examining the onset and perpetuation of depression is the biopsychosocial model (Engels, 1977) which allows the incorporation and consideration of all causative and maintaining factors for mental health problems including depression. More specific models pertaining to depression include the diathesis-stress model (Beck, 1967; Ingram & Luxton, 2005) which proposes causal links between the multiple influential factors found in depression.

The idea that predispositions, maintaining, and resilience factors are relevant to the development of psychological disorders has been long established, with a formalised diathesis-stress model being formally developed for schizophrenia in the 1960s (Ingram & Luxton, 2005). Within these models mental illness is understood in terms of a pre-existing vulnerability (diathesis), combined with a triggering experience (stress) which leads to the experience of mental illness. The diathesis can be conceptualised as either a genetic, early life-stress, and/or a schematic factor, while the stressors are usually conceptualised as life-events such as trauma, social and emotional challenges, and in some cases physical injury. Despite the general acceptance of the biopsychosocial model, medical treatments for depression tend to target biological causes leading to treatment addressing the biochemical and neurological features of depression (Linde, Rucker, Jamil, Schumann, Meissner, *et al* , 2015), while a diathesis-stress model (Ingram & Luxton, 2005) is commonly used as the foundation for psychological therapy and treatment.

Beck's diathesis-stress model of depression proposes that diathetic aspects of depression are the cognitive and behavioural biases which form part of personality interact with environmental triggers, to initiate functional biases in cognition, emotion and behaviour. Beck's model forms the foundation of the most common, psychological treatment for depression, cognitive-behaviour therapy. This therapy directly addresses cognitive schema, and attempts to adjust habitual ways of thinking, expectations and emotional responses (Beck, *et al,* 1979).

Preventative measures which address diathesis aspects of depression have shown to be effective in reducing risk of developing the disorder. In their 2008 review of 19 studies in to randomised controlled trials of methods to prevent the onset of depressive disorders, Beekman, Cuijpers and Colleagues, found that interventions in a range of groups reduced risk of developing depression by around 22%. The majority of interventions were CBT-based, with three defined as 'interpersonal' therapy and a small number of others such as

psychoeducational and peer-support groups. This reveals that not only are there specific risk factors related to depression, but that aspects of individual experience and cognition may be changed to provide protective factors reducing the chances of depression occurring. The corollary to this is that there is an imperative to define the risk factors which predispose individuals to depression

2.2 Cognitive features of depression

The key assumption of the Beck model is that dysfunctional schema are vulnerability factors for depression, and are often assumed to have some element of latency (usually in that they are formed in childhood, and become apparent under stress). Cognitive schema themselves may be conceptualised to have links with development, during which schema are thought to be established, and personality, which is theoretically both the foundation and the result of dysfunctional schema. While useful, therefore, to establish the components which cause and maintain depression, Becks model does not serve to delineate what constitutes 'dysfunction' in any particular component.

While established as a key component of Beck's model of depression, the definition of 'cognitive schema' has not been well elucidated, being differently described as sets of core beliefs about the self and the world, but also as rule systems, they may also be described in terms of 'cognitions' and 'multi-sensory representations' (James, Southam, & Blackburn, 2004). In addition, Becks model for depression suggests that people who are at risk of depression have a functional negative schema for self-related material, which is manifest in behaviour and interactions as 'low self-esteem'. This is variously described in terms of negative self-evaluation in comparison to others, low estimations of own ability, and associated lack of confidence, and is a continuous construct in those experiencing it (Hankin, Frahley, Lehey, & Waldman, 2005). Orth and Robin's 2013 meta-analysis explored the evidence for this link being a diathesis aspect of depression, asking if depression could be the result of a pre-existing low sense of self-value (the 'vulnerability model'), whether a reduction in self-esteem was as a consequence of having depression (or 'scar model'), or alternatively as a combination of these two processes (the 'reciprocal relation model'). They used regression analysis to examine longitudinal evidence linking the incidence of predictive and maintaining factors which pointed to vulnerability as a result of pre-existing low-self-esteem as the key causal factor in depression. The ability to maintain a positive and

functioning sense of self, and self-esteem, is thought rely on the ability to relate and recount, to the self and others, a narrative life-story which both positions the narrator in a positive light, allows the potential for a coherent progression in to the future, and confirms a particular life-position based on the principles and beliefs of the individual (McAdams, 2006). If this aspect of self is impaired it is reasonable to assume that the resultant poor-sense of self-identity is a vulnerability which can lead to depression.

Of particular interest to cognitive psychology are the aspects of bias which influence the attention, processing of information, and memory for events which re-inforce negative self-schema. Attentional biases may be both precursers and maintaining factors in depressive disorders (Clark, Beck, & Alford, 1997; Browning, Holmes, & Harmer, 2010) tending to result in an enhanced perception of negative material, for example, people with depression will have a reduced tendency to avert attention from negative material (as seen in non-depressed individuals) (Bradley, Mogg, & Lee, 1997; McCabe, Gotlib, & Martin, 2000). Attentional bias has also been shown to be experimentally sensitive to negative mood priming (Gilboa & Gotlib, 1997; Ingram, Bernet, & McLaughlin, 1994; Ingram, Miranda, & Segal, 1998; Miranda, Gross, Persons, & Hahn, 1998; Miranda & Persons, 1988; Miranda, Persons, & Byers, 1990). Evidence of a negative processing bias was found to be predictive of later depression was shown in a study by Rude and Colleagues (2003). Using the Scrambled Sentences task (SST: Wenzlaff, 1993), which requires participants to order a selection of words in to grammatically correct sentences, the words provided give opportunities for negative, and positive statements. For example, 'winner, born, am, I, loser, a' could result in 'I am a born winner', but also 'I am a born loser'. A negative processing bias in the SST is provided by a higher proportion of negative as opposed to positive sentences. At follow-up 12-18 months after the SST task, those participants who had subsequently experienced a depressive episode where found to have been more likely to complete sentences with a negative rather than positive meaning. Similar to attentional biases in depression, negative processing biases may not be immediately evident under experimental conditions, leading to some confusion as to the role in the aetiology of depression. When cognitive load is increased during experimental tasks, for example, by rehearsing a sequence of numbers while performing the experimental task, aspects of bias which had otherwise been undiscovered have been revealed. Wenzlaff and Bates (1998) found that when participants were given a scrambled sentence completion task, under conditions of increased or no cognitive load (in the form of maintaining a six-figure number

in short-term memory) formerly depressed students in the load condition completed more sentences with negative rather than positive meaning when compared to never depressed controls. This aspect of increased load could impact on recovery maintenance, as Segal, Gemar and Williams (1999) found that the long-term probability of relapse after CBT and psychopharmacology treatment in depression was mediated by dysfunctional attitudes, but only when these attitudes had been reported after negative mood-induction.

The presence of maladaptive cognitive mechanisms in depression is also linked to cognitive processing mode in memory encoding and recall. Processing mode relates to the cognitive generation of events as either abstract/analytic ideas, or more concrete/experiential events, the former being information or 'facts' about events, the latter containing more sensory material or evoking physical sensations. An abstract thinking style has been linked to brooding rumination, one of the risk-, maintenance- and re-occurrence-factors in depression (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). It is also linked to the perceived disparity between ideal and actual experiences (Martin & Tesser, 1989; Watkins, Moberly & Moulds 2011; Werner-Siedler & Moulds, 2011), a further feature of depressive cognition. In a recent study Werner-Siedler and Moulds (2012) found that manipulating processing mode in memory recall following negative mood induction, requiring participants to focus on an episodic memory using either an abstract (thinking of the meaning of the event), or concrete (visualisation of the event details) processing mode impacted on the ability to use specific (event-based) positive memories in mood-repair, with concrete processing in depressed participants resulting in positive mood gains, while abstract processing did not. This abstract rather than concrete modality is reflected in a diminution of memory features such as vividness, experiential detail and coherence rather than simply availability of memories (Sutin & Robins, 2007).

One aspect of depression which could explain both the abstract cognition and cognitive load phenomena is that of the use of cognitive management strategies by people with depression, to suppress, or avoid negative information, particularly that which is highly self-relevent. One body of research which has examined the role of inhibition in depressive-cognition comes from explanations for *overgeneral memory* which is a precursor, possible risk factor, and symptomatic of depression (OGM: Williams, 2006). Over-general memory was first established as a feature of suicidal groups by Williams and Broadbent (1986), and later in depressed groups by Williams and Scott (1988). The phenomena is commonly

examined experimentally by asking participants to report, in response to cue-words or images, specific episodic memories (being an autobiographical event, lasting no more than one day, for which the person can recall features which indicate that it was a single occasion). 'Generality' is considered to be present when the reported event cannot be confirmed as being a single specific event despite instructions. The standard test for OGM is the AMT (Williams & Broadbent, 1986), a word-cuing task, however other paradigms have been developed to explore the phenomena at more depth (Goddard, Pring, & Felmingham, 2005; Raes *et al* 2007).

The causal link between OGM and depression has been elucidated by examining populations who experience OGM, such as those who have experienced childhood trauma (Crane, Heron, Gunnell. Lewis, Evans, & Williams, 2014), and abuse (Aglan, Williams, Pickles, & Hill, 2010; Kuyken & Brewin, 1999; Raes, Hermann, Williams, & Eelen, 2005), which support the idea that it is predictive of depressive status (Hermann, Vandromme, Debeer, Raes, Demyttenaere, *et al*, 2008); suggests that it develops as a result of habitual avoidance of negatively impactful memories, and that it is therefore an emotional regulation strategy (Hermann, *et al*, 2005; Williams, 2006). This functional avoidance explanation is part of the CaRFAX Model of depression (Williams, *et al*, 2007) which itself draws on the Self-memory system model of autobiographical memory (Conway & Pleyell-Pearce, 2000). The CaRFAX model proposes that, once initiated by a cue or search criteria for a specific autobiographical event, a generative memory search will start at the level of general events and under normal circumstances this will result in access to one of a number of events within this category which best fit the search criteria. Once functional avoidance is established the event memories will become less likely to be accessed, with concurrent reduction in activation over time. A number of studies have shown that OGM is independent of current depressive status, (Aglan, Williams, Pickles, & Hill, 2010; Hauer, Wessel, Geraerts, Merckelbach, & Dalgleish, 2008), and avoidant coping (Horowitz, Wilner, & Alvarez, 1979; Brewin, Watson, McCarthy, Hyman, & Dayson, 1998; Hauer, Wessel, Engelhard, Peeters, & Dalgleish,2009; Hauer, *et al*, 2008; Hauer, Wessel, & Merckelbach, 2006; Kuyken & Brewin, 1995; Raes, Hermans, Williams, Beyers, 2006; Stokes, Dritschel, & Bekerian, 2004; Wessel, Merckelbach, & Dekkers, 2002), and the short-term emotional benefits of OGM were seen in two studies by Raes and Colleagues (Rae, Hermans, De Decker, Eelen, & Williams, 2003; Raes, Hermans, Williams, & Eelen, 2006, Study 1; but see Philippot, Schaefer, & Herbette, 2003). In terms of cuing technique there are obvious differences between the various

methods discussed in Section 1.1.3, so while the AMT allows assessment of memory specificity using a simple binary i.e. memory meets criteria for episodicity or not, the interview techniques and TEMPau are designed to explore the boundary between semantic and episodic memory features within a single narrative. Narrative-based sampling methods are considered to be more ecologically valid as they represent a closer analogue to real-life recall circumstances. In practice it is the balance between semantic and episodic information which characterises overgenerality in memory recall in that the former outweighs the latter. Original findings for OGM in patients with suicidal tendencies led to the use of the AMT to examine a number of psychopathologies, including schizophrenia (Warren & Haslam, 2007); post-traumatic stress disorder (Sutherland & Bryant, 2007); trauma (Raes, Williams, Herman, Eelen, 2005); personality disorders (Bech, Elklit, & Simonsen, 2015), complicated grief (Macallum & Bryant, 2011); post-natal depression (Croll & Bryant, 2000) and in particular MDD (Crane, Barnhofer, & Williams, 2007; Dalgliesh & Brewin, 2007). While these results helped guide theoretical models to explain manifestations of disorders, for example the absence of problem-solving abilities in depression (Evans, Williams, O'Loughlan, & Howells, 1992; Kao, Dritschell, & Astell, 2006; Pollock & Williams, 1998), aspects of the testing protocols and conditions have suggested that OGM is not a fixed state but is dependent on the context of recall and method of cuing, so for example when asked to verbalise cognitive imagery and processes during AMT recall, MDD patients were found to have intact autobiographical memory recall (Barnhofer, Jong-Mayer, Kleinpass, & Nikesch, 2002).

The recall of OGM in MDD is also complicated by the conflicting evidence for the role of cue-valence. A number of studies indicate that positive cues are more likely to result in over-general recall than negative cues (Bergouignan, Lemogne, Foucher, Lougin, Vistoli, *et al*, 2008; Brittlebank, Scott, Williams & Ferrier, 1993, Lemogne, Piolino, Friszer, Claret, Girault, Jouvent, *et al*, 2006; Wessel, Meeren, Peeters, Arntz, & Mechelbach, 2001; Williams & Broadbent, 1986; Williams & Scott, 1988), while other studies report the opposite effect (Brewin, Reynolds, & Tata, 1999; Burnside, Startup, Byatt, Rollinson, & Hill, 2004; Hermans, De Franc, Raes, Williams, & Eelen, 2005; Mackinger, Pachinger, Leibeseder & Fartecek, 2000; Park, Goodyer, & Teasdale, 2002, 2004; Scott, Williams, Brittlebank, & Ferrier, 1995; Watkins & Teasdale, 2004), while still others report no differences (Dickson & Bates, 2006; Goddard, Dritschel, & Burton, 1996; Kuyken & Dalgleish, 1995; Kuyken & Howell, 2006; Ramponi, Barnard & Nimmo-Smith, 2004; Vrielynck, Deplus, & Philippot,

2007). This further indicates that the crucial factor in the ability to recall episodic memories, or at least memories with greater levels of episodic as opposed to semantic details is the method of cuing, and that while over-generality may be a habitual state (Williams, 2006), be predicative of later depression on-set (Gibbs & Rude, 2004; Sumner, Griffith, & Mineka, 2010), and stable during periods of remission (Peeters, Wessel, Merkebach, & Boon-Vermeeren, 2002), it does not mean that episodic memories are unavailable to people with depressive disorders. Nor does the research point to the valence of either the cue, or the memory itself being systematically influential in deciding whether a memory is subject to over-general recall.

Notwithstanding the role of avoidance or suppression in the management of negative material in depression, autobiographical memories have been suggested to have a mood-repair function. In their ground-breaking study Parrot and Sabini, (1990) found that when study participants spontaneously recalled memories, non-depressed individuals whose mood had been negatively induced, recalled episodic memories which were more positive than those who were not depressed, indicating a mood regulation function. This function has been found to be impaired in formerly depressed groups, and reversed for people currently experiencing depressed i.e. recall of positive memories increases negative mood. In a study of currently-, formerly, and never-depressed adults, Joorman, Seimer, and Gotlib, (2007) examined two methods of mood regulation, distraction, and recall of positive memories. For controls both of these were effective in mood repair, however recall of positive memories for the formerly depressed group had not impact on mood, and for the currently depressed group actually had a negative impact.

In addition to recalling memories of positive events, mood in non-depressed groups is also maintained by future imagining of affectively positive events, this has been linked to the ability to maintain perspective on current events e.g. imagining how things will improve, and allow disengagement from current negative events (Berntsen & Jacobsen, 2008). Future thinking is suggested to have equal importance for emotional well-being when compared to memory (Lavender & Watkins, 2004; Luxton, *et al*, 2006), and the cognitive processes involved in the construction of future-imagined events are thought to be similar to those used for the reconstruction of memories (Anderson & Dewhurst, 2009; Schacter & Addis, 2009; Schacter, Addis & Buckner, 2007). The ability to imagine both positive and negative future events has a role in recovery and recurrence of depression (MacLeod & Moore, 2000), and

depression has been linked to a decreased ability to generate future events (Dalgleish, Taghavi, Neshat-Doost, Moradi, Canterbury, & Yule, 2003; Dickson & Bates, 2006; Sarkohi, Bjärehed, & Andersson, 2011; Williams, Mathews, & MacLeod, 1996).

The theoretical reliance on the SMS in the development of the CaRFAX model of overgeneral memory lies in the assumptions around the relationship between categorical, or categorised memories and the specific memories to which they are linked. In the SMS memories are associated with particular life-time periods, and general memories sit within these lifetime periods as summations of repeated events. However, while no specific links have been drawn to date between the functions of the Basic Systems Model and depression, it is possible to provide some predictions which would explain over-generality of recall of specific events. These include that the BSM relies on a narrative framework to structure recall, in essence the reconstruction of events is not reliant on accuracy of representation of past events, but is rather a representation of what is produced in narrative. As is described in the following section, a narrative-based account of memory can account for many of the observed relationships between autobiographical recall and the organisation of self-knowledge in depression.

2.2.1 Self- and narrative-schema in depression

As mentioned in the previous chapter, the definition of 'cognitive schema' has not been well elucidated, being differently described as sets of core beliefs about the self and the world, and rule systems, but are also described in terms of 'cognitions' and 'multi-sensory representations' (James, Todd, & Reichelt, 2009) which are memory-like in nature i.e. representative of past events, containing episodic detail (James, Reichelt, Freeston, & Barton, 2007). Schema, according to Beck's diathesis-stress model can be conceptualised as being both conscious, and pre-conscious, learnt expectations and it is autobiographical memory which provides the components of schema construction. While schema may theoretically consist of Socratically-based if X then Y sequences e.g. If my boss is angry (X) then I am rubbish at my job (Y), autobiographical memory is the 'evidence' store for these beliefs e.g. events when I was rubbish at things. The links between self-concept (the characteristics I believe I possess) and self-esteem (the value I place on these characteristics) and depression have been explored by Beck and Perkins (2001), who developed the proposal that dysfunctional self-schema are a causative factor in development and maintenance of depression.

One schematic representation of self is the life-story schema, which, as discussed in the previous chapter, uses the information within the autobiographical memory system and the framework of the cultural life script to guide the self-concept. In this respect it can be thought of as a meta-schema which links narrative identity, guided rehearsal and communication of autobiographical information, with the autobiographical memory base. Dysfunction within this meta-schema would be predicted to disrupt processes associated with the life-story, such as sense of self, and also the ability to draw on aspects of experience to narrate life-experiences.

The idea that dysfunction as represented in narratives is associated with mental health problems is not new, Schaffer (1983) conceptualized psychopathology as essentially both reflected and perpetuated by a life-story, that does not cohere, is not flexible, and describes an essentially non-agentic, non-responsible self. Impoverished and disorganised narratives appear to reflect a diminished sense of a coherent self or super-ordination (Salvatore, DiMaggio & Semerari, 2004) and the production of disrupted and disorganised narratives is found in a range of people suffering from mental health problems (DiMaggio, 2006; Lysaker & Lysaker, 2006; Neimeyer & Buchanan-Arvay 2004). Narration of positive events, or the ability to represent negative events in a positive light as a result of autobiographical reasoning allows 'meaning-making' (Taylor, 1991) and the maintenance of positive self-image. This process can be considered to be a primary role of narration i.e. that being able to explain an event to produce a cause and effect sequence, or to create aspects of the event which can be used positively, for example by containing 'lessons learnt', or as a foil for current situations. The secondary impact of narration is that in communicating events there is concurrent recall of the cognitive representation, or memory, linked with it, and research where the positively of self-image in communication was manipulated has shown that changes to the affective content of memory as a result (McLean, 2005; McLean & Pasupathi, 2011).

There are two important narrative features of depression which are predicted to impact on the consolidation and maintenance of life-story schema and autobiographical memories. The first is the range and characteristics of available audiences, while the second is the ways in which narratives are constructed, and stories told by people with depression.

The sharing of personal experiences and events helps to maintain social bonds, and interpersonal contact. It occurs within constraints of what can be discussed, and what audiences are receptive to, and this will impact on subsequent memory (Pasupathi &

Oldroyd, 2015; Pasupathi, Stallworth, & Mudoch, 1998). Social discourse rules may involve the requirement for novel information (Pennebaker & Harber, 1993; Skowronski, *et al*, 2004); for relevance, for example, when speakers adjust their information to match the expectation and also the goals of the listener (Russell & Schober, 1999). However, this could be dysfunctional in people with depression. In a review of social skills in people with depression evidence was found indicating that reduced social-skills can be a risk-factor and lead to depression, and that depression can lead to poor social skills (Segrin, 2000), although the former assertion is perhaps the least supported (Lewinsohn, Roberts, Seeley, Rohde, Gotlib & Hops, 1994). Poor social skills include embodied communication such as eye-contact and posture, along with volume and modulation of voice (Youngren & Lewinsohn, 1980), which may be perceived negatively. Some features of depression also impair access to social rehearsal, for example, smaller social networks (Santini, Koyanagi, Tyrovolas, Mason, & Haro, 2015); an inability to recall specific events (Sumner, Griffith, & Mineka, 2010); impaired executive control and memory intrusions (Roiser, Blackwell, Rock, & Riedel, 2014), and a negative recall bias (Watkins, Grimm, Whitney, & Brown, 2005) which limits access to tellable information (Adler, *et al*, 2015).

In terms of the content of speech there are significant thematic differences between depressed and non-depressed groups, for example negative evaluations and negative emotional tone in conversations (Hautzinger, Linden & Hoffman, 1982), although content may still be moderated according to the audience, with strangers receiving less negative reports than friends (Segrin & Flora, 1998). There are also a number of communication functions which are characteristically heightened in depression, these being re-assurance seeking behaviours, (Joiner, Metalsky, Gencoz, & Gencoz, 2001) and solicitation of negative feedback (Giesler, Josephs & Swann, 1996). Coyne, (1976) studied the emotional responses of conversation partners for depressed participants and found a significant negative effect of interactions, and this led him to propose an interpersonal model of depression maintenance, whereby audiences experience interactions with people with depression as negative and may act to limit or avoid them, leading to isolation. Emery and Breslau (1989) found evidence for language deficits in elderly people with depression, and there are changes in neural circuitry of language when comparing before and after major depression treatment (Abdullaev, Kennedy, & Tasman, 2002). Despite this there is evidence that sharing personal information, or merely interacting socially can improve mood and reduce symptoms of

depression (DeSilva, Mckenzie, Harpham, & Huttley, 2005; Ehasn & DeSilva, 2015; Santini, *et al*, 2015)

Evidence of depresso-typic structuring of personal stories is indicated by research on the nature and characteristics of narrative production, but also from a small number of studies specifically examining the structure of entire life-stories. The features of narratives discussed in the previous chapter, including themes, structure, thematic coherence, integration, underlying narrative motifs, have been specifically examined in the narratives of people who are suffering from depression.

People with depression have narratives which differ from non-depressed groups in two areas, the first is the propensity to relate negative information, the second is in structuring of the narrative frame, and sequence of events. Depresso-typic narratives are temporally disordered (Fromholt, Larsen, & Larsen, 1995; Habermas *et al*, 2008); focus more on negative events (Rude, Gortner, & Pennebaker, 2004), and have a more depressed explanatory style (Seligman, Castellon, Cacciola, Schilamd, Luborsky, *et al*, 1988; Silverman & Peterson, 1993), and this has been linked to future outcome of depressiveness. People with depression also use more negative or negatively charged words (Alison & Burgess, 2003; Rude *et al*, 2004), particularly when talking about themselves (Fromholt *et al*, 1995). There is some evidence that the narratives of people with depression reflect a sense of temporal stagnation, for example, Luborsky (1993) found depressed elderly people produced narratives which reflected a recurrent themes and a cyclical nature. Narrative processes appear to act in ways to support the depressive experience of the person, in terms of interpretation and meaning construction, a bias which may predate the depressive episode (Rude *et al*, 2003).

Habermas and Colleagues (2008) carried out a study to investigate evidence that life narratives both reflect and stabilize psychopathology. They examined the narratives of 20 adults with clinical depression being treated in a psychiatric institute with 20 matched controls. Their examination was based on the proposed role of narrative in psychopathology in that life story narratives not only *reflect* but *perpetuate* the essential characteristics of the self. They found that life-story narratives of people with depression differ from controls in the kind of events included in the life story, with a mood congruent effect for the narration of autobiographical events, a depressed explanatory style (more self-blame and external attribution of positive events), ruminative characteristics, and an impaired temporal linearity

in narrative. Habermas and colleagues were particularly interested in the ways that a sense of distance from past events was reflected in narrative and used the ability to compare past and present as an indication of temporal structuring. Narratives for people with depression and dysphoria were negative, sparse and affectively congruent, and in addition, the results indicated that depressed individuals were less able to take a distanced perspective on past events. This dual-examination of the content and structure of depressive narratives has led to the proposal that difficulties resulting from cognitive processing biases interact with habitual narrative structuring, and also potentially impact on social interactions.

2.2.2 Therapeutic interventions impacting on self-schema in depression

In order to establish the role of recounting events in narrative form to benefit mental health, Pennebaker and Seagal (1999) reviewed research indicating that the process of narration of events and experiences in an emotional way is linked to both good mental and physical health. This finding has been replicated across age, gender, culture, social class, and personality type (Pennebaker & Seagal, 1999). In his original study (Pennebaker, 1997) found that writing about personal experiences in an emotional way for as little as 15 minutes over the course of three days brings about improvements in mental and physical health. Using a text-analysis computer program, which categorises text according to the emotionality of words, they found that those who benefit maximally from writing tend to use a high number of positive-emotion words, a moderate amount of negative-emotion words, and increase their use of cognitive words over the days of writing. These findings suggest that the formation of a narrative is critical and is an indicator of good mental and physical health, perhaps by organizing complex emotional experiences. Pennebaker's focus on written narrative has led to an expansion of the notion of verbal accounts providing the same mental health benefits, and that the effective structuring of narrative has an essential role to play in this process (Singer & Salovey, 1998).

When suggesting the focus for change in talking therapies in his development of Cognitive Behaviour Therapy (CBT), Beck, (1979) emphasised the role of realistic (sometimes things are bad/good) rather than global thinking (everything is terrible/great). In therapy clients may be asked to engage in the recollection and narration of 'alternative' event memories, or self-knowledge, for example beliefs based on the events around the breakup of a relationship, with associated memories of saying or doing 'the wrong thing', can be re-scripted to lessen the attribution of blame, by recalling memories of saying and doing 'the

right thing', and accepting a more realistic view on events. Brewin (2006) proposed a cognitive model for the impact of this differential recall, as a result of therapeutic interventions, on both semantic and episodic autobiographical knowledge in people with depression, aligning with the idea that narrative schemata may be responsible for the maintained recall of autobiographical information which maintains the depressed state. Brewin argues that as therapy has become less reliant on traditional behavioural and cognitive techniques, an alternative explanation must be provided. Early theories suggested that the targets of therapy were the representations of past, and potential future events and that effective manipulation of these images e.g. Hackmann, (2011), and Smucker, Dancu, Foa, & Niederee, (1995), to provide alternative images, and that CBT works to manipulate the relative activation of imagery, leading to alternative evaluations. Therapy involves adjustment of negative representations by the activation of positive competitors, in traditional model of CBT this process has involved the targeting of negative representations and making attempts to adjust these. However using a hierarchical approach to this process what could be happening in CBT is that information in the form of conclusions about the self and the world created from particular summations of experience, or assumptions, is changed as a result of the recall of alternatives. Similarly Schema-focussed therapy has been developed for people with long-standing mental health problems for whom positive alternatives are not available for elaboration (Padesky, 1994) specifically to construct real or imagined images of events. According to Brewin, negative representations remain available even after therapy, but a less competitive at preventing recall of positive representations. This assumes that for any particular situation or cue there is a competitive process at a pre-conscious level (Brewin, 1989), but in mental health disorders that this can be disrupted by a negative attentional, and retrieval bias.

In the selection of memory representations it is widely assumed that some process of retrieval competition, decides which representation enters consciousness (Anderson, Bjork, & Bjork, 1994). Stronger association with a retrieval cue will be more likely to win the retrieval competition, and come to mind through a process of cognitive interference (Anderson & Neely, 1996). Explanations for competitive preference in the long term include the *occlusion* approach which proposes blocking of competitive links to other material (Anderson & Neely, 1996), the *unlearning* approach which proposes that less competitive information experiences attrition of associations (Melton & Irwin, 1940), and the *attentional focus* approach which posits that the act of retrieval strengthens the activation of all relevant items, while decreasing

activation of competing but not-wanted items. Standing activation is reliant on levels of rehearsal, primarily in terms of frequency, and elaborative rehearsal processes are likely to make representations highly accessible (Baddeley, 1990). This means that in the long-term preferences for retrieval are likely to be reinforced, and as a result of retrieval, long-term forgetting occurs. This phenomena has been extensively explored for the competitive inhibition of recall of information in the short-term, through retrieval-induced forgetting (RIF: Anderson, Bjork & Bjork, 1994) and studies indicate a longer term impact of an apparently adaptive function of memory selection (Anderson, 2003).

The impact of RIF specifically predicts that retrieval of a negative memory may reduce the accessibility of competing positive memories and vice versa. This suggests a cycle whereby negative mood creates negative evaluation and elaboration through autobiographical reasoning, creating a bias toward negative recall of ABM, which in turn enhance negative mood (e.g. Ingram, 1984, Teasdale, 1988). Raised competitiveness of memories is not simply a factor of self-relevance and cue-strength, but also the visio-sensory details of the memory which make it distinct (Hunt & McDaniel, 1993; Hunt & Smith, 1996) and that this distinctiveness makes the memory more likely to inhibit other memories (Anderson, Green, & McCulloch, 2000).

Thus Brewin, (2006) has proposed that CBT acts to enhance the competitive retrieval of positive self-knowledge compared to, more habitual, negative knowledge. For people experiencing depression a change from global negative thinking (Dalgleish, *et al*, 2011) to a realistic and balanced approach to self-knowledge is beneficial, and this could occur only by accessing both positive and negative material for both past and future chapters.

Brewin's suggestion is therefore a unifying theory which can be applied to a range of already effective therapeutic techniques, gaining support using a principle of parsimony. Other therapy techniques mimic these ideas by specifically drawing on visual images and changing their details to enhance retrieval, for example cognitive imagery rescripting which allows adjustment to be made to memory representations e.g. during an assault the person is able to defend themselves (Arntz & Weertman, 1999; Hackmann, 1998). While still others encourage tolerance, rather than avoidance of negative imagery changing the associated valence of cognitive representations (Mindfulness-based cognitive therapy: Williams, 2010; Acceptance and commitment therapy: Hayes, Strosahl, & Wilson, 1999; Hayes, Levin, Plumb-Vilardage, Vilatte, & Pistorello, 2013; Hayes, Luoma, Bond, Masuda, & Lillis, 2006).

This process may also form an active ingredient in constructivist forms of talking therapy, as exploration and potential revision of personal narratives is considered one of the major achievements of successful therapy. Many theorists from within the field of psychotherapy and counselling view therapy as a process of story reformulation and repair (Angus & McLeod, 2004; Salvatore, *et al*, 2004; Singer & Bonalume, 2010), or event incorporation (Stiles, 2001), and that access to a more rich and nuanced narrative could be the result of therapeutic interventions (White, 1989). In their comprehensive examination of therapeutic narratives, Singer and Bonalume, (2010) found reduced complexity and memory-narrative specificity, reduced levels of causal and temporal coherence for clients at the beginning of a course of psychotherapy for depression, and from this proposed a systematic methodology for assessing narrative change. The authors suggest that at the beginning of therapy memory and life-story narratives presented by clients may be those which have been well rehearsed and less susceptible to fluctuations. Their subsequent examination of narratives from pre-therapy individuals with depression found that temporal and casual coherence, specificity and complexity in the narrative, improved significantly over the course of treatment (Singer, Blagov, Berry, & Oost, 2013). DiMaggio (2006) also found that therapy brings about both modifications to the content of stories but also their form (in terms of organisation and coherence).

Some therapeutic interventions focus explicitly on client narratives in order to enhance the ability to incorporate alternative scripts and new ways of talking about unique events (Salvatore, *et al,* 2004; Freedman & Combs, 1996; Neimeyer & Tschudi, 2003; Maruna & Ramsden, 2004; White & Epston, 1990). For example, in *Narrative Therapy* (White & Epston, 1990) impoverished, disrupted or disorganised narratives are thought to result from the dominance of cultural narratives which are too restrictive to incorporate the tellers' subjective experiences. Singer and Bonalume (2010) provide a causal account of these changes by suggesting that at the beginning of therapy the memory narratives presented by clients may be those which have been well rehearsed and less susceptible to fluctuations, and that these may be 'self-defining' functional narratives which are easily recalled and presented. They suggest that exploration and potential revision of these memory narratives is one of the major achievements of successful therapy.

In support of this idea Pals and McAdams (2011) predicts that changes and new developments to narrative identity can result in changes to how people ascribe meaning to

events, and can trigger corresponding changes in habitual patterns of thinking, feeling and behaving, which have already been shown to help people suffering from depression (Lopes, Goncalves, Fassnacht, Machado, & Sousa, 2014), and even when narrative was not the specific focus of intervention narrative change has been shown to be a feature of good-outcome but not bad-outcome therapeutic interventions (Angus & Kagan, 2013; Moreira, Beutler, & Goncalves,2008). When examining transcripts from clients from three therapy models (cognitive, narrative and prescriptive - one good outcome one bad outcome), Moriera and colleagues compared transcripts from the beginning, middle and end of treatment in terms of narrative structural coherence, process complexity and content diversity. Results indicated that narrative change related to good outcome, as the client is able to narrate events in novel and increasingly detailed ways.

Returning to the hierarchical structure of the life-story schema, Brewin's proposal indicates that schematic representations are problematic, and that therapy adjusts these by bringing in alternative representations, which is supported by research in to narrative change in therapy. Chapters are proposed to be schematic components of the life-story and exist as extrapolated self-knowledge and conclusion around particular life events, clustered by theme or by temporality (or both). Chapters constitute a useful level at which to examine predictions around how narrative features link to schematic representations, as they are effective in cueing episodic memories, and the formation of chapters involves autobiographical reasoning. In addition to this, cognitive features of depression such as OGM and rumination could impede the recall of competitors to currently available representations. Returning to the hierarchical structure of the life-story schema, Brewin's proposal indicates a number of factors which would impact on competition accounts of depression maintenance. First that, in depression, negative schematic representations facilitate retrieval of congruent information, and that this becomes a summative representation of autobiographical events (Barsalou, 2003).

2.3 Summary of Chapter 2

Mental-health requires the ability to construct rich self-referential narratives incorporating a range of positive and negative events (DiMaggio, 2006; Di Maggio, *et al*¸ 2003). People experiencing depression are found to be more likely to produce thematically and affectively monotonous (Habermas, *et al*, 2008, McAdams, Lensky, Daple, & Allen,

1988), and negative, autobiographical narratives (Adler, Kissel & McAdams, 2006; McAdams, Diamon, de St Aubin, & Mansfield, 1997). Along with these narrative characteristics, people with depression also experience cognitive autobiographical memory deficits, including a negative memory bias (Watkins, *et al*, 2005), mood congruency effects in perception and recall (Kuyken & Dalgleish, 1995); over-generality or non-specificity of episodic memories, (Barsalou, 1988; Williams & Broadbent, 1987), and positive memory recall deficits may impact on mood-repair in people with depression (Joorman & Siemer, 2004; Werner-Siedler & Moulds, 2012). This has two implications for research in to life-story research, the first being whether depresso-typic characteristics of narrative are represented at a chapter level, but also whether these narrative differences are representative of underlying cognitive schema which influence the recall of autobiographical information, and are a potential target for therapeutic interventions.

2.4 Summary of Chapters 1 and 2

The life-story schema is an internal representation of autobiographical information, the structure of which is framed around cultural expectation, aligned to personal experience. The life-story narrative is thought to be the communication, in whole, or in part, of this life-story schema. The life-story narrative itself contains thematically, and temporally linked chapter clusters of autobiographical information which both organise and facilitate recall of episodic memories. The process by which episodic memories are linked within the life-story schema is autobiographical reasoning, and an associated process, life-period reasoning is likely to account for the formation of chapters.

In depressive disorders narrative accounts are found to lack temporal and thematic coherence, and early evidence indicates that life-story narratives, and chapter structures may be structured differently from non-depressed groups. In addition to this, a number of cognitive factors may influence the ability of people with depression to establish chapter structures through life-period reasoning, including a negative recall bias, and overgeneral memory. In combination with negative affective tone, depresso-typic structure of narrative would in turn disrupt the rehearsal, either social or solitary, of positive life-story events. The therapeutic benefit of recall and integration of positive autobiographical events in to life-stories is well established, and Brewin (2006) has proposed a unifying theory as to how this may function to create improvements for people in therapy independent of the 'school' of therapy delivery.

2.5 Questions addressed in this thesis

While the establishment of evidence for the structural and organisational role of life-story chapters is of theoretical importance in the development of an understanding of the links between narrative and autobiographical memory, there are also implications of the structure of life-stories for people experiencing depression. Narrative disorder, temporal monotony, and over-generality of autobiographical memory recall are all symptomatic of the depressive experience, and can have specific implications for the ability of people with depression to engage in 'talking therapy' aimed at addressing their condition. It is for this reason that the studies in this thesis address the similarity between depressed and non-depressed populations in terms of i) their ability to create life-stories with coherent structures,

ii) to produce chapter-level structural elements of life-story narratives, iii) to recall events which are positively incongruent to chapter-level schema.

Before this can be established the first question is whether chapters exist as contextual schematic information, and as such are influential in the recall of episodic memory. This prediction draws on the concept of schema atypicality. If the schematic chapter is used to cue a memory, this will influence recall in several ways, for example, the typicality and relevance to the chapter of the memory is likely to improve its chances of retrieval, so a chapter about school is far more likely to cue a memory of a classroom-based activity. If a chapter is perceived as an unhappy period in life then retrieval of a negative memory for this time is more likely for two reasons, first that there may be more memories which are congruent with this negativity, but second that positive event memories may be atypical, and therefore create a dissonance with the chapter content. Finally the atypicality of the event must be taken in to account as this is likely to make the event more memorable overall. The chapters in which memories are perceived to belong will act as a prism to influence the recall of memories which belong to it, and it is proposed that these influences, as with schema research discussed in Chapter 1, act to bring consistency between schema and recalled information.

Chapter 3 Life-story narratives and chapter-cued memory recall

3.1 Introduction

The ways in which people tell their life-stories has long been of interest to social and psychological science (McAdams, 2001; McAdams & McLean 2013). Personal narratives have been examined in terms of developmental influences (Glück, Bluck, Baron, & McAdams, 2005; McAdams, Bauer, Sakaeda, Anyidoho, Machado, *et al*, 2006), culturally defined content (Bohn & Berntsen, 2011; Koppell & Berntsen, 2014; Thomsen & Berntsen, 2008), and audience effects (Pasupathi, Mansour, & Brubaker, 2007; Pasupathi, Stallworth, & Murdoch, 1998). Comparisons between the life story narratives of different groups is a growing area, particularly with respect to their relation to the cultural life-script (Bohn & Habermas, 2016; Coleman, 2014; Janssen, Uemiya, Naka, 2014; Ottsen & Berntsen, 2014), and characteristics of narratives produced by people experiencing psychopathology (Adler, Turner, Brookshier, Monohan, Walder-Biesanz, *et al*, 2015; Phillips, 2004; Waters & Fivush, 2015).

Life-stories in depressed subjects have been examined in a number of key areas: the *defacto* content of the life-stories which provide information around the person, the ways in which these life-stories can change as a result of recovery or therapeutic interventions, in that different information may be forthcoming, or alternative conclusions or 'life-lessons' can be expressed (Angus & Greenberg, 2011; McLeod, 1997; Singer, Blagov, Berry, & Oost, 2013), and that the structure of narratives can differ from those on non-depressed groups. In addition to the content of life-stories in depressed groups, there may be differences in the structure of life-story narrative delivery, for example a speech patterns (Alpert, Pouget, & Silva, 2001; Mundt, Snyder, Cannizzar, Chappie, & Geralts, 2007), with concurrent or independent reduction in word count (Derby & Hollien, 1977). The self-function of autobiographical narratives suggests that the greater the degree to which the narrator can create a self-focus, the greater their ability to differentiate self-from other. This leads to different predictions for people with depression, the first is that it is likely that social isolation (Cruwys, Haslam, Dingle, Haslam, & Jetten, 2014; Santini, Koyanagi, Tyrovolas, Mason, &

Haro, 2015) and a ruminative self-focus (Watkins & Moulds, 2005; Watkins & Teasdale, 2001) would lead to a greater self-focus within a narrative as a result of reduced access to stories and information on other people's activities and interactions, while the ruminative self-focus would increase accessibility of self-relevant, negative, material. In terms of the content of speech there are significant thematic differences between depressed and non-depressed groups, for example negative evaluations, and negative emotional tone in conversations (Hautzinger, Linden & Hoffman, 1982), although content may still be moderated according to the audience, with strangers receiving less negative reports than friends (Segrin & Flora, 1998). There are also a number of communication functions which are characteristically heightened in depression, these being re-assurance seeking behaviours, (Joiner, Metalsky, Gencoz, & Gencoz, 2001) and solicitation of negative feedback (Giesler, Josephs & Swann, 1996).

In order to examine the differences in structure and content of life story narratives in depression, evidence for self-reference, and negative bias (in the form of negative life events reported) were examined by Boulard (2015), in her analysis of 60 life-story narratives of hospitalised adolescents with major depressive disorder, non-hospitalised adolescents with depression, and never depressed controls. Her results revealed that hospitalised adolescents produced narratives which were structurally significantly shorter than the other groups, textual analysis of content also revealed a significant self-focus for the hospitalised group, with greater use of the pronouns 'I' and 'me', compared to the other groups, there was also a diminished range of topics for discussion. While this may be indicative of depressive characteristics, it is not unreasonable to consider this small study in the light of the populations chosen for analysis, as the state of being hospitalised could present either the outcome of depression severity, or the cause of prosodic slowing, and an environment where self-focus is more likely (there being fewer distractions).

In addition to a negative self-focus, depressive narratives are created with diminished coherence and reduced evidence for a sense of self represented in spoken word, and in text (Adler,Wagner, & McAdams, 2007; Prebble, *et al*, 2013). Reduced coherence of spoken accounts is seen in the narratives of clients entering psychotherapy (Angus & Kagan, 2013; Singer, Blagov, Berry, & Oost, 2013), and in narrative accounts of depressed individuals (Fromholt *et al*, 1995; Habermas *et al*, 2008; Shafer, 1983). Features of the narrative production in depression include the characteristic absence of variability in affective tone

(Cohen, 2011; Fromholt, *et al*, 1995; Goncalves, Matos, & Santos, 2008; Habermas, *et al*, 2008; Luborsky, 1993), the attributional style including negative evaluations of self (Abramson, Seligman, & Teasdale, 1978; Schulman, Castilion, & Seligman, 1989); self-blame (Tilghman-Osbourne, Cole, Feltham, & Cielsla, 2008), and characteristics of temporal disorder (Habermas, *et al*, 2008; Kuhs, 1991).

The schematic nature of life-story narratives was introduced in Section 1.2.5. That the content of narratives can fluctuate, while structural motifs and narrative form can remain constant has been shown in studies of 'master narratives' (Boje, 1991; Thorne & McLean, 2002; Westrate & McKlean, 2010), and the narrative sequences reported by McAdams and colleagues (2001) indicates that structured assumptions about the stories of the self, and the internal and external (spoken) representation of these is different for depressed compared to non-depressed groups. The links between the life-story schema represented in life-story narratives have indicated that schematic representations of life-story chapters help organise events in narrative (Thomsen, 2015), and guide recall of constituent events (as discussed in section 1.3.2), so while the focus of narrative accounts in depression is predicted to be self-directed and negative, this aspect of narrative structure could influence the ways in which autobiographical information is recalled.

In their study of 17 life-story narratives from older adults with major-depressive disorder, compared to 17 never-depressed controls, Habermas and colleagues (2008) used two measures of narrative temporal coherence. The percentage of propositions (i.e. individual statements or meaning units), which deviated from the temporal linear order, and the percentage of propositions which drew comparisons between the present and the past. Deviations from linear order were significantly more frequent for the depressed group, while the proportion of past-present comparisons was significantly smaller compared to controls. Overall the authors suggest that this resulted from the depressed group being more 'stuck in the past' and less able to create narrative, and by inference cognitive, distance to past events. However, these differences, while significant, were small and not indicative of global temporal breakdown of life-story structures.

One study points to this lack of variation in narrative accounts being a result of an underlying difference in the structural attributes of chapters, rather than life-stories, for people with depression. Dalgleish and colleagues (2011) found that when asked to apportion attributes to self-selected life-story chapters, people with a current diagnosis of major

depressive disorder (MDD) were significantly more likely to use negative attributes, to re-use negative attributes repeatedly for a number of chapters, and were less likely to re-use positive attributes. In addition the current-MDD group were more inclined to compartmentalise their attributes, creating both broadly negative and broadly positive chapters, while the control group showed a more variable attributional pattern. Interestingly a remitted MDD group showed a similar pattern of compartmentalisation and negative bias, but not redundancy in negative attributes, and future chapters did not show any group differences. What this indicates is that people with depressive disorders have pre-established chapter schema within autobiographic memory, but possibly not future imagining, which are structured differently from never-depressed groups.

The proposition of structural dissimilarity between depressed and non-depressed groups is supported by the current models attempting to explain the impact of depression on cognition. Depression is characterised by cognitive over-representation of negative material which is thought to be both symptomatic and causative in the perpetuation of depressive symptomatology (Beck, 1976; Markus, 1977; Segal & Ingram, 1994). Evidence points to increased levels of negative thoughts, biased attention, interpretation, and memory (Mathews & MacLeod, 2005). Gotlib and Joorman (2010) reviewed the evidence for memory and cognition in depression and proposed that a negative cognitive bias in depression is not simply due to attention being drawn to negative, particularly self-referencing material, but that reduced inhibitory processes lead to an inability to disengage from negative material, and reduced cognitive control means that positive compensatory material is less accessible. Over time this is suggested to lead to the establishment of negative schema (Beck, 1987), and subsequent emotional dysregulation, as the processing of information is filtered by negative internal cognitive representations. Externally represented these structures include i) narrative self-representations (descriptions and evaluations of self), drawn from autobiographical memory and semantic knowledge, ii) life-story narrative accounts and finally iii) episodic recall. Accordingly Brewin's model of cognitive therapy (2006) proposes that increased variability of affective material can be achieved by the practiced recall of autobiographical events to change their competitive advantage over more negative but well-rehearsed memories. But, recalling positive events is not simply a matter of accessing appropriate episodic material. Accessibility concerns characteristics of episodic events including the speed at which they are recalled (e.g. Williams & Broadbent, 1986), the visio-sensory features such as clarity, vividness, sensory detail, and 'reliving' (e.g. Piolino, Desgrandes, &

Eustaches, 2009), specificity of details (e.g. who, what, where, and when); ways in which they are felt to be personally significant or important to the 'self' (Berntsen & Rubin, 2006); along the visual perspective perceived during recall (Nigro & Neisser, 1983) all of which endow the memory with a sense of re-living, and these factors must be considered when evaluating the complex nature of 'accessibility' in episodic information.

That chapters are schema implies that there are associated characteristics which are common to them. In Koppell and Berntsens (2014) study of schema expectation in life-stories, valence of events was used to establish typicality, and researchers found that affective atypicality of event on presentation was predictive of both greater recall, and judgements of remembering the event (as opposed to simply knowing it occurred). Expanding on this it is proposed that typicality in terms of chapter schema will enhance recall, either in terms of accessibility, or representative detail (clarity), leading to a prediction of affective incongruence at the point at which the event occurs may raise memory accessibility. The role of typicality to schema also indicates that there would be a recall expectation bias in component information (Pezdek, *et al*, 1989), whereby memories which are congruent with the beliefs and assumptions about the schema, or in this case the chapter, would overall be more accessible. Memories for which there are no representations available would be 'filled' in with reference to the schema, and as a result, over time, chapter-based memories would be expected to become more schematic, and less variable. Event memories which do not 'fit' a particular chapter would be less likely to be recalled as part of a particular chapter, and may become less available over time.

In a study of life-period cued episodic memories Beike and Landoll (2000) examined the cognitive response to the recall of memories which were inconsistent with beliefs about the life-period. Their aim was to explore the role of dissonance reduction processes in response to recall, and in doing so did not explore the relationship between the events and their life-period context. On recall of incongruent events participants were found to engage in consistency restoring actions, which included changes to memory representations, the attribution of cause, and salience of the event, along with a subsequent increase in accessibility of congruent event representations that fit with the schematic beliefs of the life-period. This suggests that incongruent memories are either adjusted to fit chapter-schema, or are outweighed by the reactive recall of other more congruent memories.

Together the evidence that life-periods, and chapters can be effectively used to cue autobiographical memory, (reviewed in Sections 1.1.2 and 1.3.1), and indications of the schematic role of life-stories, suggests that chapters act to index episodic memories, and to prime their recall, but also act as cognitive schema. As schema they are not direct representations of events as they occurred, but rather an extracted representation of information guided by expectation, and in this respect are predicted to influence recall of chapter-cued memories to fit with expectations. Drawing on evidence of monotony, and lack of affective variation in narrative structures for depressed groups, and the cognitive deficits which impair episodic recall, and thus make depressed groups more reliant on schematic representations (Beck, 1987), this relationship between chapters and content is proposed to be qualitatively different from non-depressed controls in terms of both a negative bias, and a decrease in the variability of valence between chapters and episodic memories.

Specific predictions based on this are that depressed groups will experience an intra-chapter schematic monotony, which is reflected in a reduction in the affective variance between chapters and episodic memories. This reduction could be indicated by:

- reduced accessibility of incongruent events, or
- reduction in memory features which are themselves indicative of personal relevance and rehearsal of the event.
    - clarity
    - centrality
    - field perspective

To enable an exploration of the impact of schematic chapter structure on recall this study took a top-down approach to the structure of life-stories, by examining the structure and distribution of life-story chapters, and in doing so allowed a detailed exploration of the impact of chapter context on episodic memory recall. This approach also enabled a subsidiary examination the structure of autobiographical life-story accounts. Participants were asked to verbally narrative their life stories, then reported chapters from these life stories, and these chapters were subsequently used to sample both positive and negative episodic memories.

For depressed groups it was predicted that there would be structural differences in chapter representation as indicated by reduced coherence and a temporal breakdown in the

chapter sequencing. Secondary to this and given an absence of breakdown (i.e. depressed and non-depressed groups represent their chapters in similar ways) and following Dalgliesh and colleagues' study (2011) and Habermas and colleagues (2008), it was predicted that access to the episodic memory content of the chapters would be influenced by a monotony in affective tone.

Drawing together predictions about the influence of schematic monotony of narrative, life-stories, and life-story chapters, with the requirement for the recall of episodic memories, it is further proposed that there will be, for people with depression:

- A temporal breakdown in the chapter structure in terms of sequence of production, number produced
- As a result of depressive status, a negative affective bias would mean both chapters and episodic memories were rated as more negative than controls
- A subsidiary prediction is that the depressed group will show evidence for a depresso-typic narrative structure and content difference, in terms of self-focus and negative bias in their life-story narratives. Prosodic slowing would result ini) a lower word count for the depressed group compared to controls, and a negative self-focus would result in proportionally ii) fewer positive words, iii) more negative words, iii) more self-referencing words, and iv) fewer social words

Within this study we have assumed that i) chapters are more likely to represent the internal cognitive representation, and hierarchical memory structures if they are defined by the subject (as opposed to the researcher), ii) that chapters are temporally defined having a clear beginning and end (although this may be ongoing for current chapters) iii) chapters may overlap, or be clustered within one another.

3.2 Method

3.2.1 Participants

This study recruited twenty-eight participants aged 18-55 via the University of St Andrews School of Psychology participant recruitment SONA system and campus posters. Although there was a relatively large range in the ages of participants there was no significant

difference between the groups, $t(23)<1$, the range being 18-55 for the depressed, and formerly depressed group, and 18-54 for the controls. The mean (SD) age of the MDD group was 24.3 (9.6), and the controls 27.27 (12.3) years. The MDD group (n=14) contained two males, and controls (n=11) three males. All participants received a £10 payment for their time. English was the first language of all participants and no participants had a history of neurological or attentional disorders. Participants were tested individually. This study was approved by the ethics committee of the University of St Andrews (Appendix 1)

Allocation to two groups, depressed and never-depressed control, was carried out using the Structured Clinical Interview for DSM-IV (SCID-II, First, Spitzer, Gibbon & Williams, 2002) (Appendix 12), which establishes diagnostic status for current and former depression. Four participants met criteria for a historic diagnosis of MDD, ten participants met criteria for current MDD, and these fourteen participants constituted the MDD group while eleven met the criteria for never depressed and were considered the control group. Three participants were excluded as they met the criteria for a historic, but not current diagnosis of sub-clinical depression.

3.2.2 Design

The overall aim of this study was to examine both narrative construction and also memory recall. In order to do this this study used established protocols to elicit life-story narratives from both depressed and non-depressed participants. Using these as guides, participants were asked to define life-story chapters associated with the narratives. In a follow-up session these chapters were used to cue the recall of specific memories. The use of this chapter-based memory cuing task was designed to address the question of group differences and the impact of affective incongruence on the recall of memory features. The study used participant-defined, rather than researcher-defined chapters as cues which accommodates the need for ecological validity in the cuing process.

The elucidation of life-stories, life-story chapters and the cued recall of memories was carried out using the procedure below. The analysis of the life-stories comprised an examination of the transcribed narratives for group differences in word count, and the proportions of positive words, negative words, self-referencing words, and social words, in relation to the length of the narratives. The life-story chapters were compared between groups for temporal sequencing, and the number and valence of chapters reported. These

chapters were then used to cue episodic memories. Initially group differences in episodic memory recall were examined, and following this episodic memories were categorised in terms of their affective congruence to the cueing chapter. Each memory and chapter were rated by participants according to the statement 'I feel positive when I think of this memory/chapter' Both episodic memories and chapters were categorised as being either positive or negative according to their positivity rating, with 1-3 being negative, and 4-6 being positive. They were then categorised according to the match between episodic memory positivity and chapter positivity. Negative incongruence being a negative memory in a positive chapter, positive incongruence being a positive memory in a negative chapter, and a congruent memory being a memory which is categorised as the same valence as its cuing chapter.

3.2.3 Measures

The National Adult Reading Test (NART: Nelson & Wilson, 1991) is a measure of premorbid intelligence, with results showing strong correlations with IQ as represented by the Wechsler Adult Intelligence Scale (Blair & Spreen, 1989). It involves participants reading a series of 50 words out-loud, e.g. Chord, Prelate, Demesne, which are then scored for correct pronunciation (Appendix 11). In this study it was used to ensure parity between groups for verbal fluency.

The Structured Clinical Interview for Diagnosis II (SCID-II) (Appendix 12) was used to establish depressive status in participants. The SCID-II uses the criteria established by the DSM-IV to diagnose the current or historical presence or absence of depressive disorders (First, *et al*¸ 2002)

3.2.4 Procedure

In the first session participants were tested individually for approximately one hour, this was composed of four sections 1. Completion of NART (Nelson & Willison, 1991), 2. Verbal narration of life-story narrative, and 3. Memory reporting, 4. Completion of SCID-II

Participants were then given the following verbal instruction and their response was audio recorded

'I am interested in understanding who you are and how you have become the person you are today. Please tell me about your life to date. Give yourself about 15-20 minutes and try and tell me a coherent story of your life so that I can get a good picture of you.'

The researcher remained silent during narration as far as possible, non-verbal cues were used to reinforce to the participants that they were being listened to, but no comments on the narratives were made. Participants were able to see a clock during narration and were therefore able to regulate their divulgences to meet the suggested time limits. The time taken to complete this task ranged from 7 to 36 minutes, mean (SD) 21.20 (7.87). No standardisation of prompts was carried out.

Following this narration the participants were required to generate chapters which would represent significant periods of their lives. They were given the following instruction:

'I would like you to imagine that your life-story is a book, and that within this book there are chapters each involving a different part of your life. The chapters of your life-story can be thematic e.g. 'my love of art', or relating to particular time in your life e.g. 'my time in the army'. Chapters can be any length and can overlap, for example during your time in the army you could have taken up painting.

Starting with the first chapter that comes to mind, write a title and brief description of the chapter in the space on top of one of the booklets provided, and follow the instructions on the front cover of the booklet. Then think about the title and description of the next chapter you think and write this on another booklet, continue until all you chapters have been named and each has a response booklet with the front cover completed'

Participants were free to complete as many or as few chapter sheets as they chose (Appendix 6). The booklets each had a front page requiring the completion of the title of the chapter, a space for a short description, and a likert scale ratings (1=very negative, 6=very positive) 'In terms of how I feel now this chapter is…'. The function of this question was to ascertain the valence of the chapter, allowing for an exploration of a negative bias in depressed group towards chapter definition, and also to allow the relative affective congruence of memories to their contextual chapters to be examined. Following this the participants underwent the SCID-II to establish their depressive status. Subsequently they were requested to return for the second part of the study between 6-8 days later.

In the second session the previously generated chapters were used to cue autobiographical memories. The participants were given the chapter booklets prepared in the previous session and asked to recall three memories for each. Each booklet contained prompts for events within the relevant chapter, being 'first to mind', 'negative event' and 'positive event' in that order. The purpose of this sampling technique was to garner a range of autobiographical memories with different affective values. Each event had a space for a title, a short description, and rated for clarity, centrality of event, difficulty of recall, positivity, rehearsal and perspective by indicating on a Likert scale 1-6 (not at all – very much so):

Category 1: Clarity calculated as the sum of the following ratings

1. 'This event is very vivid.' (vividness)
2. 'This event feels coherent and complete.' (coherence)
3. 'Thinking about this memory is like travelling back in time.' (mental time travel)

Category 2: Centrality of the event (Berntsen & Rubin, 2006: 2005) as calculated as the sum of the following ratings:

4. 'This memory is of an event which was a turning point in my life'
5. 'This memory is of an event which is central to my sense of who I am'
6. 'I automatically see connections between the events in this memory and my present life''
7. 'This memory is of an event which was very important to what I was doing in my life at the time'
8. 'This memory is of an event which was very important to what I was doing in my life at the time'

Category 3: Difficulty of recall

9. 'I found it difficult to retrieve a memory for this part of the task'

Category 4: Positivity

10. 'I feel positive when I think of this memory'

Category 5: Rehearsal

11. ‘I have thought about this memory a lot’
12. ‘I have spoken about this memory to other people’

Category 6: Perspective

13. ‘I experience this memory as if I am looking through my own eyes (as opposed to watching myself)’’

To establish all memories recalled are ‘specific’ it is possible to check them against established criteria all of which were confirmed by the subjects during data collection using a ‘check back tick box’: That the event occurred within a 24 hour period; that the event has at least two features which allow the recaller to distinguish it from other similar events. The further criteria that the event occurred to the subject, rather than an event which was known about or reported to the subject was also included in the instruction.

The event report section took a further 30-40 minutes. The entire second session was completed in around 60 minutes.

3.3 Results

The initial screening for equivalence between groups was carried out to ensure that differences in life-story narrative accounts were not a result of differences in verbal fluency. The NART results revealed no significant difference in verbal fluency between the two groups, $t(23)<1$. with the MDD group scoring mean (SD) 42.71 (4.23) and the control group 43.09 (4.23).

3.3.1 Analysis of chapters

The number of chapters produced varied from 3 to 9 for the MDD group, and 4 to 11 for the controls. To compare groups for the production of chapters, analysis of group differences in the temporal sequence, number and valence of the chapters produced was examined. Predictions were that the MDD group would differ from the control group in i) the degree to which the chapters would be produced in sequence from early years, to present day, ii) the number of chapters produced, and also, as a result of a negative bias, that iii) the MDD group would report more negative chapters than controls.

While there appeared to be some variability in the length of chapters all participants produced chapters in temporal sequence, from early on in life to the present day, so no group comparisons were made leaving the first prediction that the MDD group would produce chapters out-with temporal order untested but with no apparent support. The number of chapters produced by each group was analysed using an independent samples t-test, results revealed no difference between the number of chapters produced, $t(23)<1$ MDD mean (SD) number of chapters 5.43 (1.65), control 5.00 (1.34).. There was also no difference in the positivity of the chapters produced, with the mean (SD) valence of chapters for the MDD group 4.25 (0.82), and for controls 3.93 (0.98), an independent t-test revealed no significant group difference $t(23)<1$.

This established not only an absence of negativity in the chapters produced, but also indicated that there were no group-based structural differences in the representation of chapter level information, and validated the use of chapters to cue episodic memories in both groups with any group differences in recall being the result of the relationship between chapter and episodic memory. A table showing examples of chapter themes, titles, and lengths can be found in Appendix 9.

3.3.2 Analysis of episodic memories

Two sets of analysis were carried out on the memories which were recalled by participants during the procedure. The first compared the episodic memories recalled according to both group and valence to establish baseline comparability, the second analysis examined the memories according to the group and their valence with their contextual (cueing) chapter. These analyses looked at the mean scores for the memories reported for each of the participants in these categories.

To examine whether there was a base-line group difference in the positivity of memories recalled the mean rated positivity of recalled events was compared. An independent samples t-test revealed no group difference in the valence of memories recalled $t(23)<1$. with MDD having a mean (SD) positivity of 3.23 (0.49), and controls 3.35 (3.63). Again this is contrary to the original prediction that there would be a negative bias in the recall of episodic memories for the MDD group compared to controls.

A series of mixed factorial ANOVAs were carried out to establish baseline group differences between negative and positive memories. These were categorised according to their reported positivity 1-3 being negative, and 4-6 being positive. Mean group differences were explored for clarity, centrality, recall perspective, recall difficulty. During this series of analyses a mixed factorial ANOVA (within: memory valence [positive or negative] between: group [MDD or control]) was used with these independent variables being consistent throughout.

The clarity of episodic memories recalled revealed a main effect of memory valence on clarity $F(1,23)=7.511$, $p=0.013$, $\eta_p^2=0.34$, with negative memories being rated with lower clarity mean (SD) 15.38 (3.29) compared to positive memories 17.14 (2.99); a main effect of group $F(1,23)=7.743$, $p=0.012$ $\eta_p^2=0.36$, where the MDD mean (SD) rating was 15.12 (3.11) compared to controls 18.34 (2.17), there was no interaction $F(1,23)<1$.

Next, group differences in the reported centrality of the episodic memory was examined, the independent variables remaining the same, there was no main effect of memory valence on the reported centrality of memories, $F(1,23)<1$. no effect of group, $F(1,23)<1$, and no interaction $F(1,23)<1$. The mean (SD) centrality of memories reported by the MDD group was 16.23 (3.82) and for controls 15.90 (2.64), for negative memories, 14.64 (4.30), and positive memories 16.01 (3.45)

The reported perspective experienced during recall was found to be independent of memory valence $F(1,23)<1$, a main effect of group on the reported perspective of recall $F(1,23)=9.382$, $p=0.006$, $\eta_p^2=0.54$ was seen, and no interaction between these variables $F(1,23)=1.548$, $p=0.229$. The MDD group were significantly less likely to report seeing events through their own eyes, with a mean (SD) rating of 3.76 (1.19), compared to controls 4.99 (0.89), for negative memories the rating was 4.31(1.30), and positive memories 3.88 (0.45).

The difficulty with which episodic memories were recalled was not dependent on their valence $F(1,23)<1$, but a main effect of group, $F(1,23)=6.593$, $p=0.019$, $\eta_p^2=0.27$ indicated that the MDD group reporting a significantly greater difficulty in recalling cued memories. The mean (SD) rated difficulty of recall for negative memories was 2.15 (1.08) and positive memories 1.94 (0.63), and for the MDD group it was 2.62 (0.95) and controls

1.90 (0.52). No interaction between the valence of the memory and the group was revealed F(1,23) <1.

The difference in the ability to recall memories and the reduction in clarity perceived by the MDD group could have been as a result of the reduced rehearsal of the events, two measures which examined this: ratings of the degree to which the memory is thought about, and spoken about were summed and used as co-variates in the analysis. This mean rehearsal measure was calculated for each participant using the rating for rehearsal for each reported memory. Overall mean (SD) rated rehearsal (talking) for negative memories was 3.23 (1.78), and positive memories 3.01 (1.09), while the MDD group rated talking about their memories as 3.57 (1.88), and controls 3.16 (1.21). Overall mean (SD) rated rehearsal (thinking) for negative memories was 4.01 (2.11), and positive memories 4.21 (1.34), while the MDD group rated thinking about their memories as 3.84 (1.33), and controls 3.84 (1.33) 4.38 (1.98).

The impact of rehearsal on difficulty of recall was examined first by controlling for the degree to which a memory had been thought about, revealing no main effect F(1, 22)<1, and the group effect which remained F(1,22)=4.525, p=0.045 η_p^2=0.28. Controlling for the degree to which participants reported speaking of an event did not significantly impact on the difficulty of memory recall, had no effect F(1,22)<1, while the group effect remained F(1,22)=4.530, p=0.045, η_p^2=0.28. Thus it appears that the group difference in the perceived difficulty of recall did not relate to the degree of rehearsal.

The impact of rehearsal on clarity was also examined revealing an effect of how much a memory had been thought about when controlled for, this removed the group difference in memory clarity F(1,22)=2.591, p=0.220. However, controlling for speaking revealed no effect on clarity F(1,22)<1, with the group difference remaining F(1,22)=4.418, p=0.048, η_p^2 =0.19. It appears that thinking about a memory was a significant factor in the rated clarity for the control group, and that speaking about the memory has no effect.

Overall the control group recalled memories with greater clarity than the MDD group, and results indicate that this may be due to an increased tendency to internally rehearse (think about) them. The control group also reported that memories were easier to recall, and were more likely to recall them from the first person perspective than the MDD group. This is

reflective of a greater reported engagement in episodic memories which belong to life-story chapters, independent of valence. It also indicates that there may be some level of over-generality in the recall of chapter-cued episodic memories, supporting the finding that people with depression experience over-general memory recall.

Impact of narrative congruence on memory features

An examination of the prediction that as a result of schematic monotony, the MDD group would have a relatively reduced access to episodic memories which were incongruent followed. Episodic memories recalled using chapter cues were categorised according to the congruence category, i.e. 'positively incongruent'; 'negatively incongruent', or 'congruent' with the rated positivity of their cueing chapter. This categorisation was carried out according to the criteria in Table 3.1.

Table 3.1: Congruence of memories

Memory Valence	**Chapter Valence**	**Category**
Positive (rated 4-6)	Positive (rated 4-6)	Congruent
Positive (rated 4-6)	Negative (rated 1-3)	Positively incongruent
Negative (rated 1-3)	Positive (rated 4-6)	Negatively incongruent
Negative (rated 1-3)	Negative (rated 1-3)	Congruent

This table indicates the categorisation criteria for the three congruence categories (congruent, positively incongruent, and negatively incongruent) used in the analysis of episodic events in Study 1.

For each participant and category a mean score was calculated for the memory features: clarity, centrality of the event, difficulty of recall, rehearsal (thinking and speaking), and recall perspective. Because of the nature of the task there were varying numbers of memories of each class, while all participants reported both negative and positive memories, they did not necessarily report memories for each of the three valence categories. These analyses are looking at the mean scores for the memories reported for each of the participants in these categories. The number of memories for each category by group is shown in Table 3.2. Of the total 24 participants, three failed to recall events form all three categories, one participant in the MDD group failed to produce any positively incongruent events, while two

members failed to produce negatively incongruent memories, while one member of the control group failed to produce negatively incongruent memories, and one did not produce any congruent events. The mean (SD) number of chapters produced was for the MDD group negative 2.22 (2.36), positive 3.21 (1.87), and controls negative 2.50 (2.18), positive 2.51 (1.67).

Table 3.2: Number of memories by category and group

	Negatively incongruent	Congruent	Positively incongruent
MDD (n=14)	63	91	48
Control (n=11)	51	85	59

This table indicates the number of memories within each category by group. Three memories were recalled for each chapter,

A series of mixed factorial ANOVAs using the same independent variables (between: group, within: congruence category) was carried out, with congruence being defined as one of three ways: 1. Positively incongruent, 2. Congruent, or 3. Negatively incongruent. Follow-up analysis, compared the effect of positive and negative incongruence on the dependent variable of interest. The means for each memory category can be found on Table 3.3.The effect of congruence on mean memory clarity was examined using a mixed factorial ANOVA (between: group, within: congruence category (positively incongruent, congruent, negatively incongruent)), this revealed no main effect of congruence category on the clarity of the memories recalled $F(1,17)=3.239$, $p=0.090$, a significant effect of group on clarity $F(1,17)=4.550$, $p=0.048$, $\eta_p^2=0.21$ as would be expected from initial analysis, and no interaction $F(1,17)<1$.

Follow-up analysis using a mixed factorial ANOVA (between: group, within: congruence category (positively incongruent, negatively incongruent)) revealed a significant difference between the two incongruence category, $F(1,18)=4.493$, $p=0.048$, $\eta_p^2=0.12$, with negatively incongruent memories being rated with greater clarity, a consistent group effect $F(1,18)=7.424$, $p=0.014$, $\eta_p^2=0.25$, and no interaction $F(1,18)<1$. This indicates that schematic atypicality of negative but not positive events impacts on memory clarity for both groups.

Next, and following the same mixed factorial ANOVA analysis, the impact of congruence on the rated centrality of memories was explored. Analysis revealed no effect on congruence category on the centrality of the memory recalled F(1,17)=1.219, p=0.329, no effect of group F(1,17)=1.010, p=0.285, and no interaction F(1,17)<1. Follow-up analysis revealed no significant difference between the centrality of negatively and positively incongruent memories F(1,18)<1, no consistent group effect F(1,18)<1, and no interaction F(1,18)<1. Overall the centrality of the events was not influenced by the schematic incongruence of the event.

The same mixed factorial ANOVA was carried out to examine the role of congruence on rated difficulty of access for memories. Analysis revealed no main effect of congruence category on the difficulty of recall of the memory F(1,17)<1, no significant effect of group F(1,17)=4.270, p=0.054, and no interaction F(1,17)<1. Follow-up analysis revealed no main effect of congruence category F(1,18)<1, no group effect F(1,18)=2.031, p=0.171, and no interaction F(1,18)<1. Indicating that rated difficulty of access was not influenced by the schematic incongruence of the event.

A mixed factorial ANOVA examine the impact of congruence on rehearsal (thinking). Analysis revealed no effect on congruence category on the rating of how often a memory was thought about F(1,17)=2.076, p=0.168., a significant effect of group F(1,17)=5.786, p=0.028, η_p^2=0.37, and no interaction F(1,17)<1. Follow-up analysis revealed no main effect of incongruence category on rehearsal F(1,18)=3.110, p=0.095, a group effect F(1,18)=4.962, p=0.039, η_p^2=0.32, and no interaction F(1,18)=1.187, p=0.290. The MDD group reported thinking about their memories more than controls, but the incongruence of these events did not impact on this.

A further mixed factorial ANOVA was carried out, on the degree to which participants felt they had spoken about the memory. Analysis revealed an effect on congruence category on the rating of how often a memory was spoken about F(1,17)=5.579, p=0.030, η_p^2=0.16, a significant effect of group F(1,17)= 4.571, p=0.047, η_p^2=0.17, and no interaction F(1,17)<1. Follow-up analysis using a mixed revealed a significant difference between the degree to which positively and negatively incongruent memories were spoken about, F(1,18)=5.859, p=0.026, η_p^2= 0.24, a group effect F(1,18)=5.985, p=0.025, η_p^2=0.22, and again no interaction F(1,18)<1.

Finally a mixed factorial ANOVA was carried out to examine the impact of congruence on visual perspective during recall. Analysis revealed no effect of congruence category on the rating of field perspective ('I see this memory through my own eyes') $F(1,17)<1$, no significant effect of group $F(1,17)=3.530$, $p=0.078$, and no interaction $F(1,17)=1.474$, $p=0.241$. Follow-up analysis revealed no significant difference between the perspective of positively and negatively incongruent memories $F(1,18)<1$, a group effect $F(1,18)=6.498$, $p=0.020$, $\eta_p^2=0.17$, and again no interaction $F(1,18)=2.802$, $p=0.111$. These results indicate that the MDD group are more likely to view incongruent episodic memories from an observer perspective compared to controls, but that the valence of the incongruence does not impact on this.

Overall these results indicate that the congruence of a memory with its contextual chapter has little impact on the ease at which the memory is recalled, or the rated centrality, however negatively incongruent memories are recalled with greater clarity than either congruent or positively incongruent memories, and that these memories are more likely to be spoken about. Group differences reveal that the control group report thinking more about their memories, and are more likely to recall their memories with greater clarity than the MDD group. The MDD group were also more likely to view their incongruent memories from the observer perspective than controls.

No interactions between congruence and group were revealed, and therefore what has not been supported is the prediction that incongruence has a different effect on memory characteristics depending on the depressive status of the recaller. This study gives no support for the prediction that the MDD group, compared to controls, would experience a reduced ability to recall or experience episodic memories which are incongruent with their cueing chapter.

Table 3.3: Means (SD) for memory features Study one

Memory characteristics	Congruence category	MDD	Control
Clarity[1]	Negatively incongruent	17.914 (3.65)	17.132 (4.10)
	Congruent	14.929 (3.12)	16.161 (2.54)
	Positively incongruent	15.136 (2.12)	16.083 (5.16)
Centrality[2]	Negatively incongruent	16.010 (4.30)	15.931 (3.45)
	Congruent	15.493 (3.05)	14.147 (6.23)
	Positively incongruent	15.176 (3.56)	14.844 (4.44)
Difficulty of recall[3]	Negatively incongruent	4.010 (1.10)	3.041 (1.80)
	Congruent	3.964 (1.50)	3.344 (1.24)
	Positively incongruent	3.620 (0.56)	2.864 (0.64)
Rehearsal (thought)[4]	Negatively incongruent	4.011 (0.83)	3.041 (1.10)
	Congruent	3.964 (0.68)	3.562 (0.88)
	Positively incongruent	2.872 (1.02)	3.820 (1.12)
Rehearsal (spoken)[5]	Negatively incongruent	3.900 (0.60)	3.871 (1.17)
	Congruent	3.012 (0.77)	3.114 (0.82)
	Positively incongruent	2.810 (1.06)	3.211 (0.74)
Perspective[6]	Negatively incongruent	2.471 (0.65)	3.336 (0.54)
	Congruent	3.764 (0.83)	3.681 (0.42)
	Positively incongruent	2.610 (0.40)	3.412 (0.68)

This table provides the mean (SD) ratings for the two groups, for each memory characteristic within each congruence category.

[1] Higher values indicates increased clarity
[2] Higher values indicate greater centrality
[3] Higher values indicate greater difficulty
[4] Higher values indicate greater rehearsal
[5] Higher values indicate greater rehearsal
[6] Higher values indicate greater field perspective

3.3.3 Analysis of life-story narratives

In order to establish whether depresso-typic characteristics were present in the life-stories of the MDD group, the life-story narratives were transcribed and examined for group differences in i) word count, and proportions of ii) positive words, iii) negative words, iii) self-referencing words, and iv) social words, all calculated as proportional to the length of the narratives

The word count was predicted to be lower for the MDD group. As it transpired the relative length of narratives was very broad and so a mean rate of word production was calculated to allow for the time taken to produce the words i.e. words/time taken to narrate life-story, rather than simply number of words. There was no significant difference between the groups for the number of words produced during narration $t(23)<1$.

Analysis was carried out using the Linguistic Inquiry and Word Count system (LIWC, 2016) to explore the relative distribution of positive, negative, social, and self-referencing words. This textual analysis programme allows objective analysis of coded word content of written and transcribed texts. The results reflect the percentage of each category of word in any given text. The word categories chosen for this analysis were based on the prediction that people with current or historical major depressive disorder would be more likely to use negative words and less likely to use positive words in their life-story narratives when compared to never depressed controls. In addition it was predicted that this group would use more self-referencing and fewer socially referenced works, as they would be more 'self-focussed', and less social as a result of a ruminative cognitive bias, and social isolation.

Table 3.4: Component production (%) in life-story narratives for Study one

	MDD (SD)	**Control (SD)**	**t-test**
Self-reference (%)	8.02 (1.76)	10.36 (2.20)	$t(23)=2.949$, $p=0.007$
Social words (%)	7.53 (2.42)	8.12 (1.16)	$t(23)<1$, n.s.
Positive words (%)	2.19 (0.74)	2.57 (0.86)	$t(23)=1.191$, $p=0.246$
Negative words (%)	0.86 (0.42)	1.45 (0.60)	$t(23)=2.874$, $p=0.009$

This table provides the proportion of words, as compared to the total number of words produced in the life-stories, which were categorised within each category. Results are provided for the dysphoric and control groups, and the results were compared using t-tests reported in the final column.

A series of independent t-tests was carried out to explore group differences in these narrative characteristics. Table 3.4 shows the mean (SD) % of the components produced.

The anticipated group difference in the overall proportion of positive words found no support,. while a group difference in the proportion of negative words indicated that, contrary to prediction, the control group produced a greater mean (SD) relative percentage of negative words, 1.45 (0.60)%, compared to the MDD group, 0.86 (0.42)%. Group differences were found between the percentage of self-referencing words in the narratives, but not for the proportion of social words, and this effect was again the opposite of that predicted with the control group being more self-referential with a mean (SD) percentage of 10.36 (2.20)% words in the narrative compared to 8.02 (1.76)% for the MDD group. While these proportions were very small, the results are contradictory to the proposal that there would be a greater self-focus and a negative bias in the MDD group compared to controls.

3.4 Discussion

This study explored the schematic role of life-story narrative chapters in the structure of narrative and the recall of autobiographic episodic memories. This involved a process of life-story narration and chapter generation and resulted in a rich data set allowing an exploration of the structure of chapter representations, these chapters were, in turn, used to cue episodic memories, and an exploration of the nature of these, and comparing two groups, those who have experienced major depressive disorder (MDD), and non-depressed controls we were able to make predictions concerning the nature of the internal cognitive structures which are represented through narrative accounts.

There were two questions concerning the characteristics of this chapter-cued memory recall, the first, examining the role of chapters as schematic representations, asks whether the use of life-story chapter context will influence recall. That chapters are schema implies that there are associated characteristics which are common to them, and it was proposed that atypicality in terms of chapter schema will enhance recall, either in terms of accessibility, or representative detail (clarity), leading to a prediction of affective incongruence raising memory accessibility overall. Drawing together predictions about the influence of cognitive deficits, and schematic monotony of narrative, life-stories, and life-story chapters, with the requirement for the recall of episodic memories, it was further proposed that there would be, for people with depression, an intra-chapter schematic monotony, reflected in a reduction in

the affective variance between chapters and episodic memories. In addition, a temporal breakdown in the chapter structure in terms of sequence of production, number produced, a negative affective bias would mean both chapters and episodic memories were rated as more negative than controls. A subsidiary prediction was that the depressed group will show evidence for a depresso-typic narrative structure and content difference, in terms of self-focus and negative bias in their life-story narratives. in i) word count, and proportions of ii) positive words, iii) negative words, iii) self-referencing words, and iv) social words. Because this study was exploring a relatively novel cueing method, there was also a consideration of whether the depressed group would display over-general recall of episodic memories.

The prediction that temporal breakdown in chapter structure was drawn from research which indicates that their formation relies on specific memory recall (D'Argembeau, *et al*, 2014), and life-period reasoning (Thomsen, 2015) processes,and as a result of overgeneral memory recall people who had experienced MDD may be impaired in this. This prediction is supported by a number of studies which show a breakdown in life-story coherence in narrative accounts (e.g. Adler, *et al*, 2007; Boulard, 2015; McAdams, 2006; Waters & Fivush, 2015). Initial analysis therefore examined the temporal structuring of life-story chapters, but no evidence was seen for chapter-level disorder. The groups were similar in terms of the temporal production (which chapters came first), and the valence of the chapters produced. During the chapter production phase chapters were reliably produced sequentially from early childhood, through school, careers and on to the present day. Interestingly, no matter what the age of the participant there was little difference in the number of chapters produced, and thus the length of chapters varied according to age for both groups. This feature may have more to do with the demand characteristics of the task than the internal representation of the autobiographical life-story narrative, in that reference is made to the chapters of a book, that chapters can be of any length, but that perhaps participants were likely to be aware of the time which they were given to produce the chapters (coming at the end of the hour-long session), and their ability to use their previously narrated life-story as a structural cue.

In order to test the prediction that chapters represent sub-divisions of a schematic life-story, and are themselves schematic in nature, the impact of affective atypicality or *incongruence* of events was expected to follow a pattern of increased accessibility. This was anticipated to be seen for memory clarity, and centrality, and as a result the difficulty in recall

would be reduced. This study builds upon procedures which have already attempted to refine recall within life-time periods, and incorporates the TEMPau criteria in to an experimental design. In addition, a centrality of event measure was incorporated in to the ratings, as this has been found to be an important aspect of inclusion in to life-story narratives, and influential on rehearsal and thus subsequent accessibility (Berntsen & Rubin, 2006). The impact of affective narrative congruence on episodic memory recall has not been addressed in any research study to date. While congruence of memories with their cuing chapters had no impact on the centrality (personal importance) of memories, nor did it impact on the difficulty of recall, there was an impact of incongruence on the clarity of memories. Overall negatively incongruent memories were rated with greater clarity, and were spoken about more than positively incongruent and congruent memories. The impact of incongruence was predicted to be different for the MDD compared to the control group. This prediction is drawn from evidence that MDD is linked to monotony in the structuring of chapters (Dalgliesh, *et al*, 2011), and narrative accounts (Habermas, *et al*¸ 2008), and this was anticipated to be seen in a significant reduction in the degree to which incongruence impacted on recall, however no group differences were seen. This absence of a group effect could have been seen for a number of reasons, first that simply the representations of incongruent events, are not recalled differently depending on depressive status, and that mood effects are more likely to manifest in the recall of autobiograpchail information more generally. However, this was also not a characteristic of either the chapters, or specific memories in the MDD group.

A series of analyses were carried out on the life-story narratives, the first was to explore depresso-typic narrative features, with the prediction that the MDD groups would produce more negative and fewer positive words, be shorter, and have a more self-focussed narrative style. The life-story narratives were used to establish whether there was a consistent difference in the narrative, in terms of negative representations, and a depresso-typic self-focus. In addition to this the self- and social-focus of narratives were explored to begin to differentiate the content of life-stories, and further to this the rate of delivery of narratives to establish comparability between groups was examined.

Overall, and somewhat intriguingly, the never-depressed controls produced a significantly greater proportion of negative words within their life-story narratives, while there were no differences in the proportion of positive words. Tentative explanations can be

offered for this, the first being that in depression, engagement with negative material can induce a disproportionately negative response, and thus a disengagement or avoidance of negative material in narrative could be seen to be a protective device in accordance with the predictions of Williams and colleagues (2011). This might be particularly significant in the MDD group in this study as depressive status was established using SCID-II criteria, and current mood was not taken in to account, so if current mood were positive, avoidance might function to reduce risk of dysphoric mood. This explanation is supported by evidence for a significantly reduced self-referencing speech for the MDD group. Contrary to expectations the ruminative self-focus (Nolen-Hoeksema, *et al*, 2008) associated with depression was not apparent, however, if there is a functional avoidance of negative material in the MDD narrative production, this might be linked in to a reduction in the personalisation of narrative accounts. In conjunction these two characteristics would serve to allow the speaker to fulfil the demands of the task, while still avoiding speaking of negative material linked to the self. A separate account for functional avoidance of negative event memories has been proposed, whereby the negative impact of events is reduced by recall perspective (Robinson & Swanson, 1993; Siedlecki, 2015) as a third-person perspective is associated with reduced emotional impact of event recall, and a significant perspective difference was seen, with the MDD group reporting greater levels of visualising events from an observer perspective, but again this was seen for this group with both positive and negative memories, and so avoidance is suggested, but not evidenced by these results.

A second explanation for the group difference in negative speech is that the characteristic absence of affective variation in depressive experience may be expressed in the use of moderately positive words. The LIWC categorises words, when they are valenced, as either positive or negative, but does not distinguish between moderately and highly rated words in either category, therefore happy and ecstatic, are counted in the same way. If the MDD group produce words which are consistently neutral or mildly positive ‘nice’ ‘good’, while the control group were more likely to produce words of both higher positivity ‘brilliant’ and negativity ‘awful’, this could explain the disparity. The rate of delivery (word number/time taken) of narratives themselves was not different between groups and so it appears that the slowing of production seen in depression, particularly for hospitalised MDD patients (Boulard, 2015), is not a consideration in this study as a community sample of participants was used.

The autobiographical memory cuing task using chapter-cues revealed some evidence for over-generality in autobiographical memory recall. The MDD group recalled events with less clarity, reported access to be more difficult, and also adopted the observer rather than the field perspective, in particular for incongruent events. All of these results are indicative of decreased specificity in recall, and the latter result links with the suggestion that depressed individuals are more likely to take a distanced approach to recall of impactful personal experiences.

On further examination and when controlled for by accounting for the degree to which an event was thought about, the difference between groups in terms of event clarity was removed. While the direction of effect cannot be predicted i.e. are events more clear because subjects had thought about them, or were events thought about more because they were represented with greater clarity, this association does call in to question whether the effect revealed is over-generality, and how this links with the role of rehearsal and maintenance of specificity of memories. The results give no evidence for a group difference for engagement with negative autobiographical material, and the apparent over-generality is not linked to memory valence, also, and in contrast to a number of studies, negative episodic memories were less clear overall (Berntsen, Rubin, & Siegler, 2011). There may have been an impact of the life-story narrative priming memory recall in this case, but the nature of this impact is not clear.

Theoretically the life-story narrative has been proposed to act as a personal schema (Bluck & Habermas, 2000) which provides structure to the autobiographical memory, and narrative construction. The nature of schema are such that they provide a scaffold on which to recall and recount past events, this scaffold relies on beliefs and expectations and is used during recall of autobiographical events, and in the recounting of life-stories. The prediction that chapters provide a mid-level structure to this schema is supported by this study in a number of ways, the first being the role of negative incongruence in increasing clarity of memories. Negative incongruence relates to the situation where something occurs that is worse than expected. Examples from the study include events where typically pleasant chapter, such as time at school, cued a memory for a poor performance in an exam. That overall negative memories are not recalled with greater clarity than positive memories, but are when the chapter context is taken in to account indicates that the context of the event occurring, or the cognitive representation will be significant in the memory recall experience.

The impact of recalling memories with greater clarity has been suggested to be that they are more significant for goals seeking, or avoidance functions (Berntsen *et al*, 2011*;* Bluck, 2003; Pillemer, 1998; Csikszentmihalkyi & Beattie, 1979), and although in the current study the rated centrality did not appear to be a factor this could be the case. The idea that negative events require processing and 'closure' for them to lose their sense of clarity or emotional impact, also points to the possible role of negative incongruence. A negative event within the context of a number of other negative events, within a negative chapter would be less likely to feel unusual or in need of explanation. A negative event in a period of more positive events might have, at the time, been more surprising and this would have impacted on encoding (Berntsen & Rubin, 2006), while the nature of unusual events is that they would require more explanation in order to become minimised (Taylor, 1991).

Key considerations for this study were the way in which the top-down life-story narrative to individual event impacted on the systematic sampling of memories, at each level of the study (narrative, chapters, and episodic memories) there were factors which impacted on the comparability of the next step, and therefore draw in to question the findings reported. The life story narratives were of varying length, but the number of chapters which were reported following the narration were similar, and this was independent of the participants' age. It can therefore be reasonably assumed that if narrative chapters are representative of 'clustering' of events, they would be more likely to be similar lengths, for example, 'school' 'university' 'first job', whereas the chapters here appear to have been stretched to fit the task, indicating that we cannot draw assumptions about cognitive representations. Using the method of collective sampling and creating post-hoc categories of congruence also caused problems, this is because a number of participants failed to provide episodic memories for all the congruence categories.

These concerns resulted in a recognition that the structure of life-story narratives should be examined in more detail, and that if they were to be used to structure episodic recall, differences between life-stories and life-story chapters of people with depression and never-depressed groups should first be established. Taking these results forward it is clear that any tentative suggestions must be considered in the context of the variability in participant performance, and also the nature of the way the incongruence was established between memories and their contextual chapters.

The use of participant-defined, rather than researcher-defined chapters as cues within a study accommodates the need for ecological validity in the cuing process, incorporating the need to explore specific episodic memories. The cuing technique appears to effectively result in episodic memory recall as shown by the criteria checks, and may also effectively differentiate the over-general memory bias seen in depressed groups. This narrative-based sampling method can be considered more ecologically valid representing a closer analogue to real-life recall circumstances.

Overall incongruence of events in this study has no effect on memory representations and difficulty of access, however negatively incongruent events were reported to have greater clarity than postively incongruent events. The life-story narratives produced by the two groups were very similar in terms of the characteristics examined. In terms of differentiating between the two models of autobiographical memory introduced in Chapter 1, this study provides support for the hierarchical structure of the Self-memory system (Conway, *et al*, 2000) in terms of chapter-event links, but does not differentiate the impact of narrative context on recall because no difference was established between the MDD and control group narrative production in terms of sequencing and coherence. The temporal sequencing of chapters produced could be a result of internal representations upon a temporally defined framework (as would be seen with the SMS), or be the result of a culturally accepted temporal sequence to the narrative frame (as would be seen with the BSM (Rubin, 2006)).

This study was carried using a small number (25) of participants, effect sizes were small, and any conclusions from analysis should be approached with caution. However, the protocol used to elicit life-story narratives, associated chapters, and cued episodic memories was effective. Studies two and three refine and develop the method of data collection by separating the two stages of analysis, to life-story narratives and depresso-typic features, and the cued recall of chapter-based memories.

Chapter 4 The structure of life-stories in dysphoric groups

4.1 Introduction

Despite theoretical models which posit the link between life-story schematic representations, and life-story narratives, little direct exploration has been carried out to evaluate the proposal that life-story narratives are verbal representations of cognitive schema. In order to establish this link this study uses the assumption that the components of life-story narratives can be matched to characteristics of underlying representations, and that in order to create a predictive model features of narrative will map on to representational characteristics of different groups (Habermas, 2011). Research has indicated that for people with depression there are features of narrative which are suggestive of a breakdown in self-coherence, schematic; self-representations, such as low self-esteem, and cognitive processes such as over-general recall of autobiographical memories.

This link has been proposed as a result of the combination of impaired narrative ability, and cognitive impairment for people with depression. Depressive disorders are linked with a reduced ability to create a coherent life-story narrative, and this is suggested to be a result of either an impaired ability to access autobiographical information (Williams, *et al*, 2006), or the impaired cognitive ability to undergo autobiographical reasoning (Lilgendahl & McAdams, 2011; Waters & Fivush, 2015) which in turn could influence their ability to distance themselves from past events, and to effectively anticipate a positive future. So while the content of narratives is linked to the trajectory of mental health over time in terms of the incorporation of positive events, and optimistic outcomes (Adler, Turner, Brookshier, Monohan, Walder-Biesanz, *et al*, 2015), the structure of narratives is also indicative of mental health. Habermas and Colleagues (2008) carried out a study to investigate evidence that life narratives both reflect (in terms of negative content) and stabilize (in terms of information processing) psychopathology in depression. They examined the narratives of 20 adults with clinical depression being treated in a psychiatric institute with 20 matched controls. They found that narratives of people with depression differ from controls in the kind of events included in the life story, with a mood congruent effect for the narration of

autobiographical events, a depressed explanatory style (more self-blame and external attribution of positive events), ruminative characteristics and an impaired temporal linearity in narrative. Habermas and colleagues were particularly interested in the ways that a sense of distance from past events was reflected in narrative and used the ability to compare past and present as an indication of temporal structuring (Habermas & Paha, 2001). Narratives for people with depression and dysphoria were negative, sparse and affectively congruent, and in addition, the results indicated that depressed individuals were less able to take a distanced perspective on past events. The authors emphasised an interactional aspect to these narratives, in that the ways in which information was processed appeared to be both influenced by, and to influence the depressive status. For example, reports of temporal breakdown in depressed groups, was evidenced in narrative by an absence of past-present comparison, and that this process of comparison would itself be predicted to impact on the ways that memories were perceived i.e. that the past is recalled with a less distanced frame.

This proposed interaction between how something is related in narrative, and represented in memory relies on the ways in which meaning-making occurs. Evidence of cognitive management of events is found in the autobiographical reasoning process (Habermas & Bluck, 2000). As a result of autobiographical reasoning, abstracted processes are proposed to be evident in life-story narratives which represent the meaning-making, evaluative, and connection-making aspects of creating a coherent and communicative narrative (McLean & Pasupathi, 2011). A number of characteristic statements are likely to be embedded within narrative, including reflections, evaluations, life-lessons, inferences about personality, and meta-communication. Thus life-story narratives are thought to represent the underlying cognitive representations, or autobiographical self, but also contain evidence of reasoning processes essential to the creation of a narrative identity.

In a novel study exploring the representation of autobiographical memory in narratives of non-depressed adults, Thomsen (2009) examined the role of chapters and structural components of life-story narratives in a group of 30 elderly Danes considered to be in ‘good emotional health’, Participants were given 45 minutes to relate their life-stories and these were then transcribed and coded for the following features: The first five narrative features were types of autobiographic memories, Lifetime periods, Mini-narratives, Specific memories/events, Categoric memories, and Facts (autobiographical semantics). The next six narrative features were derived from literature on autobiographical reasoning, and also as

being commonly represented categories in the data set itself: Reflections, evaluations, life-lessons, inferences about personality, meta-communication, and chapters for other people. The narratives were found to contain a preponderance of chapter components, with the number of chapters being un-related to the number of other components. Thomsen concluded that while chapters are likely to exist in nested hierarchical structures, they have an essential role in creating context and coherence to the higher-order structure. Specific events within the narratives of this study were suggested to be the building blocks of chapter formation, as they functioned most often as illustrations of chapter-level summations, indicating that autobiographical or life-period reasoning creates links between events resulting in clusters of thematically linked events with a summative narrative.

Reasoning processes are linked to the chapter structure, if chapter structures are based on memories for specific events, and are created through autobiographical-, or life-period reasoning processing, it leads to the prediction that people with depression, who have an impaired ability to retrieve specific memories (Sumner, *et al*, 2010), and also are more likely to find the reasoning process cognitively demanding (Roiser, *et al*, 2014) will have a different chapter representation in narrative, this could be in terms of the ability to close chapters (resulting in a larger number being ongoing at the time of narration), and to create chapters with a discrete focus (resulting in fewer chapters being produced overall, and less overlap between chapters).

Outwith the chapter structure, other aspects of narrative could reflect depressive psychopathology as the cognitive features of depression are also predicted to be represented in spoken narratives. Rumination, a negative problem-focussed thinking style which is both a risk-factor and mediator of recovery in depression (McLaughlin & Nolen-Hoeksema, 2011), and difficulties in the recall of specific autobiographical memories (Williams, *et al*, 2006) could also be reflected leading to the following predictions: That due to habitual capture and rumination on a categoric event-level, rather than accessing specific event-based knowledge (Williams, 2006), people with depression would be more likely to narrate their life-stories with reduced levels of specific memories, and higher levels of categorical memories, narratives would also reflect characteristics associated with ruminative thinking in terms of higher levels of negative evaluations, and higher levels of negative life lessons compared to controls

There are broadly three suggestions for why there might be a difference between these structures for dysphoric and non-depressed groups: (1) there would be a disruption in the ability to construct chapters resulting from impaired reasoning, resulting in temporal disorder, (2) a ruminative past-oriented thinking patterns would prevent the 'closure' of past chapters, and/or (3) the disrupted sense of self associated with depression (e.g. Adler, *et al*, 2015; Cruwys *et al*, 2014) would prevent the crystallisation of a socially meaningful narrative.

In order to address the proposal that depression could be perpetuated by narratives which are overwhelmingly negative, and representative of a life-story schema which creates negative links and expectations. An examination of the differences between the narrative structuring of life-stories in depressed groups is required to ascertain whether there are differences between depressed and non-depressed groups, dolife-story narratives of people with depression differ from those of non-depressed controls in terms of number, distribution, and length of chapters reported by participants. Based on the findings of temporal monotony and reduced coherence in depressive narratives (Boulard, 2015; Waters & Fivush, 2015), in this between-participants study, life-stories will be elucidated, and propositional content compared, in addition chapters are expected to be represented with longer periods with greater similarity of themes and features, and that a reduction in structural coherence would reduce the delineation between chapters. Autobiographical reasoning processes will be less evident in depressed people. There would also be reduced evidence for autobiographical, or life-period, reasoning and past-present distancing in the form of fewer reflections, fewer evaluations overall, and, relative to positive evaluations, more negative evaluations of self (compared to others), and more negative autobiographical facts (referring to self).

These are predicted to be evident in the presence of autobiographical information in narrative, and in terms of the temporal coherence reflected in the chapter-level structure. The following hypotheses concerning the nature of the depressive state are also explored: That the life-stories of the dysphoric group would reveal fewer specific events, and more categoric or general memories compared to controls, and that narratives of depressed participants would reveal ruminative characteristics in the form of more negative evaluations, and more negative life lessons and self-referenced facts.

Overall predictions are therefore that:

- Chapters are a primary feature of life-story narratives, and that they are not reciprocal to specific memories, which would be reflecting in longer narratives by:
    - more specific memories
    - fewer categoric memories
    - fewer chapters.
- The dysphoric group, compared to controls, will have different chapter representations as a result of reduced coherence of life-story chapters resulting in:
    - fewer chapters overall
    - longer chapters
    - more overlapping chapters
- As a result of reduced autobiographical, or life-period, reasoning and past-present distancing, the life-stories of the dysphoric group, compared to the control group, will have:
    - fewer, or more negative life-lessons
    - fewer, or more negative self-referencing facts
    - fewer reflections
- The dysphoric group will also have life-stories with depresso-typic features reflecting overgenerality, in terms of:
    - fewer specific events
    - more general events,

    and evidence of rumination, as indicated by:
    - higher levels of negative evaluations
    - fewer positive evaluations
- There would also be evidence for a depresso-typic narrative structure and content differences, in terms of self-focus and negative bias in their life-story narratives, demonstrated as
    - fewer positive words
    - more negative words;
    - more self-referencing words, and
    - fewer social words.

4.2 Method

4.2.1 Participants

This study recruited 30 young adults aged between 18-25, via campus flyers and the University of Abertay participant recruitment SONA, system, asking for both currently depressed or dysphoric individuals, and never depressed participants to take part. The overall mean (SD) age of participants was 23.1 (1.9), the dysphoric group had a mean (SD) age of 23.4 (2.1) years, with 4 males, and the control group a mean (SD) age of 22.8 (1.6) years, with 6 males. Each participant received £5 on completion of the research protocol. Allocation to two groups, dysphoric and non-dysphoric was carried out using the PHQ-9 (Kroenke & Spitzer, 2002) (Appendix 13) with a cut-off of 10.

4.2.2 Design

This is a between participant design which compares the transcripts of life-story narratives of dysphoric and non-dysphoric groups. Ethical consent was obtained from the University of Abertay Dundee (Appendix 2). The interviews were transcribed verbatim to produce 30 life-story narratives.

Process of coding

Each narrative was independently coded for narrative components by the current author, and a research assistant. A dual-coding process was established, whereby each narrative account was coded by the author, and by a research assistant using the same criteria, coding disparities between coded components were agreed by discussion. The same coders were used throughout.

The coding categories used were chapters (lifetime periods, extended events, and mini-narratives), specific memories, categorical memories (general events), facts, inferences about personality, life-lessons, evaluations (positive), evaluations (negative), reflections, metacommunication and chapters for other people.

The first five were chosen because they represent the autobiographical memory categories accepted in literature, while the latter four give a representation of the results of

autobiographical or life-period reasoning, and were used by Thomsen (2009) in her transcript analysis as a result of common identifiable components of narratives.

The two coders agreed on 92% of the components coded. The percentage of agreement for each component is as follows: Chapters 82%; Specific memories 89%, Categoric memories 92%, Facts 96%, Inferences about personality 97%, Life lessons 84%, positive evaluations 97%, Negative evaluations 99%, Reflections 79%, Metacommunication 98%, Chapters for other people 100%

While there was good agreement in the categories of evaluations, the most commonly confused categories were reflections and life lessons. Disagreements were resolved via discussions between the two coders.

Definitions of narrative components

Chapters

Life-time periods are temporally extended structures containing commonalities, such as life-stages, and in practice are difficult to distinguish systematically from mini-narratives. The latter being extended periods focussing on a particular activity or situation. Either of these categories can be defined as 'chapters' in practice. As a result of this difficulty in differentiation, Thomsen (2009) chose to categorise both as 'chapters' in her analysis. In this study, initially a distinction was drawn between them, but this proved problematic as despite researchers feeling that the narrative distinction could be drawn there were challenges in establishing clear objective criteria. Chapters therefore are both life-time periods and mini-narratives, meeting the criteria drawn from Thomsen (2009), and allowing for the hierarchical clustering of chapters seen in naturalistic studies of chapter structures (Thomsen & Berntsen, 2008; Thomsen, *et al*, 2011):

A life-story chapter is a component of the life-story containing descriptions of parts of the life-course stretching in length from 24 hours to several years. An example of a chapter is:

'*So by the time I went to secondary school, the marriage between my parents was really rocky, so we were all very conscious of that, as a result the whole of my teens became*

like a set of stepping stones between one row or drama and the next. I finally got out to uni, and mum left shortly after, not sure why she hung around…'

Whereas a categorical memory might be:

'*during my teens my parents argued all the time*'

During categorisation it is possible to confuse chapters with general events or categorical memories, which are summarisations of a series of similar events. In theory each chapter defined within a narrative could represent several chapters, so for the example above, the above example may represent chapters for the parents' marriage and secondary school, leading to an underestimation of the number of chapter components. In addition the same chapter may be referred to multiple times during the life-story, and this would create an over-estimation of the number of chapter components. In order to explore the potential disparity between researcher defined chapters and the perspective of the participants we asked participants to define life-story chapters for their own life-stories following their narration.

Specific memories:

These are defined as memories for events lasting less than 24 hours, which have sufficient detail to be identifiable as single incidents, or are indicated to have occurred only once. Within a narrative account they are often signposted with the use of introductory statements such as 'One day …', or 'It was during this time that I …'. They generally give some information about setting, and the action sequence within the memory, there may also be sensory-perceptual information, for example:

'..and one day, see I'd been set about, picked upon by some group of kids actually I don't remember who but I just lost it and ended up jumping on the first other kid who came near me. I was furious with anyone else who went to that school and picked on just one person as just an example of that hated group and um beat the stuffing out of him and I was not particularly given to fighting at all which finally got my parents to take my repeated requests to change schools'

Sometimes evaluations and reflections are included, which are apparently intrinsic to the specific memory, for example, 'I was not particularly given to fighting at all', and these were not coded separately due to their link to the specific event. In this example too there is a

continuation of the story ‘ which finally got my parents to take my repeated requests..’, that appears to belong to this event, and while it may be the result of autobiographical reasoning is also considered part of the specific memory. During coding, interpretation of these incidents was decided by discussion between coders, seven discussions occurred across the data set.

Categorical memories:

Categorical memories are defined as memories for repeated, and similar types of event which are described with no reference to time course of occurrence, nor relating to a particular day or date. For example:

‘We’d come downstairs in the morning and Dad would be sleeping on the couch’

They are dissimilar from chapters in that they represent not a cluster of related events but a summation of repeated events. They are distinct from episodic memories in that they lack distinct ‘one-off’ details, and tend to be relatively poorly defined in terms of sensory details.

Facts:

Are where the narrator is providing specific information, about themselves, events or the world they are describing. Because facts can be intrinsic to both specific memories, general events, and chapters they were only coded as being facts if they were longer than two lines, or could not be connected to other coded categories. For example:

‘*In the US you start school at 5, then move to middle school at around 10, at 14/15 you move to High School’*

Inferences about personality:

These are categories of communication where the narrator makes some evaluation or statement about the characteristics of themselves or others, such as personality traits, roles or interests. These may introduce or follow a section of description of events, which support the inference. For example:

‘I think you could fairly well characterise me as, at that point, a teenage pseudo intellectual which is, I suppose, the way most genuine intellectuals get their start’

Life-lessons:

These are statement where the speaker draws on principles, moral rules, or some higher 'truth' which has been learnt as a result of experience. For example:

'I don't know how I got through that first year, but you have to pull yourself together and carry on through, you can't just give up'

Evaluations:

These were coded when the narrator made some evaluative comment about a part of their life-story, but not when they made some evaluation of an object, or third person e.g. 'a nice house', or 'a horrible person'. For example:

'..well I was born in Namibia in above South Africa to a South African guy and an American woman, I have a younger brother who if four years younger than me, um happy childhood'

Evaluations were scored as either positive e.g. *'that was a happy time'* or negative e.g. '*that was a difficult three years'*.

Reflections:

Include narrators' explanations for decisions and choices, along with summary reflections on life-story events. They may be similar to evaluations but if so they are judged to be reflections when they have no clear emotional tone, for example:

'*So at the point I chose to come here, which kind of influenced my whole life'*

Meta-communication:

This is when the narrator 'breaks the fourth wall' in terms of the description and indicates to the listener what they are doing. For example:

'I'm just marshalling my thoughts'

Chapters for other people:

These are descriptions of sequences of events in other people's lives, for example:

'my father had come over from the US to live and work in Africa, he flew planes for the oil company before he met my mother'

The author trained a research assistant to code the categories. They independently separated the final life-story transcripts in to propositions, and any disagreement at this stage of categorization was agreed through discussion.

The propositions were then coded by both the researcher and research assistant. Thus all transcripts were independently double-coded by researchers.

An important question in terms of this thesis is whether there is a difference between the dysphoric and control groups in the ways in which they represent chapters in their life story, and by inference how these chapters might be constructed and represented cognitively. This was examined in two ways, the first being the categorisation of life-story chapters within transcripts, the second being the reporting of chapters by participants which could then be matched to the coder categorised chapters. To ensure coders were not influenced by participant-defined chapters these remained in sealed envelopes until the transcription and component coding of life-stories was complete. On completion the participant-defined chapters were counted and matched to those defined by the coders.

The total number of chapters, and the theme of the chapter was matched between participant defined and coder defined chapters. The matching process was carried out by counting clear matches, followed by discussions of unclear matches using the criteria of 1. Matched theme e.g. '*playing the piano'*, 2. Matched timeframe, e.g. '*early teens'*, 3. Matched content events e.g. *'performing in Macbeth*', chapters were considered the same if they matched on two out of three of these criteria.

4.2.3 Measures

Depression status was evaluated using the PHQ-9[7] (Kroenke & Spitzer, 2002). This self-report measure requires the rating of nine features of depression as defined by the DSM-IV. The cut-off scores are for the absence of, or minor, depression 0-9; moderate/moderately severe depression 15-19, and severe depression 20+. The PHQ-9 had sensitivity (testing

[7] PHQ-9 was adopted for this study to limit time taken to establish dysphoric status. The PHQ-9 has nine questions, the BDI-II has 21

positive) of 88%, specificity (testing negative) of 88%. The PHQ-9 takes less than 3 minutes to complete (Appendix 13).

4.2.4 Procedure

All procedures were carried out at the University of Abertay Dundee.

Participants were invited individually to attend the University research centre and were asked to complete the PHQ-9 (Kroenke & Spitzer, 2002).

Following this the participants were asked to recount their life-story to the researcher. This was audio recorded and the following prompt was used:

'*I am interested in understanding who you are and how you have become the person you are today. Please tell me about your life to date. Give yourself about 15-20 minutes and try and tell me a coherent story of your life, so that I can get a good picture of you'*

If participants talked for longer than 25 minutes they were asked to complete their narration at a convenient point.

The participants were then asked to provide, using the metaphor of an autobiographical book, chapters which relate to periods of their lives, in response to the following prompt:

'*I would like to imagine that your life story is a book, and that within this book there are chapters each involving a different part of your life. The chapters of your life story can be thematic e.g. 'my love of art', or relating to particular times in your life e.g. 'my time in the army', chapters can be of any length and can overlap e.g. for example during your time in the army you could have taken up painting.*

Starting with the chapter that first comes to mind, write a title and a brief description of the chapter in the space provided.

Then think about the title and description of the next chapter you think of and write this on another, continue until all your chapters have been named and each has a response booklet with the front cover completed'.

Participant reported the approximate date at the start and end of the chapter, and were free to complete as many or as few chapter sheets as they chose. On completion, the participants were thanked, and received their payment.

4.3 Results

The transcribed life-story narratives of a dysphoric and control participant can be found in Appendix 8. The number of coded components for each group, and category are shown in Table 4.1.

An overview of the structure and content of the narratives revealed a mean (SD) 42.73 (22.03) components, the minimum number of components was 25, and the maximum 66. A Pearsons Correlation was carried out to examine the relationship between narrative length and number of components, and found no evidence for a relationship r=0.14, p=0.431, df=14. Our results follow the patterns reported by Thomsen (2009) in that chapters were the most common component of the narratives, being around three times more common than specific memories.

This pattern was consistent across participants, with none providing a narrative with more specific memories than chapters, supporting the idea that life-stories are predominantly structured at chapter-level. Expanding on this we considered whether the commonality of chapters was due to a need for narrative brevity, and were perhaps chosen to allow the entire story to be told within the suggested time allowed as this was indicated by Study one. This would be indicated by shorter narratives being more likely to use summary events and chapters and provide fewer details in the form of specific memories? Pearson' correlation analysis revealed no evidence that longer narratives contained i) a greater number of specific memories r=0.05, p=0.776. nor ii) fewer categoric memories r=0.02, p=0.674, or iii) fewer chapters r=0.28, p=0.312, all dfs=29.

Comparison of the two population samples:

Life-story narratives of people with depression were predicted to differ from those of non-depressed controls in terms of valence, number, distribution, length of chapters reported by participants.

Based on the findings of temporal monotony and reduced coherence in depressive narratives (Boulard, 2015; Waters & Fivush, 2015), chapters were be expected to be represented as longer periods and that a reduction in structural coherence would reduce the delineation between chapters. Overall there were no group differences in the number of chapters produced $t(28)<1$, however there was a disparity between the number of chapters as defined by the researchers, and by the participants themselves.

The participants reported a mean (SD) 7.65 (2.12) chapters, and the research coders 10.40 (2.50). This disparity was examined and it was proposed that while the coders understood chapters to involve mini-narratives, some of which could have had a relatively short time-frame, participants may have understood chapters as longer, periods which might align to themes within the cultural life-script (Berntsen & Rubin 2004).

Further examination of the chapter disparity involved location of chapters reported by participants which were not coded by researchers. These 'missing' chapters were returned to the transcripts to see if they could be recognised by the content, a mean of 2.75 (2.58) chapters were reported by participants which were not coded, and very few of these returned chapters were recognisable in the transcripts, for example a mention of singing in the choir which was coded as a categorical memory, but clearly related to the chapter 'singing!' defined by the participant. A few of the chapters could be inferred, for example a chapter for 'first year' could be inferred from the progression in the life-story from primary school to GCSEs, but was not mentioned in the transcript at all. These 'missing' chapters could have been left out because of the length of time given for life-story narration.

Although there was clearly some disparity in the matching of chapters in the life-stories, and the ways that the participants defined chapters, around 87% of the participant-defined chapters appeared in the chapters coded by researchers. This supports the proposal that internal structuring of autobiographical memory, i.e. how individuals cluster their memories, has a strong alignment with the way that they are presented in narrative form.

Table 4.1: Life-story components for Study two

Component	Total Mean (SD)	Range	Dysphoric Mean (SD)	Control Mean (SD)	t(28)
Chapters	10.40 (2.50)	4-15	10.13 (2.25)	10.67 (2.77)	<1
Specific memory	3.16 (1.55)	0-6	3.40 (1.54)	2.93 (1.57)	1.077 n.s.
Categorical memory	6.37 (2.61)	3-14	6.80 (2.71)	5.93 (2.52)	<1
Facts	10.73 (6.01)	3-25	10.33 (5.59)	11.13 (6.55)	<1
Inferences about personality	10.40(2.50)	0-7	2.40 (1.36)	3.67 (2.39)	<1
Life-lessons	0.57 (0.79)	0-3	0.53 (0.72)	0.60 (0.88)	Mann-Whitney U <1
Evaluations (positive)	0.10 (0.30)	0-3	2.47 (1.78)	2.93 (1.57)	<1
Evaluations (negative)	2.70 (1.67)	0.6	3.13 (1.82)*	1.53 (1.75)	2.373, p=0.025
Reflections	2.33 (1.92)	0-8	1.00 (0.97)	0.67 (0.87)	<1
Meta-communication	0.83 (0.92)	0-3	3.00 (2.17)*	1.33 (1.59)	2.399, p=0.023
Chapters for other people	2.17 (1.99)	0-7	0.27 (0.57)	0.07 (0.25)	1.197, n.s.
Components which could not be coded	0.17 (0.45)	0-2	1.13 (1.31)	1.00 (1.26)	<1
Transcript length in words	3897.87 (742.00)	2671-6001	3841.66 (604.04)	3954.51 (875.52)	<1
Number of components	42.73 (22.03)	17-51	43.60 (21.75)	41.80 (23.04)	<1

This table provides an overview of the mean (SD) number and range of components in the life-story narratives overall, and the mean (SD) of components as produced by the dysphoric and control groups.

It was decided that to ensure alignment with the exploration of chapters as represented within narrative, the researcher-coded chapters were included in the analysis of narrative features. However, because of the requirement for details of start and end points for chapters, those reported by participants were used in the analysis of valence, temporal coherence. The first prediction that due to impaired abilities to create chapters, the dysphoric group would report fewer chapters overall was examined by comparing groups according to the number of chapters reported overall, results indicated that there was no group difference $t(29)<1$, with a mean (SD) 7.65 (2.12) chapters being reported by participants overall, dysphoric 7.70 (2.35) and control 8.56 (4.32). An impaired ability to create 'closure' for chapters was predicted for the dysphoric group, in that reduced reasoning ability would prevent chapters being perceived as over, resulting in longer chapters, and a greater number being perceived as open at an one time. There was no significant difference in the length of chapters reported $t(29)<1$, with an overall mean (SD) of 3.12 (1.98) years, dysphoric 3.40 (2.08) and control 2.98 (1.86). The mean number of 'open' chapters was calculated by a year-on year analysis of current chapters, divided by age of the participant, this again showed no group difference $t(29)<1$. The mean (SD) number of open chapters was 1.34 (0.87) at any one time, dysphoric 1.40 (0.81) and control 1.28 (0.79).

The second prediction for this study was that there would also be reduced evidence for autobiographical, or life-period, reasoning and past-present distancing in the form of life-lessons, self-referencing facts, and reflections. Life-lessons were the least common component in the transcripts, with only a minority of participants (12) including these in their life-story, and although these could be categorised in to negative and positive, overall only two life-lessons were coded in the former category. A Mann-Whitney U test revealed no significant difference between the numbers of life-lessons ($U<1$), but the number of negative life-lessons were insufficient to explore group differences. Similarly the facts given within the text were generally not self-referencing, being related to circumstantial and context details, as a result no analysis could be carried out to ascertain group differences in the frequency of negative and positive self-referencing facts. No group differences were seen in the frequency of reflections reported in the narratives, and in practice these were defined as lacking emotional tone, so no further analysis was carried out, see Table 4.1 for means.

The final aspect of examination was for depresso-typic narrative features, following the proposal that depressive features would be represented in narrative as a result of the

relationship with cognitive representations. These were explored in terms of evidence for overgenerality, and rumination. It was predicted that, reflecting overgeneral memory, the life-stories of the dysphoric group would reveal fewer specific events (representing episodic memories), and more general events (representing categoric memories) compared to controls. Two t-tests were carried out to explore group differences in the number and proportion of episodic and categoric memories in the narratives. This revealed no significant difference in the number of specific memories, $t(28)=1.077$, nor significant difference in the number of categoric memories, $t(28)<1$. The difference in the number of general compared to specific memories, calculated as the proportion of general, and other autobiographical memories (general and specific) was also not significantly different $t(28)<1$. Indicating that overgenerality was either not present, or not represented in the narratives.

Ruminative characteristics in the form of more negative evaluations, and more negative life lessons and self-referenced facts were predicted to be higher in the dysphoric group compared to controls. The narratives of the depressed group included significantly more negative evaluations of elements in their life-stories compared to controls $t(28)=2.373$, $p=0.025$, $d=0.16$, but not fewer positive evaluations $t(28)<1$. This indicates that aspects of rumination may be represented in the ways in which life-stories are told by dysphoric groups.

Evidence for depresso-typic narratives

Study one results indicated a number of unexpected features of the narratives of the MDD group compared to controls, and so a component analysis replication was carried out examining the narrative features which were predicted to be associated with depression. A series of independent t-tests comparing the proportions of each word category (self-reference, social, positive and negative) was carried out, as can be seen in Table 4.2, a clear pattern of positive and negative word use was seen, with the dysphoric group being significantly more likely to use negative words mean (SD) 2.56 (1.04)% negative compared to controls who produced 1.74 (0.82)% negative words in their life-stories. As can be seen in Table 4.2, and in contrast to Study one, the dysphoric group produced life-story narratives with significantly less positive words that controls with a mean (SD) 2.00 (0.77)% compared to 3.18 (1.07)% for controls.

Table 4.2: Component production (%) in life-story narratives in Study two

	Dysphoric (SD)	Control (SD)	t-test
Self-reference	7.48 (2.40)	7.81 (2.26)	t(28)<1, n.s.
Social words	6.67 (2.26)	6.14 (2.51)	t(28)<1, n.s.
Positive words	2.00 (0.77)	3.18 (1.07)	t(28)=3.453, p=0.002, d=0.44
Negative words	2.56 (1.04)	1.74 (0.82)	t(28)=2.393, p=0.024, d=0.21

This table provides the proportion of words, as compared to the total number of words produced in the life-stories, which were categorised within each category. Results are provided for the dysphoric and control groups, and the results were compared using t-tests reported in the final column.

4.4 Discussion

The aim of this study was to replicate the component analysis carried out by Thomsen (2009), and to expand this analysis to a dysphoric group in order to test the prediction that the production of depresso-typic life story narratives both represent, and as a result could perpetuate, depression. In order to do this three predictions were explored concerning the life-story narratives of the dysphoric groups were compared to non-depressed controls. The first asked whether, the reduced temporal coherence found in narratives of depressed groups would be evident in the distribution of chapters; the second was to look for evidence of autobiographical reasoning, which may be reduced in dysphoric groups. Finally, life-stories were examined for evidence of depresso-typic processes including overgeneral recall of specific memories, and ruminative characteristics.

The first focus of this study was the comparison of life-story chapters, the mid-level organisational narrative structures in life-stories. There are broadly three suggestions for why there might be a difference between these structures for dysphoric and non-depressed groups: (1) there would be a disruption in the ability to construct chapters, resulting in temporal disorder, (2) a ruminative past-oriented thinking patterns would prevent the 'closure' of past chapters, and/or (3) the disrupted sense of self associated with depression would prevent the crystallisation of a socially meaningful narrative. Results point to the depressed and control groups having a similar ability to create a structured narrative as non-depressed controls. Within the narratives of both groups chapters were the most common component identified, and this reflects similar findings by Thomsen (2009, and Thomsen, *et al*, 2011), no studies which examine the nature of narrative coherence have looked at the chapter level, usually focussing on causal sequencing (Grysman & Hudson, 2010), or the thematic focus of the

narrative (Köber, Schmiedeck, & Habermas, 2015; Habermas & de Silverira, 2008), and this highlights that in research on narrative construction generally the significance of these mid-level structures have often been neglected. The group similarities in chapter numbers and distribution indicates that temporal and thematic coherence differences for people with and without depression are not evidenced at the chapter level, it could also be inferred that the ability to construct chapters is either unaffected by over-general memory recall and therefore might not be reliant on the recall of specific events clusters (Brown, 2005), but alternatively draw on a framework of cultural, and abstracted knowledge internalised from the cultural life-script. This is certainly indicated by studies which have found external events to act as punctuation for the start and ends of chapters (Brown, *et al*, 2012). The broad prediction, that the depressed group would show evidence within their narratives of a breakdown in temporal coherence due to impaired autobiographical reasoning would have been revealed in group differences in terms of abstracted narrative content such as reflections, evaluation and life-lessons and, inferences. There is no evidence that this is occurred, however these narrative components were sparse and group differences difficult to ascertain.

The direct examination of possible group differences between the number of specific or general memories in the narratives, and also in the proportions of general memories compared to other memories could indicate that this particular method of accessing memories circumvents the generative retrieval which is subject to habitual truncation of search (Williams, *et al,* 2007). The absence of a group difference in the number of specific memories could also be because i) specific memories may be embedded in the narrative, be frequently accessed and related to others, reflecting that this task is very different from the AMT and other cueing protocols ii) No time limits were provided within the narration process, and some evidence points to over-generality being the result of cognitive demand rather than habitual avoidance alone (Lemogne, Piolino, Friszerm Claret, Girault, *et al*, 2006). iii) depressed group were not classified as severely depressed, and also recurrent MDD and dysphoric individuals may not have the same negative bias, and over-general recall features (Kaiser, Andews-Hanna, Spielberg, Warren, Sutton, *et al*, 2015; Roiser, Blackwell, Rock, & Riedel, 2014), iv) the task was not sensitive enough, with mean specific memory recall 3.16 per narrative, which was not very high. A standard AMT test would sample around 10-20 memories, and in the original study the degree of over-generality occurred for less than a third of the cued memories for the suicidal group (Williams & Broadbent, 1986). This indicates that a tendency towards overgenerality would not necessarily be apparent using

the life-story narrative protocol. This shortcoming could be addressed in a number of ways, the first being that the time given to create the narratives could be longer, allowing for a greater opportunity to share specific memories, and that comparisons could be made with a group of participant meeting criteria for major depressive disorder.

Within the narratives there were suggestions of a depresso-typic narrative style linked to rumination. Negative self-evaluations have been found to be significant to the development (Beck, 1987), maintenance (Orth, Robins & Roberts, 2008) and recurrence (Shahar & Davidson, 2003) of depression in a number of domains including social expertise, work and/or task performance, behaviour, and personal presentation (Anderson & Friedman, 2014). There was no difference in the number of positive evaluations, indicating that the dysphoric group were more evaluative overall, which would be in keeping with evidence for self-focus in depression (Watkins & Teasdale, 2004), but might also represent a greater level of autobiographical reasoning (Habermas, 2011) and past-focus (Habermas, *et al*, 2008). Autobiographical reasoning is a process by which problematic events are assimilated (Stiles, 2001) in to a person's sense of self, and the linkage of negative self-evaluations may indicate a process by which a negative narrative is constructed in depression, with a biased reasoning process.

Given the group difference in the number of evaluations it might be anticipated that this would be concurrent with a greater level of life-lesson production, as these are the outcome of the evaluative process, however there were insufficient life-lessons in the narrative to enable a group comparison. This dearth of life-lessons may have been because the participants in the study were relatively young compared to that of similar research. McAdams (2006) suggests that repeated evaluation of autobiographical events ultimately result in the production of personally espoused 'truths', which are expressed as life-lessons i.e. what has been learnt from experiences, but that this will occur over time, with a peak evaluative period being entered in middle-age, it is possible that the participants in this study were simply too young. Negative life-lessons which might be expected for the dysphoric groups (that a lesson was learnt that 'bad things' happen) is the equivalent of contamination sequences seen in narratives of late-life depressed participants in McAdams study (2001), but overall there were very few of these summative statements in evidence, the maximum being 3 in any one life-story. A tentative suggestion is that the evaluative process in depression may be dysfunctional in that rumination over events fails to reach a point of summation, but this

would merit further investigation with a more controlled experimental design. The group difference in the number of components which represent metacommunications could be linked to creation of the need of external reassurance, 'Am I doing this right', or an attempt to avoid being taken up with the life-story narrative and serve as a check-in with reality, and the propensity for assurance seeking in dysphoric groups (Joiner, Metalsky, Gencoz, & Gencoz, 2001). Either way, these components are not key to the structure of the life-story narrative.

Comparing the result in this study to those of Thomsen (2009) it can be seen that while the number of components is greater in her study, this can, in many cases, be explained by the age of participants, and the longer time taken for the life-story to be related given for the older participants. The greater representation of chapters, when compared to specific memories is similar, with chapters being approximately three to four times more common, underlining that chapters are a central component to the life-story.

The frequency of categorical memories in this study was greater than for Thomsen, but this could be as a result of the ways in which autobiographical memories are processes in to general events and used to describe events within given timescales, the smaller life-span of our participants would mean that descriptions of events are more likely to be produced in finer detail. Thomsen suggests that categorical memories, over the lifespan, become autobiographical facts, and this would be indicated by a frequency trade-off between these two components which is not apparent in the data. Categorical memories occur approximately 2.5 times more than in the Thomsen study, and facts only a little less, indicating not a reciprocal role but possibly a feature of narrative style. Evaluations do seem to show a generational effect, with the narratives of the older cohort in the Thomsen study containing around four times as many positive evaluations, but only twice as many negative evaluations (despite the dysphoric participants in this study), this again could be the result of age and stage of participants, as evidence points to a greater tendency of older adults to create meaning and redemption sequences where events are evaluated in a positive way during a process of 'coming to terms' with the past (McAdams, 2001), this is also supported by the levels of reflections coded which were over ten times more common in the Thomsen cohort. These discrepancies may again be explained by the age of the participants.

Finally, this study asked whether it is credible for researchers to identify chapters from narratives, and whether these are representative of participant-defined chapters. Researchers tended to code more chapters, and this may be a result of the definitions used,

and also that participants may misunderstand the ways in which chapters can be hierarchically clustered (notwithstanding instructions). Despite this, overall there was good alignment between the chapters defined by participants and those identified by researchers. This indicates that chapters are a reliable method of sampling internal representations or clusters of interlinking events and information, and key to the exploration of the role of chapters are schema is that there were no group differences in the representation in the narratives.

The structure of life-story narratives from both dysphoric and non-dysphoric groups was examined to ascertain whether it is reasonable to assume that chapters are representative of underlying cognitive structures, and by inference may be temporally stable rather being a result of the demand characteristics of the task in hand. There was good evidence, unlike in Study one, that chapters are not influenced by the need for brevity or demand characteristics, with other memory components being in evidence and not inter-related in terms of frequency. Group comparisons indicate similarities in the degree of autobiographical reasoning, and in narrative components, but with an underlying tendency to negatively self-evaluate in the dysphoric group.

The ability of researchers to judge from reading the narrative the underlying chapter structures, and participants' subjective representation, supports suggestions that narratives represent the structure of the autobiographical memory system, given audience, goal and contextual factors. These results also validate studies which used researcher defined chapters.

In summary the implications of these results are that it seems reasonable, for this population, that the life-story narrative accounts, and by inference the cognitive representations of the life-story are structured similarly for dysphoric and non-dysphoric groups at a chapter level. While there are negative evaluations characteristic of depression, and also a greater number of metacommunications, the structural components representing memories, and life-story chapters were similar. These predictions may not hold for individuals experiencing major depressive disorders (MDD), and so the full impact of possible cognitive impairments, or over-generality in autobiographical memory, may not be manifest.

Chapter 5 The impact of chapter context on recall

5.1 Introduction

The nature of autobiographical memory, the self-memory system, and the temporally stable sense of self that it endows (Conway, 2005; Conway, Collins, Gathercole, & Anderson, 1996; Prebble, Addis, & Tippett, 2013; Tulving, 1985) has been proposed to involve striving for both correspondence for representations held in memory to actual events experienced, and coherence with the persons understandings of who they are (Conway, Singer, & Tagini, 2004). Memory recall itself is a reconstructive process and changes to recalled representations of autobiographical memory have been shown to be influenced by self-perceptions (Conway & Ross, 1984; McNally, Lasko, Macklin, & Pitman, 1995; McLean & Pasupathi, 2010) and long-term goals and motivations (McAdams, 1993; 1985; McAdams, Diamond, de Aubin, & Mansfield, 1997). Examples of recall which creates coherence with either a delusional (Baddeley, Thornton, Chua, & McKenna, 1996), or hypnotically constructed self (Cox & Barnier, 2013) reveal the extent to which these changes can diverge from genuine lived experience.

Conway (2005) proposed that changes in memory representation as a result of the need for coherence occur through both facilitatory, and inhibitory processes. Evidence for the influence of these factors has been examined in terms of the content and themes of autobiographical events recalled by people with, for example, personality-based motivations for intimacy, or power (McAdams, Diamon, de Aubin, & Mansfield, 1997), or though the manipulation of perceived ‘desirable characteristics such as (McLean, Pasupathi, & Pals, 2007). Conway and Pleydell-Pearce (2000) evoked the concept of the working-self, a fluid representation of self-identity, to account for the on-going balance between the correspondence and coherence which must occur, pre-consciously, for autobiographical recall. This includes both a source monitoring to establish that representations actually occurred, and defined rules on coherence with the current working self, with autobiographic memories which are acceptable being facilitated, and unacceptable memories being inhibited.

A number of factors are likely to influence whether a life-story chapter will cue an episodic event memory, these include the degree to which the event is both typical and representative of the chapter as predicted by schema theory; whether it constitutes a punctuation between chapters (Thomsen, Pillemer, & Ivcevic, 2011), and whether it is consistent with the schematic emotional valence of the chapter (Thomsen, 2015). The drive for coherence to bring about changes to memory representations which align them to the emotional content of contextual chapters has, to date, only been explored in one study examining dissonance reduction (Beike & Landoll, 2000). When recalling an event which is incongruent with the persons' schematic understanding of the time-period for which it belongs, for example a happy event in a marriage which ended badly, the sense of perceived continuity with semantic knowledge held for this period is challenged. The management of a perceived dissonance between a recalled event, and the autobiographic knowledge relating to the self during the period the events was based has been proposed to have three possible ways of resolution. Drawing on cognitive theory (Festinger, 1957) event representations can be i) distanced from a person's sense of self, ii) 'watered down' by the bringing to mind of other more congruent events, or iii) trivialised. For example a life-story chapter for school might be evaluated as 'a terrible time', but could contain an event memory of an enjoyable school trip with an episodic memory of sitting in a park, in the sunshine, eating an ice-cream, this would be incongruent with the overall chapter evaluation, and so dissonance reducing processes could i) reduce the sense of personal connection with the event; ii) bring to mind the long bus journey, the concerns about getting lost, and the subsequent school trip which was a disaster, or iii) discount the event as unimportant, or 'trivialise' it.

In their study of memories for events affectively inconsistent with the life-time period in which they occurred, Beike and Landoll (2000) explored the link between consistency restoring cognitive processes and mental well-being. A dissonance reduction process was suggested to occur when recalled memories are perceived as incongruent with the evaluation of the contextual life-period in which they occurred. The authors carried out three studies which tested Festingers (1957) dissonance reduction processes. In their first experiment they asked 56 college (university) students to recall two events from two life-time periods in the recent and distant past. They asked participant to rate the event on a Likert scale according to causation (caused entirely by me – not at all by me, and caused entirely by the situation – not all by the situation) with a low score for personal influence, and a high score for situational influence being indicative of 'explaining away' the event. Life-time periods were judged on

a scale of 1 (very negative) to 7 (very positive). The positivity of the events was judged by the cueing valence, and the congruence of events recalled to the life-time period created two groups, 'consistent' (congruent) and 'inconsistent' (incongruent). This study did not control for depressive status, and used the outcome measure of 'Satisfaction with Life Scale (SWLS: Diener, Emmons, Larsen, & Griffin, 1985) a self-report questionnaire, which taps in to global life-satisfaction, to denote mental wellbeing. In the first experiment higher well-being scores were associated with the 'explaining away' of incongruent events as predicted by cognitive dissonance theory, for example by not taking responsibility for them. In a further experiment 67 students went through a similar procedure, but instead of being given the opportunity to 'explain away' or justify an event, they were asked to recall further events from the life-time period. Well-being in this case was associated with the ability to recall further events which were congruent with the life-time period. In a final experiment the researchers proposed to find evidence of 'closure' for a particular event, considered to be evidence of 'trivialisation' (Simon, Greenberg, & Brehm, 1995). In this study 85 students were asked to complete the protocol either for the process of explaining away, for outweighing, and for a sense of closure on the event. Overall this final experiment revealed that there were differences in the methods used to deal with dissonance depending on the participants' well-being score. Those low on well-being tended to use more explaining away, than either outweighing, or reporting event closure. Those high on the well-being scale tended to use more outweighing. However overall those high on well-being were not more likely to engage in consistency restoring processes than those low on well-being. In particular the direction of causation in this study was complicated by the possibility that well-being gives a greater likelihood of engaging in effective strategies for reduction in dissonance, or that it is the result of reduced cognitive dissonance. The latter direction was suggested by the finding that cognitive dissonance reduction was more likely following the recall of a negative event, suggesting a self-positivity bias, or avoidance of negative material. The authors also found evidence that the recall valence of the life-time period was an 'overwhelming' factor in deciding the emotional impact of the recall of single events, suggesting that the impact of negative events would be greater if the incongruence between the event and life-time period was large, than if it were small, and that an overwhelmingly negative chapter would influence positive episodic memories to a greater extent than a more neutral or mixed chapter, and *vice versa*. Overall there is therefore an argument that good mental health is reliant on reduced incongruence between memories for events and life-period context, particularly when the event itself is negative.

Brewin (2006) proposed a somewhat different situation for people who are experiencing depression, in that rather than demanding a reduction in cognitive dissonance, recall of positive events which create a level of variability, or difference from the normal representations could create a positive dissonance for the recaller. For example, given the idea that 'school was a terrible time', a person who was unable to recall exceptions to this rule would be impacted by the negative evaluation of the entire life-chapter. However, someone who was able to say 'school was largely terrible, but I did have some good times', would be less negatively impacted by thoughts of school, and there would be a reduced potential for interlinked and associated negative memories to be brought to mind (Bower, 1981; 1987; Brewin, *et al,* 1999). A more beneficial cognitive process would be that access to a range of affectively toned memories, which better reflect 'real-life', would be linked to mental health.

The proposal that dissonance-reduction is beneficial in maintaining a coherent sense of self, but also that variability in available memories, particularly those which are positively incongruent has a number of implications for depressed groups. These relate to the ability to respond to the cognitive demands of potential dissonance reduction process, the availability and representation of specific event memories, and the potential for the overall affect of negative life-periods to overwhelm the positive events which may have occurred during the period. As well as reporting finding cognitive processing and attentional tasks more demanding that non-depressed groups (Beevers, 2005; Joorman & Vanderlind, 2014; Dalgleish, Tchanturia, Watking, Williams, Golden, *et al,* 2007; Wenzlaff & Bates, 1998), people with depression display a negative bias in a number of domains including automatic thoughts and cognitions, attentional bias, interpretation and memory (Gotlib & Joorman, 2010; Mathews & MacLeod, 2005; Roiser, *et al,* 2014).

In the development of dysfunctional cognitive schema in depression it is proposed that repeated patterns of activation create stable constructs representing the past, and anticipated future, and with concurrent negative expectations (Beck, 1997). This feature of autobiographical memory clustering could be amplified in people with depression because of their reduced ability to recall specific memories (Williams, 2006; Williams, *et al,* 2007). That people with depression are more likely to recall general memories when cued to recall episodic memories is well established, although there is some evidence which points to this tendency to be dependent on cuing methodology, and depressive status i.e. mild-moderate or

major depression (Hertel, 1998; Hertel & Rude, 1991). The impact of habitual recall of general, or non-specific autobiographical memories in depression could potentially lead, first of all, to a reduced necessity for dissonance resolution, but would also make thematic and affective congruence within life-time periods more likely as incongruity is reliant on features of events which are associated with specific memories, such as affect, time, place and personal impact of events. The idea that discrepancies between current self-concept in people with depression, and ideal self, may also trigger ruminative processes aimed at reducing this discrepancy (Martin & Tesser, 1989), resulting in the activation of abstract representations with reduced specificity as an avoidance strategy.

An alternative proposition for the recall of incongruent events in depression, particularly in people with a mild-moderate depressive status, where cognitive impairments and over-general recall are less pronounced (Gotlib & Joorman, 2010), is that cognitive dissonance processes occur, and that the overall valence of perceived life chapters impacts on the negativity of the resultant event memories. Thus if a dysphoric individual maintains cognitive representations within their autobiographical memory of mainly negative chapters, there would be a dissonance between these and positive events which occur within them. Cognitive dissonance processes would then serve to align the event with its contextual chapter. The dissonance reduction effect would impact differently on the memories to which it was subject, it would be expected that events that were i) 'explained away' could be retrieved with ease and accuracy, but would be contain material which compensates for their a mismatch with the valence of the chapter, ultimately being less affectively incongruent; for those which are ii) 'outweighed' they would be associated with a number of other congruent events which would compete for accessibility; iii) for closure there would be a diminished rating of importance and centrality to the event, and the memories which have been subject to being ignored would both have decreased accessibility, and decreased centrality.

The ability to conceptualise a positive future is an essential aspect for hope, and recovery in mild to moderate depression (Bjarehed, Sarkohi, & Andersson, 2010; Edmondson & MacLeod, 2015; Kosnes, Whelan, O'Donovan, & McHugh, 2013; Liu, Kleiman, Nestor, & Cheek, 2015; Luxton, Ingram, & Wenzlaff, 2006; MacLeod & Salaminiou, 2001;). Depressed individuals demonstrate lower positive, but similar negative, expectancies compared with non-depressed controls (MacLeod, Tata, Kentish & Jacobsen, 1997). Kosnes and colleagues (2013) examined explicit and implicit future event expectancies using a

version of the future thinking task (FFT: McLeod, Tata, Evans, Tyrer, Schmidt, *et al*, 1998), which measured the association latencies between responses or 'True' or 'False' to positive future expectancies such as 'Happy' 'Wealthy', and negative future expectancies 'Worry', 'Failure'. The dysphoric group in this study generated fewer positive future events, but also were faster in the implicit negative expectancies lending support to the Hopelessness Theory of Depression (Liu, *et al*, 2015).

In any talking therapy there is an aspect of change which involves re-interpretation and exception-finding to beliefs and expectations which may be firmly held by clients. This may be carried out in a variety of ways, but all rely on the recall of specific events, and future-imagining of possible outcomes and the manipulation of these to influence mood. Manipulation of specificity of future event representations has shown to improve expectations of future 'worrisome' events, with increased problem-solving, and a related increase in positive affect, and decrease in negative affect (Madore, & Schacter, 2016) Interventions which facilitate the imagining and exploration of potential positive future events have been found to be effective in therapeutic settings (Andersson, Sarkoje, Karlson, Bjärehead, & Hesser, 2013; Roepke & Seligman, 2016). Future thinking is the third part of Becks (1987) cognitive triad, whereby the self, world and future must all be represented in schematic form. Automatic thoughts and beliefs which drive emotions and behaviour are central to the theory behind cognitive behaviour therapy (CBT). Automatic thoughts are beliefs and assumptions which have become so habitual that they occur pre-consciously and it is the role of the therapist to raise the awareness of the client to these in order for them to be changed. A variety of approaches within the therapy room to encourage clients to recall variations on seemingly fixed events and interpretations (McLeod, 2013). This process is also used to encourage clients to imagine future events which are potential positive variations of habitually unoptimistic future-thinking. Negative-bias and reduced access to positive event memories in depression is actively countered by therapy by the location and rehearsal of positive events.

While narrative therapy (White & Epston, 1990) makes no assumption on the cognitive processes which occur during therapy, a similar process is induced by interventions in which the client is encouraged to think about, and repeatedly discuss possible positive alternatives to negative perceptions, both of past and possible future outcomes. Recently a number of therapeutic approaches have used the term re-scripting to denote this process of

changing the narrative explanations and descriptions client provide of themselves (Wehr, 2010). Re-scripting involves a narrative process by which infrequently communicated autobiographical events, which are positive, hopeful, or provide the foundations for positive self-evaluations are strategically spoken about both within, and out-with therapy. This re-scripting is reported to create a shift in self-identity, more positive interpersonal relations, and an increased ability to provide rich, and varied self-narratives (Homes, Arntz, Smucker, 2007). In order for these therapeutic interventions to be successful there must be a shift from broadly negative monotonic narratives to more varied representations where positively incongruent material can become increasingly available.

Access to positively incongruent material is of therapeutic benefit to people with depression, however there are a number of apparent challenges to this ability. Dissonance reduction mechanisms, which serve to ensure a coherent sense of self may maintain an overwhelmingly negative self-perception, the ability to recall positively incongruent events may also be impaired by over-general memory, and a tendency of depressed and dysphoric groups to engage with negative autobiographical material. Evidence for the existence of monotonic, life-story narratives, which may be representative of reduced variation, or access to incongruent events in depression points to a need to understand the nature of access to this information.

This current study examines the function of chapters in accessing event-specific knowledge for life-story chapters of the past, and those anticipated to occur in the future. By comparing two groups, dysphoric and non-dysphoric controls, it aims to address the impact of affective incongruence on the recall or imagining of specific autobiographical events. This study partially replicates Study one, in the generation of chapter cues, and the examination of the impact of affective incongruence on the recall of episodic memories. It was therefore proposed that:

Dysphoric groups access event-specific knowledge in a way that favours material congruent with contextual chapters. This would be indicated by:

- an overall reduction in affective variability of events, (with variability represented by the difference between contextual positivity and event positivity);
- increased difficulty in accessing incongruent events or reduction in the clarity of events; and
- a reduction in the centrality of incongruent events.

In addition to this it was predicted that

- the dysphoric group would show a bias towards the access of negatively incongruent, compared to positively incongruent events.

Three tentative predictions can be drawn from the dissonance reduction theory which may provide further insight in to the processes which are undertaken by dysphoric group and controls to manage incongruence in recall. These are that

i) events are available, but are 'explained away' and as a result the reported difference in valence will be reduced resulting in the dysphoric group having overall a reduced affective variance between their chapters and episodic memories.
ii) due to competition as a result of recall of congruent events the incongruent event would be less available.
iii) due to a 'closure' response the incongruent events would be recalled with decreased importance for self.

Further to this, the dysphoric group are predicted to show a differential dissonance reduction response in that they will be more likely to undergo dissonance reduction for positively incongruent events compared to negatively incongruent events, and that the control group would not differ.

5.2 Method

5.2.1 Participants

The study recruited 87 undergraduate and postgraduate participants aged 19-25 were recruited via the University of St Andrews School of Psychology participant recruitment SONA system and campus posters. They received £5 for taking part. Allocation to two groups, dysphoric and control, was carried out using the BDI-II (Beck, *et al*, 1996), with the cut-off criteria for groups defined as dysphoric>19, control<11 (Appendix 14). Of the 87 participants, four were excluded as they scored between these limits. Three participants were excluded as their responses to the prompts for specific events could not be confirmed as being single events (two controls and one dysphoric), 80 participants are therefore included in the analysis.

The overall mean (SD) age of participants was 22.1 (3.6), the dysphoric group had a mean (SD) age of 22.3 (2.2) years, with 6 males, and the control group a mean (SD) age of 21.8 (2.8) years, with 6 males. The groups were therefore matched for gender.

5.2.2 Design

Ethical consent was obtained from the University of St Andrews (Appendix 3). This was a between participants design, which aimed to establish group differences in chapter-cued recall for dysphoric and non-dysphoric groups.

5.2.3 Measures

The BDI-II (Beck, *et al*, 1996) was used to establish depressive status. This self-assessment measure which reflects the severity of depressive status contains 20 questions focusing on aspects of mood and psychological and social functioning. The cut-off scores are for the absence depression of 0–13, 14–19 is mild, 20–28 is moderate, and 29–63 is severe. The BDI-II has been reported as having a reliability co-efficient of 0.91 (Beck, *et al*, 1996). The BDI-II takes approximately 5-10 minutes to complete (Appendix 14).

5.2.4 Procedure

Participants were tested individually for approximately one hour, this was composed of three tasks 1. Completion of mood measures, 2. Chapter definition, and 3. Memory reporting.

Section 1:

At the beginning of the session participants were told that they would provide information on the events and chapters of their past and future-imagined lives. Participants then completed the BDI-II (Beck, *et al*, 1996).

Section 2:

Participants were then given paper booklets in which to write their responses for the next part of the experiment. The booklets contained separate sheets for each chapter, including space for a short description and ratings scales. Participants defined life-story chapters in response to the following prompts.

> 'I would like to imagine that your life is like a book, and the story within this book is your 'life-story'. Your life-story is not only about your past, but also your imagined future. So that your life-story leads on from your earliest memories, to today and on in to the future, it is like a complete autobiography.
>
> Within your life-story book there are chapters each involving a different part of your life. The chapters of your life story can be thematic e.g. 'my love of art', or relating to particular times in your life e.g. 'my time in the army', or 'retirement' chapters can be of any length and can overlap e.g. for example during your time in the army you could have taken up painting.
>
> (Either):
>
> Starting with your imagined future (things that you think may happen to you), think of the chapter that first comes to mind, write a title and a brief description of the chapter in the space on top of one the booklets provided, and follow the instructions on the front cover of the booklet.

Then think about the title and description of the next chapter you think of and write this on another booklet, continue until all your chapters have been named and each has a response booklet with the front cover completed.

(or):

Starting with your past (things that have actually happened to you), think of the chapter that first comes to mind, write a title and a brief description of the chapter in the space on top of one the booklets provided, and follow the instructions on the front cover of the booklet.

Then think about the title and description of the next chapter you think of and write this on another booklet, continue until all your chapters have been named and each has a response booklet with the front cover completed.

The chapters were then rated for positivity:

'The way I think of this chapter now is' 1 (very negative) – (6 very positive)

After participants completed the first category of chapters (i.e. past or future) they received instructions and carried out the task for the second category of chapters (i.e. future if their first category had been past, past if their first category had been future). Once participants indicated that they had completed their chapters, the pages were removed by the researcher. This chapter definition section of the study took around 10-15 minutes to complete.

Section 3:

The researcher selected four chapters to act as cues for event generation. Cueing-chapters were chosen as being the four most closely placed in time to the present day which could be considered 'closed' i.e. past chapters which were over, or future chapters which had not started yet.

Each of the four cueing- chapters was attached to an event booklet and the participants were asked to work through the booklets in alternating order (past-future-past-future or vice-versa), the presentation order was counter-balanced across participants. Each booklet contained prompts for events within the relevant chapter, being 'first to mind',

‘negative event’ and ‘positive event’ in that order. Each event had a space for a title, a short description, and rated for clarity, difficulty of recall and positivity, by indicating on a Likert scale 1-6 (not at all – very much so) for ten questions divided into four question categories:

Category 1: Clarity calculated as the sum of the following ratings

1. ‘This event is very vivid.’ (vividness)
2. ‘This event feels coherent and complete.’ (coherence)
3. ‘Thinking about this memory is like travelling back in time.’ (mental time travel)

Category 2: Difficulty of recall

4. ‘I found it difficult to think of an event’

Category 3: Positivity

5. ‘I feel positive when I think of this memory’

Category 4: Centrality of the event as the sum of the following ratings:

6. ‘This memory is of an event which was a turning point in my life’
7. ‘This memory is of an event which is central to my sense of who I am’
8. ‘I automatically see connections between the events in this memory and my present life’’
9. ‘This memory is of an event which was very important to what I was doing in my life at the time’
10. ‘This memory is of an event which was very important to what I was doing in my life at the time’

The event report section took a further 30-40 minutes. The entire procedure was completed in around 60 minutes.

5.3 Results

Chapters and events were initially examined across groups for equality in terms of event positivity, clarity and difficulty of recall. Then events were scored on their 'degree of incongruence' which was calculated as the difference between affective ratings of event and contextual (cuing) chapter, this was the first dependent variable examined. In addition to this they were categorised according to the valence of their contextual chapter i.e. negative chapter (rated 1-3), positive chapter (rated 4-6), and the positivity of the event rated on the same scale as the chapters. Each event was then classified according to its congruence to the chapter it appeared in: incongruent events being negative events in a positive chapter, positive events in a negative chapter, and congruent events being negative events in negative chapters and positive events in positive chapters. This second method of assessing incongruence necessitated an analysis of the first measure, i.e. it would be invalid as method of categorisation if there were group differences in the degree of incongruence between events and chapters (for example if one groups' negative events were more negative than their chapters compared to the other group), this was not the case.

Each event had a congruence category, and ratings for clarity, difficulty of recall, positivity, and centrality.

Initial analysis: In order to establish baseline equality between the groups, and comparability between past and future events (temporal orientation) a series of analyses were carried out on the positivity of both chapters and events.

Table 5.1: Mean (SD) number of chapters and events recalled by group

	Mean (SD) number of chapters			
	Past		**Future**	
	Negative	**Positive**	**Negative**	**Positive**
Dysphoric	4.23 (2.10)	3.89 (2.43)	4.10 (2.02)	5.34 (2.34)
Control	2.76 (3.10)	4.19 (2.11)	2.44 (1.98)	4.23 (2.09)

This table provides the mean (SD) number of chapters for past, and future imagined life-stories for the dysphoric and non-depressed control groups

Chapters

First the positivity of all chapters was examined across groups and temporal orientation using a mixed factorial ANOVA, (between: group, within: temporal orientation). The dysphoric group rated both their past and future chapters as more negative than controls, mean (SD) 2.67 (0.87) compared to 3.87 (0.58), but past and future chapters did not differ in positivity, past: 3.50 (0.80), future: 3.96 (1.02), analysis revealed a significant group difference in the rated positivity of chapters F(1,78)=30.040, P<0.001, η_p^2=0.62, no effect of temporal orientation F(1,78)=3.240, P=0.08, and no interaction F<1. A schematic example of a participant chapter structure can be found in Figure 5-1.

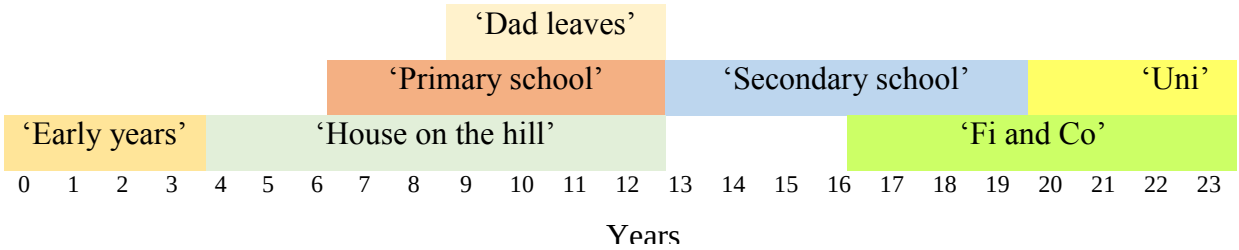

Figure 5-1: Chapter structure against timeline (Study three participant 317). *This figure shows the length, titles and degree of overlap between a typical series of life story chapters.*

Events

Each participant produced 12 events. The dysphoric group rated both their past and future events as more negative than controls, mean (SD) 2.93 (1.21) compared to 3.89 (0.62), but past and future events did not differ in positivity, past: 3.42 (0.48), future: 3.59 (0.86). Using the same independent variables the positivity of reported events was examined using a mixed-factorial ANOVA (between: group, within: temporal orientation). The ANOVA revealed a main effect of group F(1,78)=74.631, p<0.001, η_p^2=0.73 a difference approaching significance for an effect of temporal orientation F(1,78) = 3.583, p=0.066, and no interaction F(1,78)=1.494, p=0.229. This indicates that overall, events reported by the dysphoric group were rated as significantly more negative than controls, and that this difference was not significantly different for past or future events.

Event ratings for clarity, and difficulty of access were also examined. Past events were rated with greater clarity than future events, mean (SD) 4.51 (1.45) compared to 2.37 (1.40), but that the groups did not differ in their mean (SD) rated clarity MDD 3.05 (2.71), controls 4.08 (3.21). For ratings of clarity there was no main effect of group $F(1,78)<1$, a main effect of temporal orientation $F(1,78) = 97.090$, $p<0.001$, $\eta_p^2=0.75$, and no interaction $F(1,78)<1$.

Past events were rated as being easier to access than future events, for both groups, mean (SD) past 2.16 (0.99), future 4.01 (1.34) but that the groups did not differ, mean (SD) dysphoric 3.21 (0.76), control 3.42 (0.65). For rated difficulty of access there was no main effect of group, $F(1,78)<1$, a main effect of temporal orientation $F(1,78)=47.914$, $p<0.001$, $\eta_p^2=0.58$, and no significant interaction $F(1,78)<1$.

Analysis of Congruence

The first prediction, that there would be an overall reduction in affective variability of events for dysphoric groups compared to controls, was examined by calculating the 'mean affective difference' between chapter and event, the dysphoric mean (SD) difference was 0.48 (0.12), and the control 0.56 (0.23) (chapter positivity minus event positivity). Using a mixed factorial ANOVA (between: group, within: temporal orientation). This revealed no main effects of group $F(1,78)<1$, temporality $F(1,78)<1$, or interaction $F(1,78)<1$. Thus the pattern of affective variability of events with respect to their chapters was the same for both groups.

Once it was established that the groups did not differ in terms of affective variability for their incongruent events a second categorisation took place which organised events in to congruence categories. The mean ratings of clarity, difficulty of access and centrality for events within these categories was then calculated. There followed a series of tests to examine these variables for congruent and incongruent events across groups and between past recalled and future-imagined events using mixed factorial ANOVAs (between: group x within: temporality, congruence)

Following the prediction that the dysphoric group would find it harder to access incongruent material was tested by first examining the proportion of events recalled which

were incongruent to their contextual chapter, and then using comparisons of the incongruent and congruent events for each group to explore memory features.

Congruent events appear to be recalled and imagined to a greater extent than incongruent events particularly for the dysphoric group,

Table 5.2 5.1 shows the mean number of chapters produced by the two groups, and Table 5.2 shows the overall numbers of events recalled for each group, and category. Comparisons between groups on the proportion of events which were affectively incongruent were carried out using a mixed factorial ANOVA (between: group, within: temporality), this revealed a main effect of group ($F(1,78)=29.889$, $P<0.001$, $\eta_p^2=0.55$ with the mean (SD) proportion for the dysphoric group being 0.309 (0.11) and controls 0.438 (0.10); a main effect of temporality $F(1,78)= 53.411$, $p<0.001$, $\eta_p^2=0.64$ with the mean (SD) proportion of past events being incongruent being 0.428 (0.16), and future events 0.307 (0.13), but with no interaction between these effects $F(1,78)=2.226$, $p=0.140$. Pairwise t-tests revealed that the dysphoric group recalled and imagined fewer incongruent events when cued by life-story chapters than controls $t(79)=7.140$, $P<0.001$, $d=0.54$, and that overall future events were significantly more likely to be congruent with their cueing chapter $t(79)=50.980$, $p<0.001$, $d=0.67$, with the mean (SD) proportion of past events being 0.428 (0.16), and future 0.307 (0.13).

Table 5.2: Number of congruent and incongruent events for Study three

	Past			**Future**		
	Congruent	**Incongruent**	**Proportion Mean (SD)**	**Congruent**	**Incongruent**	**Proportion Mean (SD)**
Dysphoric N=40	154	86	0.358 (0.11)	196	44	0.267 (0.12)
Control N=40	117	123	0.513 (0.14)	162	78	0.362 (0.14)

This table shows the number, and relative proportion of chapter-congruent and incongruent events recalled by the dysphoric and control groups in Study 3, the proportion reflects the number of incongruent events relative to the number of events overall. The Dysphoric group were found to be significantly more likely to recall affectively congruent events when compared to control.

Ratings of memory features

In order to examine the impact of temporality and congruence category on ratings on the rated difficulty of recall. A mixed factorial ANOVA (between: group, within: congruence category, temporal orientation) revealed main effects of congruence category $F(1,77)=6.704$, $p=0.014$, $\eta_p^2=0.21$ and temporality $F(1,77)=36.688$, $p<0.001$, $\eta_p^2=0.42$, but no main effect of group, $F(1,77)<1$, and no interaction between temporality and congruence category $F(1,77)=3.717$, $p=0.060$. Overall incongruent events were easier to recall, participants reporting recalling events as easier than imagining future events. The absence of a significant group x congruence interaction indicates that the dysphoric group did not have more difficulty recalling or imagining incongruent events compared to controls. The mean ratings for congruent and incongruent events can be found in Table 5.3.That the dysphoric group would access incongruent events with less clarity than controls was examined next. The ratings for clarity revealed main effects of congruence category $F(1,77)=36.330$, $p<0.001$, $\eta_p^2=0.32$, and temporality $F(1,77)=70.231$, $p<0.001$, $\eta_p^2=0.64$ and no main effect of group $F(1,77)<1$, but an interaction between group and congruence category $F(1,77)=4.530$, $p=0.040$, $\eta_p^2=0.23$. Incongruent events were rated overall as having greater clarity compared to congruent events $t(78)=6.760$, $p=0.012$, $d=0.43$, mean (SD) incongruent clarity 3.88 (1.02), congruent clarity 2.46 (0.80), and memories were reported with greater clarity compared to future events, $t(79)=10.350$, $p<0.001$, $d=0.62$, but this effect of incongruence was significantly reduced for the dysphoric group. We thus found support for prediction that there was reduced clarity in events reported by the dysphoric group as being incongruent.

That the dysphoric group would rate incongruent events as less central to their sense of self was examined. The ratings for centrality revealed no main effects of congruence category $F(1,77)<1$, a main effect for temporality $F(1,77)=9.661$, $p=0.034$, $\eta_p^2=0.18$, and no main effect of group $F(1,77)<1$, and no interaction between group and congruence category $F(1,77)<1$. Incongruent events were not rated as having greater centrality compared to congruent events, and memories were reported with greater centrality compared to future events, mean (SD) past events 3.53 (1.31) future 2.12 (0.97)

Positive vs negative incongruence

A final analysis was carried out to examine the proposition that the dysphoric group would be more likely to maintain negative evaluations of chapters, using a differential level of dissonance reduction and as a result would i) have reduced access to positively incongruent events compared to controls, ii) have reduced access to positively incongruent events compared to negatively incongruent events. As with the previous analysis, difficulty of access was defined as rated ability to locate an event, and the clarity with which it was recalled. In order to make this comparison the incongruent events were categorised as either negatively or positively incongruent to their chapter. A mixed ANOVA (between: group x within: incongruence category) was carried out to examine the effects of dysphoria and incongruence category on the accessibility, and clarity, of events recalled, a further analysis of the impact of incongruence category on centrality of event was also included. There were fewer incongruent events than congruent events in this sample, and as there were no significant interactions between temporal orientation and group, past and future events were combined for this analysis, means for the groups can be found in ***Table 5.***

Table 5.3: Means (SD) for ratings of incongruent events for Study three

	Negatively incongruent			**Positively incongruent**			**Conguent**		
	Difficulty of access*	Clarity	Centrality	Difficulty of access*	Clarity	Centrality	Difficulty of access*	Clarity	Centrality
Dysphoric N=40	2.28 (0.82)	12.23 (2.60)	21.62 (3.57)	2.15 (0.92)	10.97 (2.78)	15.62 (4.41)	3.01 (1.11)	10.32 (2.18)	14.65 (3.75)
Control N=40	2.41 (0.79)	10.25 (3.63)	17.00 (4.74)	1.44 (0.53)	12.66 (3.51)	18.24 (4.16)	2.73 (1.54)	11.69 (2.88)	15.90 (2.65)

*This table indicates the mean (SD) ratings for the incongruent events recalled by the dysphoric and control groups, cued by the participant generated chapters. *For difficulty of access lower rating means easier access.*

There was a significant group difference between the rated difficulty of event access $F(1,75)=5.148$, $p=0.026$, $\eta_p^2=0.32$, effect of the incongruence category $F(1,75)=18.286$, $p<0.001$, $\eta_p^2=0.68$, with positively incongruent events being easier to access overall, and an interaction between group and category, $F(1,75)=10.801$, $p=0.002$, $\eta_p^2=0.43$. Follow-up t-tests revealed that the control group found the task easier overall $t(79)=4.443$, $p=0.021$,

d=0.32, and positively incongruent events were easiest to access overall t(79)=3.688, p=0.029, d=0.25. The interaction appears to reflect a greater disparity between the ability of the control group to access negatively incongruent events, compared to positively incongruent events, while the dysphoric group showed little difference between the categories.

No direct effect of group was found on the event clarity, F(1,75)<1, no main effect of congruence category F(1,75)<1, but an interaction between these F(1,75)=9.488, p=0.003, η_p^2=0.46. Follow-up t-tests revealed that the dysphoric group recalled negatively incongruent events with greater clarity that positively incongruent events t(79)=4.324, p=0.031, d=0.30, while the control group recalled positively incongruent events with greater clarity than negatively incongruent events t(79)=3.377, p=0.041, d=0.26.

No group effect was seen in the ratings of centrality of events reported F(1,75)<1, but a significant effect of incongruence category F(1,75)=6.073, p=0.016 η_p^2=0.33, reflected a greater centrality of negatively incongruent events overall compared to positively incongruent events. A significant interaction between these factors F(1,75)=12.683, p=0.001, η_p^2=0.40 indicated that the dysphoric group viewed their negatively incongruent events as having greater centrality than their positively incongruent events t(79)=5.552, p=0.019, d=0.32, and that for the control group this difference was not present t(79)<1.

5.4 Discussion

Our first proposal was that dysphoric groups would experience a more affectively monotonous representation of past and future events. Our central hypothesis was therefore that the dysphoric group, compared to controls, would access event-specific knowledge in a way that favours material congruent with contextual chapters. Thus we predicted first that the dysphoric group would recall and imagine a greater proportion of congruent as opposed to incongruent events, and would display an overall reduction in affective variability of events. On examination, the dysphoric group did report a significantly lower proportion of incongruent events, but the between event-chapter variability was not significantly different. We also predicted that, compared to controls, the dysphoric group would rate their incongruent events as being more difficult to access, which they did not. However, there was a reduction in the reported clarity of incongruent events, even when access was not impaired,

supporting our suggestion that dissonance was managed in this group by the creation of competing representative images associated with the chapter in question, thus potentially creating an underlying tendency to process incongruent events in an abstract as opposed to concrete manner in this group.

Following the analysis comparing the incongruent and congruent events for the dysphoric and control groups, the group differences in recall of negatively incongruent i.e. events which are more negative than their chapters, and the recall of positively incongruent events, i.e. more positive than their chapters, was carried out specifically to ascertain the differences between groups and their relationships with positively incongruent material. The basis for this was that there is a predicted therapeutic benefit to accessing positively incongruent events, for negative chapters to become more variable, with the inclusion of positive events. The key finding in this study was that, compared to the dysphoric group, it was the control group that had a relatively reduced access to negatively incongruent material. This accessibility difference could indicate that for non-depressed groups, there is a propensity to maintain a 'generally good' representation for positive chapters (Thomsen, Olesen, Schneiber, & Tønnesvang, 2013), and for negative chapter representations of events which are positive 'exceptions' to the negative mood. This representational difference parallels findings that non-depressed groups tend to represent the world in generally 'good' ways, with negative exceptions. Interestingly the pattern is similar but not the same for the clarity of event representations, where there is a raised clarity reported for the dysphoric group for negatively incongruent material. This pattern is also reflected in the ratings of centrality of negatively incongruent events for the dysphoric group, indicating that, while the results of the second and third analysis in this study have indicated that the dissonance management approach which is most likely for both groups is that of competition, but that there may be a breakdown in this process of the dysphoric group. The apparent raised clarity and perceived centrality of negatively incongruent events could reflect a cognitive bias towards material which is 'worse than' the schematic chapter, and is a cognitive reflection of the tendency to create contamination sequences in narrative.

This study provides evidence for a negative bias associated with depression for specific memories, future imagine events, but also for past and future chapters. Based on previous findings of over-generality in event recall, it was anticipated that dysphoric groups would have reduced access to specific events, which was not the case, with specific memories

being recalled with no less clarity or difficulty compared to controls. Overall future imagined events were rated as less clear, and harder to access. The results also indicate that incongruent events are, overall, less likely to be recalled when cued by life-story chapters, for dysphoric groups. This may be the result of a greater reliance on a schematic chapter structure to guide recall in a manner analogous to the finding that depressed groups have an over-reliance on general memories (Williams, 2006), but also that affective generalisations may be occurring at recall, and negative tone exacerbated in this group by a propensity to recall and imagine negative chapters.

Despite the general acceptance that autobiographical memory exists within hierarchical structures, contextual effects are rarely directly investigated. This study indicates that chapters, reflecting a higher-level structure within the autobiographical memory system, play a role in how we represent events within our life-stories. The affective rating of the cuing chapter was found in this study to be a significant factor in making specific memories and future-imagined events easier to recall, in addition incongruent events are recalled with significantly greater clarity than congruent events. That the difference in affective tone of an event is a predictor of the clarity and difficulty of access of past events is perhaps unsurprising, incongruent events may simply be unusual and therefore attended to at encoding, or rehearsed more frequently due to their exceptional quality thereby producing a more accessible representations. For future events, the explanation for this incongruence effect is less simple, it may be that the structure of the imagined future is a direct cognitive reflection of the past (de Brigard, & Giovenello, 2012; Schachter, 2012; Madore & Schachter, 2016) and that expectations of unusual or affectively variable events are drawn from experiences of the same in the past. It may also be that contrasting events are imagined because they are inherently unusual and therefore worthy of report, for example ‘wedding day’ or ‘first day at work’ (it may be that fewer of the future events were ‘everyday’ activities which fit well with the context). This future imagining characteristic could also have been driven by the need to relate engaging or meaningful self-narratives to an audience (Pasupathi, Stallworth, & Murdoch, 1998; Walker, *et al*, 2003), and affective variability in this case would make for a good future storyline.

The indication that affective congruence impacts on recall of events, in that incongruent events are less available, and lack clarity for the dysphoric groups, can be related to the monotonous narrative representations reported in Habermas, and colleagues 2008

study. It is suggestive that, for dysphoric groups, the underlying cognitive representations about life experiences and possibilities of the future are subject to impaired variance, or that the construction of chapters through connecting similarities in content events may result in an overemphasis on connections between affectively similar events. The final analysis for this study explored more deeply the role of positive and negative incongruence in the recall of events, and while there is a suggestion that dysphoric groups have reduced access to incongruent material, when this incongruent material was examined it revealed a further layer of difference. Essentially that non-depressed groups are less able to access negatively incongruent events, while dysphoric groups access them with greater clarity and consider them more central to their sense of self.

This study revealed a discrepancy between the clarity of incongruent and congruent events, which is not reflected in examining the group differences alone, and merits further research. One potential area of interest for incongruent events in dysphoric groups is their role in creating opportunities for positive outcomes or events to be perceived during negative periods, analogous to the redemption sequences of life-story narratives linked to good mental health (McAdams, *et al*, 2001), or the glittering events recalled during narrative therapies (Snyder & White, 1982; White & Epston, 1990) which when recalled and integrated in to narrative are associated with recovery from low mood and depression. If accessing incongruent 'exceptions' to normality, and for the future the possibilities of change, is impaired for depressed groups this could impact on their ability to improve their own mood. By recalling positive events from the past, and anticipating positive events to come, even when the current experience is broadly negative may be a useful function of incongruent events. This function would be enhanced by the associated characteristics of the representation, as recall of sensory detail of positive events is more likely to improve mood (Walker, *et al*, 2003). While the role of autobiographical and self-referential material in dysphoric groups, has often focussed on the valence of events and the differences between the ability to retrieve or imagine specific events (Barnhofer, Williams, & Crance, 2007; Williams, Chan, Eade, Healy, Barnhofer, & Crane, 2006). Studies examining processing mode, that being the degree to which events are cognitively managed in either a more concrete/experiential or abstract manner, have revealed that dysphoric groups may access information which could be beneficial to their mood in more abstract and less experience-near and concrete ways (Werner-Seidler & Moulds, 2012). This current study highlights the

significance of context and that there may be a pattern of more abstract processing of events which are incongruent with their contextual chapter.

In terms of an underlying cognitive process which can account for these results there are a number of potential explanations. One proposal is that if chapters exist in a schema form, and links between clusters of events structure the content of the chapters, there may be variability in the importance of the valence of events which are linked. For example, one possibility is that chapter formation is influenced by emotional content of events in dysphoric groups resulting in clusters of similarly valenced events, and an overall homogeneity whereas non depressed groups have more theme-based links between events. These chapter-linked events can be thematic, and temporally defined, but if the emotional valence of the event, rather than another similarity is the most important link for dysphoric groups, then single chapters would contain events of similar valence and the person will be less likely to recall or imagine affectively incongruent events, within this model the chapter-based information would be less accessible, and variation reduced. An alternative explanation draws on the CarFaX model proposed by Williams and Colleagues (2007). Habitual over-general recall of events by dysphoric and depressed groups through a process of mnemonic interlock and avoidance may impact on the ways in which chapters are structured, in that they may become populated with memories for events which are general events rather than specific occasions, e.g. dinner at my mother's (an event which occurred many times). As a result of this over-generality, the reconstruction of specific individual events will be influenced by the stronger representation within the chapter relating to general events, thus when individual events are constructed, they will tend to draw on this over-general material, and result in specific events which are by default are affectively similar to events of a similar valence, with concurrent reduced rehearsal of affectively non-similar events. So while there is no difference in the ability to actually recall or imagine incongruent events, these may be less-specific and rehearsed to a lesser extent by the dysphoric compared to controls. This reduced rehearsal explanation relies on the finding that rehearsal leads to clarity, which is supported in the literature (Walker, *et al*, 2003), and the delineation between knowing an event occurred (abstract processing) and being able to visualise it in a meaningful way (concrete processing). The reduced clarity of events may therefore be influenced by over-general recall, reduced rehearsal and also by processing mode and would be predicated to be exacerbated by ruminative thinking (Nolen-Hoeksema, 1991; Watkins & Teasdale, 2004; Watkins & Moulds, 2005).

It is important to note that this study found no direct evidence for over-general recall in the dysphoric group. This may be due to the highly structured nature of the task which reflects a generative recall process, (the contextual descriptors which must be formed prior to event-specific knowledge access are to some extent already provided), and thereby may facilitate access by generative recall, i.e. chapter-based instructions giving a preparation for specific event production (see de Beer, Raes, Williams, & Hermans, 2009 for the opposite effect), it may also be that some of the events produced were in fact over-general representations which could have been reported as single events. Williams, and colleagues (2007) argued that cue-type does not significantly impact on specificity of events recalled, and it has also been suggested that limiting time-frames for recall would increase over-generality (McCormack, 1979), while directive instruction has also been found to reduce over-generality (Griffith, Sumner, Raes, Barnhofer, DeBeer, & Hermans, 2012). It can be argued that the cueing task functioned to reduce over-generality as rated clarity (which might be expected to be reduced for over-general recall) was not reduced overall for the dysphoric group. It seems more likely that incongruent autobiographical events are simply experienced with less clarity in this group when compared to congruent events, a possibility which may be explored in the future by better distinguishing between reduced clarity and over-generality of recall.

The similarity in the patterns of clarity between past and future congruency in both groups suggests that representations of the past are used to inform on the future, and this carries implications for dysphoric groups who displayed reduced variation. While this finding contrasts with that of Dalgliesh and colleagues (2011), who found no impact of dysphoria on imagined future chapters, it may be that their study relied less on episodic details, and more on the conceptual attributes of future chapters, our results indicate that dysphoric groups experience difficulty in imagining future events as being affectively different from the norm.

Interestingly the ability to generate over-general future events has been found to correlate with over-general memory (Brown, Root, Romano, Chang, Bryant, & Hirst, 2013; Kleim, Graham, Fohosy, Stott, & Ehlers, 2014), and so if our proposal, that reduced clarity is an indicator of greater chapter-level retrieval, is correct the past-future similarity in recall would be expected. The ability to generate future events is clearly important for people in aiding the planning of activities (Ajzen, 2011) and future problem-solving (Arie, Apter,

Orbach, Yefet, & Zalzman, 2008). So the clinical implication of the results of this study lies in the way in which psychological therapies function, for example many interventions require generation of events in order to develop a more realistic or varied view on past and future life e.g. CBT (Brewin, 2006); and other talking therapies (e.g. de Shazer, & Dolan, 2012; Launer, 2006; White & Epston, 1990). Research has shown that the ability to visually imagine positive events impacts on mood to a greater extent than simply verbally describing them (Holmes, *et al*, 2007), and that concreteness training has a positive impact on dysphoria (Watkins, *et al*, 2005), and this study suggests the merits of targeted rehearsal of positively incongruent events in alleviating low-mood in dysphoric groups.

Because this study explores a relatively new approach to event cueing and generation it has a number of limitations which should be addressed in future studies. These relate to the nature of chapter-based cuing which resulted in a larger number of events being congruent, than incongruent. Our analysis was based on the mean ratings for events, however there was an inherent imbalance between the number of events in each of the categories, particularly incongruent events for the dysphoric group. A further limitation was the use of the clarity ratings scale, which required participants to rate features of vividness, re-experiencing and coherence/completeness of the event, and the centrality of event factors. These features were drawn from the Memory Experiences Questionnaire (Sutin & Robins, 2007) and the centrality of event scale (Berntsen & Rubin, 2006) and as such were an attempt to summarise some of the key dimensions of memory experience. The choice to not use the full scales was made because this study focussed on establishing the life-chapter context for event recall or future imagining, and to ensure comparability between past and future events, and is discussed later in Section 7.1.7.

This study reveals a role for the hierarchical structuring of autobiographical knowledge in recall or future-imagined event characteristics. This is an important yet underexplored area, as while most researchers acknowledge the role of hierarchies of representations within the autobiographical memory system there is a clear focus within the literature on specific events. Results may be of particular interest to psychological therapists who may attempt to focus clients on these during therapy, thereby enhancing their access to positive and 'redemption' stories, and whether access to incongruent event improves during therapy. Results suggest that dissonance reduction, in the form of competition processes might serve as a dysfunctional process for people who have a bias towards negative self-referencing material.

A further area of research might focus on how chapters are cognitively constructed by people with depression, for example, if events of a particular valence are clustered together in dysphoric and depressed groups, but that non-depressed individuals use other event characteristics.

In summary this study established, in parallel with Study one, a pattern of enhanced access and clarity for events affectively incongruent with their life-story chapter, and differential pattern of access for the dysphoric group. The clarity 'uplift' of incongruent evetns was reduced for the dysphoric group, an accessibility reduction for non-depressed controls when accessing negatively incongruent events, and the opposite effect for the dysphoric group when accessing their positively incongruent events. Study four aimed to establish whether autobiographical memory inhibition could play a role in this pattern.

Chapter 6 Retrieval-induced forgetting using life-chapter cues

6.1 Introduction

We do not remember all the events and experiences from our lives, and we tend to remember the same key incidents and events repeatedly while other autobiographical memories, while temporarily available, fade over time and become inaccessible. Studies in psychopathology have revealed the extent of the human capacity to store and make available an almost limitless number of memories. Parker, McGaugh, and Cahill (2006) reported on a woman, A.J. who experiences hyperthymnestic syndrome, an inability to forget personal experiences and events from her entire life. A.J. experiences her memories as 'non-stop, uncontrollable and automatic' and although rare is an illustration of both the human capacity to store and recall events, and also the essential need to limit recall. Other sufferers of this condition have been reported (LePort, *et al*, 2012), highlighting the problems with Thorndike's (1914) *Theory of disuse* which assumes the forgetting track of autobiographical memories. To recall information as single events without ordering them, according to importance and usefulness, in to a higher order structure would result in the kinds of chaotic experience described by AJ. In order to do this memories must be linked together, categorised, and those which are not needed deselected for recall.

Life-story chapters (McAdams, 2001, Thomsen, 2008), serve as temporally defined clusters of semantic knowledge and episodic events which are linked by shared themes, activities and goals (Wright & Nunn, 2002). These life-story chapters are thought to be generated through a process of autobiographical reasoning (Habermas & Bluck, 2000), or life-period reasoning (Thomsen, 2015) which creates categorical links between events and information. Theoretically chapters are created as a result of the replaying of episodic events, and the linking of these, through reasoning processes, in to a greater whole (D'Argembeau, *et al*, 2014). For example, a number of experiences at senior school could be encoded as a set of single events, but because of the meaning-making processes and understanding of culturally accepted life-phases, would progress over time to become a narrative-like semantic representation e.g. when it began, what it

was like, how it ended, which is illustrated by a number of episodic events e.g. a first school play, failing a French exam. At the point of creation of chapters could, theoretically, include any and all events within this time period, but in practice only some of them are available, suggestive of a process whereby some memories are favoured over others.

When considering past events, and looking back over life-story chapters, there are episodic memories which may belong to a particular chapter, this has been evidenced by a number of studies revealing the priming effects of life-periods (Section 1.1.2), and studies which use chapters as effective cues for memory recall (Section 1.3.1). There are three phases during which episodic memories may be included in the formation of chapters, the first is at the time of encoding when what is remembered depends on the personal relevance and impact of the events (e.g. Conway, Anderson, Larsen, Donnelly, McDaniel, *et al*, 1994), following that there is a process of rehearsal and reasoning whereby events are recalled either privately (Ritchie, *et al*, 2006) or during interactions (Alea, 2010; Beike, Brandon, Cole, Baron, & Bluck, 2009), which will result in them becoming more accessible over time (Harris, Barnier, Sutton, & Keil, 2010), and finally the point of cued/generative, or spontaneous/direct recall which is current context and goal dependent (Baron & Bluck, 2009).

Research into the tagging, or priming of particular episodic memories, discussed in Section 1.3.1 indicates that single events tend to be 'tied' to life-story chapters (Thomsen, 2008; 2015), and Studies one and three have shown that chapters can form the context, and reliably act as cues, for recall, with each chapter providing a 'category' for the memory. A further proposal is that life-story chapters not only function to index episodic events, but also act as schema for recall, and impact on episodic memories according to their congruence with a chapter, being more likely to be recalled if they are representative of the chapter, but also subject to being recalled with greater clarity if they are atypical (Studies one and three). While typical events are schema-linked Study three highlighted the need for dissonance reduction at a chapter level, and one of the processes by which this occurs is by managing a challenge to the self-schema by recruitment of memories which are congruent with the schematic representation (Beike & Landoll, 2000)

The availability of long-term episodic memories, in experimental contexts and in everyday life, is thought to be reliant on two main factors, the first being the storage strength of memory representation information relative to other information, which itself is dependent on encoding and subsequent learning and rehearsal, and the second is the current accessibility or 'retrieval strength' (Bjork & Bjork, 1992). Retrieval strength is thought to depend on the current relevance of information and the availability of cues (Bjork, 1989), but the most impactful factor in recall is retrieval capacity itself. This retrieval capacity can be thought of as the limiting factor in recall, and the conduit through which information is retrieved from memory storage. Given that we are theoretically capable of storing a vast amount of information in memory for each chapter, and that for each chapter cue we would be able to recall countless memories, the fact that our ability to recall is limited means that factors which curb recall must be in place. It is pertinent, therefore, to consider the mechanisms of selection in terms of active processes, and one such process which has been examined is that of retrieval-induced forgetting (Anderson, Bjork & Bjork, 1994). A process which has been proposed to work through an inhibitory mechanism functioning between exemplars of a single category of to be retrieved information.

Retrieval induced forgetting is a cognitive phenomena whereby stored memory information is inhibited by the recall of other, categorically linked, information. It has been described as the impaired ability to remember an item when it is similar to other items stored in memory (Anderson & Neely, 1996). The phenomena has been explained in terms of adaptive function whereby competitive inhibition of target-linked but non-relevant information heightens the relative activation of target information (Anderson, Bjork & Bjork, 1994), and alternatively as a way of preventing spreading activation of all information directly or indirectly linked to cues (Saunders & MacLeod, 2006). These explanations both describe retrieval induced forgetting as an emergent quality of memory recall, but in addition to that can provide opportunities for inference around the nature of information interconnectedness within the memory system. For example inhibition of memories will be more likely to occur when they are a) more closely associated with a given cue (vertical association) and b) when they are more closely associated with competitors (horizontal association) (Anderson & Neely, 1996), what is also suggested by these accounts is that memories are not thought to be unlearned as a process of interference, but progressively down-graded as a result of the relative activation of

competitors, this has been termed the *retrieval-based learning assumption* (Anderson, *et al*, 1994).

The paradigm by which Retrieval-induced forgetting is explored experimentally involves a three-stage process illustrated inFigure 6.1. Initially category-exemplar (cue-targets) pairs are studied, for example fruit-apple, fruit-pear…, followed by a second retrieval phase where categories are provided and targets are recalled, for example fruit-a____, fruit-p____; a short (5-20 minute) distractor period follows, with a subsequent free recall phase. Two key results have been established using this paradigm, the first, unsurprisingly is that the target memories which are recalled during the retrieval phase (denoted RP+) are more likely to be recalled at test, the second is that of the memories which remain unrecalled during the retrieval phase, those which share a cue with the RP+ memories (denoted RP-) are significantly less likely than those which do not share a cue (denoted nRP) to be recalled at test. This indicates that inhibition occurs at the point of categorical similarity.

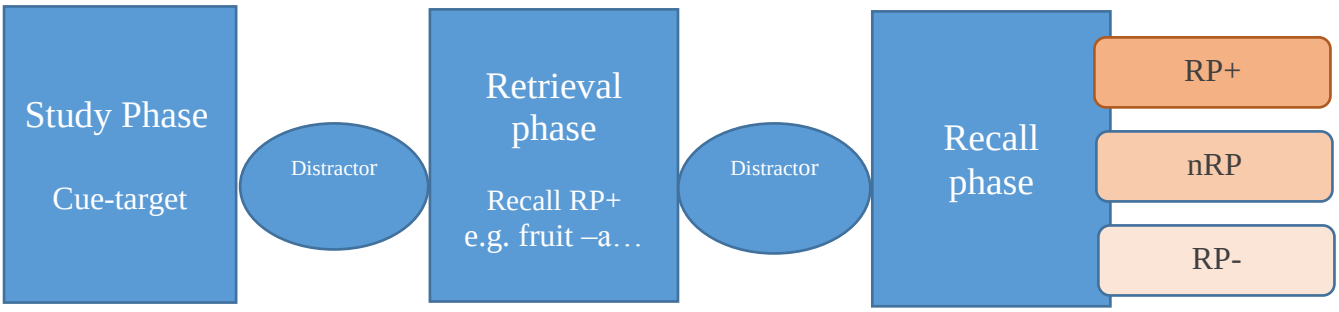

Figure 6-1: Schematic illustration of the RIF paradigm. *Depicting the stages of memory recall and rehearsal for a standard RIF procedure.*

The types of cue-target information which can display this phenomena have been expanded from the original examination of semantic word pairs, to real-life situations (for a review see Anderson & Levy, 2010). These include the attribution of personality traits (McCrae & McLeod, 1999); mental imagery (Saunder, Fernandes & Kosnes, 2009); social contexts (Dunn & Spellman, 2003; Storm, Bjork & Bjork, 2005); eyewitness memory (MacLeod, 2002) and educational learning (McCrae & MacLeod, 1999). In

addition to these types of information, personal autobiographical memories have also been found to be subject to retrieval-induced forgetting.

The phenomenon of retrieval-induced forgetting has been specifically investigated for autobiographical memory characteristics which are key to some material being privileged over others, in particular, the emotional content (valence and emotionality) and self-relevance of memories. Generally emotional material is less likely to be forgotten than neutral material (Power 2000; Dehli 2009) independent of whether the event is positive or negative (Barnier, Conway, & Hung. 2004). While autobiographical information and information of high self-relevance may be 'insulated' from forgetting effects (Amir, *et al*. 2001; Macrae & Roseveare 2002; Geraerts, Jelicic, & Merkelbach, 2006), and might also be too well integrated with other recalled memories to create forgetting effects (Anderson & McCulloch 1999). Individual ability to inhibit memories has been linked to the recall of negative autobiographical memories, Storm and Jobe (2012) carried out two experiments which linked the ability of their participants to experience RIF for standard category-exemplars such as fruit-lemon, with the recall of autobiographical memories from childhood, and the month prior to testing using positive and negative recall conditions, each rated for clarity, detail, and valence. A regression analysis indicated a significant negative correlation between recall of negative autobiographical memories and RIF, and that this occurred at the level of memory accessibility rather than memory clarity, or details, and independent of depressive status. The authors proposed that this reflected a general phenomena within non-depressed populations of a bias towards the recall of positive autobiographical material.

When Barnier and colleagues (2004) used three category cues which were of a positive (e.g. happy), negative (e.g. horrified), or neutral valence (e.g. patient) to evoke 30 autobiographical memories, they found that unrehearsed autobiographical memories from practiced categories were recalled more slowly than non-category members and practiced category members i.e. a consistent RIF effect in all valence categories. Overall, and somewhat unexpectedly, emotional memories (with positive or negative cues) were more likely to be forgotten that neutral memories.

Following from Barnier and collegues' (2004) work, Hauer and Wessel (2006) used valenced category cues of 'positive' and 'negative' events (with where, when, what and whom information) to elicit autobiographical memories and examined accuracy of

recall in the RIF procedure. They found that facilitation of recall resulted from retrieval practice (as expected) in both valence categories, and that the memory details of RP- items were recalled less accurately than the nRP memories in the negative category condition, but not in the positive category condition. This result could have been due to a consistent difference in valence between the rehearsed (RP+ and RP-) and non-rehearsed (nRP) categories. In a second follow-up experiment Hauer and Wessel used categories of 'situations' and 'traits' for only negatively valenced cue words to collect autobiographical memories. Although a RIF effect was seen, it was reduced compared to that which might be found in more traditional RIF studies. This again indicates that memories may be recalled less accurately when they share characteristics with other more frequently rehearsed memories

Because of the impact of mood-disorders on the retrieval of autobiographical memories (Dalgliesh & Werner-Seidler, 2014) in particular the relationship between cognitive failures and performance using the RIF paradigm (Bäuml & Kuhbandner, 2007; Groome & Grant 2005; Groome & Sterkaj 2010; Potts, Law, Golding, & Groome, 2012), Harris and colleagues (2010b) examined the potential inhibitory effects on autobiographical memories for high or low dysphoric groups using category cue words 'positive' and 'negative'. The memories, 10 positive and 10 negative, were scored for age, latency, valence and clarity and given a self-generated cue word. In the first study there were differences in the memorability of positive compared to negative memories in both groups (positive memories were more memorable overall), and this led to a RIF effect being reported only in the groups who had retrieval practice for negative memories. In a second experiment looking at the impact of selective rehearsal on oppositely valenced memories in people with dysphoria. Their categories were work/study (5 positive, 5 negative) and home/family (5 positive, 5 negative) and their RP+ was either positive or negative memories. Their results showed a RIF effect only in the work category when positive memories were rehearsed and negative memories inhibited. Facilitation occurred independent of valence, and there was no effect of age, nor ratings of clarity, valence or importance of memory events.

The 2010 study by Harris and colleagues seems to indicate that even in people suffering from dysphoria there is a tendency to favour positive over negative memories, and that there is also a different forgetting effect depending on what categories of cues are

used. For example, work memories are subject to a RIF effect while home/family memories are not. The authors suggest that this may be due to memories retrieved for these categories being more recent, more closely linked to the 'self' or being more emotionally impactful.

In Section 1.3.1 the evidence for the cognitive structuring of chapters was outlined, this includes that chapters reliably prime constituent episodic memories, and that horizontal priming occurs between constituent episodic memories within the same chapter. In addition to this Study two gave evidence that the recognition of chapters in narrative and as representations for participants was convergent and therefore chapters represent both internal and communicated schematic information. In addition studies one and three gave support for the use of chapters as cues for episodic memories, and therefore reliable cue-target links. Retrieval-induced forgetting can impact on the recall of specific autobiographical memories, but as a result of their non-neutrality when compared, for example, to word pairs, there must be a consideration of equivalence between categories, and of memories themselves in terms of affective content, and personal significance. The use of chapter-episodic memory pairs has never been explored but represents a way of addressing this neutrality and the effect of personal significance on RIF.

The formation of chapters themselves is suggested to be a result of the stringing together of the experiences by linking themes, activities and temporal similarity through autobiographical (Habermas, 2011; Habermas & Bluck, 2000) or life-period reasoning (Thomsen, 2015). In addition to this it appears that chapter valence is not simply and emergent feature of the summation of event valence, but may also be influential in deciding the valence, on recall, of constituent episodic memories (Beike & Landoll, 2000). Although not fully explored it seems that while there is evidence that the valence of chapters in dysphoric groups are significantly less positive (Study three, Section 5.3), but there is no reason to think that they are structured differently (Studies one and two), in terms of length, narrative coherence, and temporality. While this may be the case, there is some indication that the events within them are influenced by the chapter in a 'top-down' manner, with a drive to reduce dissonance between within-chapter events (Beike & Landoll, 2000). In Studies one (Section 3.3.2) and three (Section 5.3) the incongruence of events raised access, but that there may be some reduction in this effect in terms of the

clarity at which positively incongruent events are recalled for people with dysphoria, this group also recalled fewer incongruent events overall. Study three also indicated that the dysphoric group overall spontaneously recalled fewer incongruent events. This is significant to dysphoric groups in particular because there are suggestions that of a 'healthy balance' between coherence with the evaluative whole of the chapter, and the ability to recall incongruent events, particularly those which are more positive than the contextual chapter (Study three) or schema-related expectation, is essential to mental health and well-being (Beck, 1987; Brewin, 2006; Singer & Salovey, 1993; White & Epston, 1990).

These studies are based on the proposal that, first of all, the composition of chapters, i.e. as collective representations of autobiographical information, and higher order themes, is influential in the recall of affectively incongruent events by a process of competitive inhibition in both dysphoric and non-dysphoric groups. Retrieval-induced forgetting is one of the mechanisms which impacts on recall in the short term, but according to the retrieval-based learning assumption (Anderson, *et al*, 1994) over longer periods could function to downgrade affectively incongruent events, and could be at play in the formation of chapters which are coherent, positive summations of life events, and have limited dissonance. The suggestion that people with dysphoria have chapters with reduced access to incongruent events, and for their incongruent events, reduced clarity for positive events, indicates that, assuming retrieval-induced forgetting is a factor, they would have a differential RIF effect, with negative material being more likely to effectively inhibit positive material, but not *vice versa*.

The first study in this chapter aims to establish patterns of inhibition and retrieval of positive and negative autobiographical memories cued by chapters in non-depressed populations, the second study examines this pattern of retrieval for dysphoric groups. In order to examine the impact of autobiographical reasoning on the process, i.e. the attribution of causation, consequence and personal significance, in addition to overall retrievability on manipulation, this study examines a number of salient and ecologically valid memory characteristics, of the content of chapter-cued memories rather than speed or order of recall.

In order to control for 'importance to self' on the retrieval process the aim is to create equivalent categories which are similar to those which may be spontaneously

produced by people when ordering their past experiences in to chapters (Thomsen, 2009). In Studies 1 and 3 of this thesis we found that university student participants aged between 18-25 reliably chose chapters relating to school and university chapters, and so these categories were applied to create category (chapter) -exemplar (episodic memory) links. Using recall practice of either positive or negative category exemplars, the predictions of this study are that:

- Recall practice of autobiographical memories will enhance recall at test (standard facilitation)

- Recall practice of autobiographical memories from particular life-chapters will cause inhibition of other memories from these chapters i.e. a RIF effect. This will be evidenced by:

    - reduced recall of memories from the RP- memories

    - changes in memory features of RP- memories indicative of dissonance reduction processes:

        - increase reported difficulty in accessing memories

        - a rehearsal valence linked change in positivity (negative rehearsal results in more negative recall *vice versa*)

        - decreases in memory clarity (vividness, coherence, and intensity)

    - reduced accuracy of memory details (who was present during the event; what occurred during the event; where the event occurred, and when it was, along with the attributed cause of the event; consequence of the event, and its personal significance)

6.2 Method

6.2.1 Participants

46 participants between 18-25 years of age, with a mean (SD) 24.1 (2.7) years were recruited from campus and using the University of Abertay and University of Andrews School of Psychology participant recruitment SONA systems. Of the included participants, 18 were male. The PHQ-9 (Kroenke & Spitzer, 2002) (Appendix 13) was used to establish non-depressed status, and study participants were required to be currently non-dysphoric (PHQ-9<5), and six recruited participants were not included in the analysis because their PHQ-9 score was greater than 5. The participants were either required to take part in the study to obtain course credit, or received £10 for taking part.

6.2.2 Design

Ethical consent was obtained from the University of St Andrews (Appendix 4), and University of Abertay Dundee (Appendix 5). This study was a between participants design with 20 participants rehearsing positive autobiographical memories, and 20 rehearsing negative autobiographical memories in the RP+ phase. The two cueing chapters were 'high-school' and 'university' and recency of recalled events, and categorical priming during the memory production phase, which could impact on retrievability, was controlled by alternating the cueing categories.

6.2.3 Measures

The PHQ-9[8] (Kroenke & Spitzer, 2002) was used to establish depressive status.

[8] PHQ-9 was adopted in place of the BDI-II for this study to decrease time taken to establish dysphoric status. The PHQ-9 has nine questions, the BDI-II has 21

6.2.4 Procedure.

Study sessions were carried out in the experimental labs of St Andrews University and in the Division of Mental Health Nursing and Counselling, at Abertay University, Dundee. The procedure is illustrated in Figure 6.2.

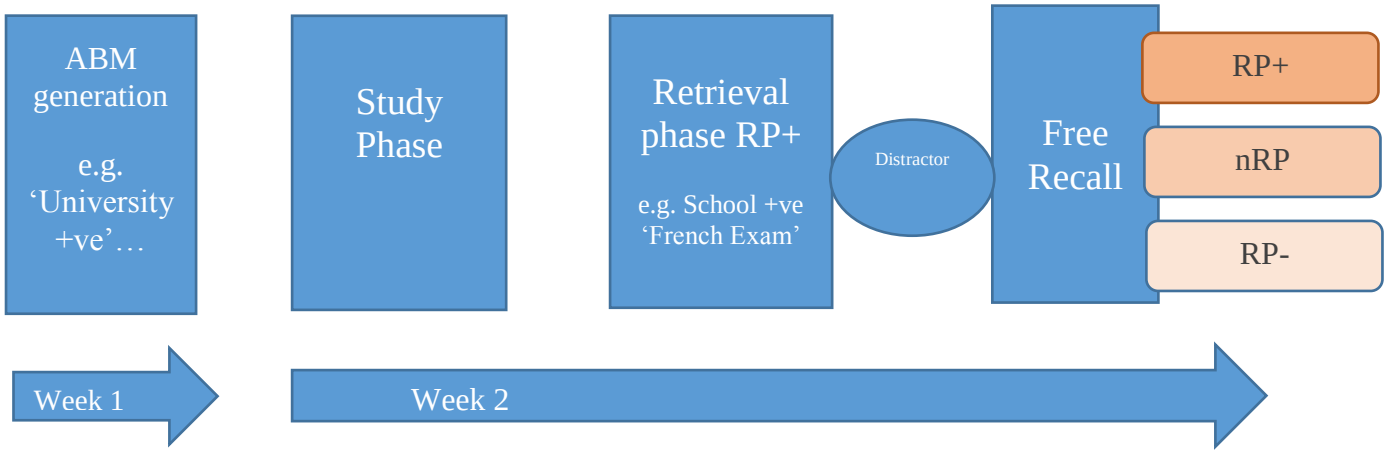

Figure 6-2: Schematic of RIF procedure for Study four. *Depicting the sequence of activities for the studies 4a and 4b. ABM generation occurred in the week prior to the RIF, the study phase involved a reminder of these, and this was followed by the RP+ rehearsal phase, distractor and final free recall phase.*

Session 1:

Following informed consent being given, participants were required to complete the PHQ-9 and undergo autobiographical memory generation.

Participants were informed that there were two autobiographical periods of interest, these being the 'life-story chapters' of *high-school* and *university* henceforth known as categories. They were then given a definition of specific autobiographical memories as follows:

'Specific autobiographical memories are of events that lasted less than a day, and are events which you *know* only happened once (because you can remember some 'one off' details), that happened to you so not things like current events e.g. the royal wedding, or things that people said happened e.g. your sister had an accident. They don't have to be special events, and can be events which happened more than once but the memory is of one

of these times. For this study we ask that they happened *during the chapter in question*. In addition, a positive memory is one that is '*good to think about*' and a negative memory is one that is '*bad to think about'*

There are two types of cue for which memories can be retrieved in this study, (high, or senior) 'school', and 'university'. When cued for a memory please ensure it is related to, and occurred during, the appropriate life-time period.

The cueing of memories occurred via a computer monitor using E-Prime (Psychology Software Tools Inc). Each cue was presented on on-screen and the participant was required to respond to each one in turn. Following the appearance of the cue participants verbally confirmed when a specific autobiographical memory had been retrieved, they then typed in a 'personal word(s)' specific to that memory, e.g. 'Christmas with Alice', to act as a reminder and 'tag' for subsequent sessions. Once the 'tag' had been entered participants were sequentially prompted on-screen for memory details which were given verbally and recorded by the researcher these included *who, what, where* and *when* (memory details) along with the *cause, consequence* and *personal significance* (autobiographical reasoning) of the event. The participant then scored the memory features on a likert scale (1-6):

Positivity (very positive/very negative),

Recall (comes to mind easily/with difficulty),

Coherence (feels coherent and complete/does not feel coherent and complete)

Vividness (very detailed/not detailed at all)

Emotional Intensity (not at all/extremely emotional)

Participants were then asked to estimate their age during the event and this enabled a check-back to ensure the event occurred during the time period of the chapter/category.

Prior to the initial generation phase two practice memories were generated, for the cue 'last week and +ve' and 'last week and –ve' and the protocol below followed to ensure that the participant understood the procedure.

The experimental procedure was then used to generate 20 autobiographical events, comprising 10 positive and 10 negative memories. The cue sequence was alternated by chapter and by valence.

Between sessions the memory details were transcribed (*who, what, where* and *when*, along with *cause, consequence* and *personal significance*), and rehearsal groups matched according to the ratings of valence and clarity (summed score of coherence, emotional intensity, and vividness) of the memories. This resulted in four sets of ten participants with memories which are equivalent at baseline for these two memory features.

Slides were created on E-prime for two phases of the subsequent session. In order to remind participants of all memories which had been produced in the previous week a set of slides was created on which was contained an event memory 'tag', and associated chapter and valence.

For the rehearsal phase cueing slides for the appropriate category and valence were produced i.e. all memories for either school: positive, or negative, university: positive or negative. This created four sets of RP+ slides for cued recall as indicated in Table 6.1

During session two the participants underwent a reminder stage where each of the memories they had produced in the previous session were cued by the tag being presented on an E-Prime slide, and they were asked to scroll through these slides once they had recalled and spoken out loud some details of the memory and the researcher had confirmed that they had remembered at least two details correctly e.g. who, and when.

The next stage of session two involved the cued recall of the RP+ memories, this entailed presentation of a slide containing the cue 'tag' along with prompts for who, what, where, and when, along with cause, consequence, and personal meaning details on sequential slides. Participants were required to state the event details out-loud in response to the slides, and were corrected by the researcher if their response deviated from their previous report or if they took longer than ten seconds to recall the detail. The RP+ curing continued for three rounds, every event being recalled in each round.

Table 6.1: The RP+, RP-, and nRP cues for each group in Study four

	RP+	RP-	NRP
GROUP A	SCHOOL +	SCHOOL -	UNIVERSITY -
GROUP B	SCHOOL -	SCHOOL +	UNIVERSITY +
GROUP C	UNIVERSITY +	UNIVERSITY -	SCHOOL -
GROUP D	UNIVERSITY -	UNIVERSITY +	SCHOOL +

This table represents the four possible groups, ten participants in each, and the memories which are included in each RP category in studies 4a and 4b

A twenty-minute distractor phase followed during which participants undertook an on-screen operational-span task (OSPAN: Turner & Eagle, 1989) which engaged attention and working memory to prevent covert rehearsal of memories.

In the final phase participants were asked to freely recall as many memories as they could from the 20 that they had been reminded of at the beginning of the session. They spoke the 'tag' out-loud and were cued on screen for memory details of what where when, causes, consequences and personal significance, and memory features

On completion of this phase, when participants confirmed that they were unable to recall further memories, they were debriefed, and provided with their £10 for participation.

6.3 Results

6.3.1 Study 4a Results

The data resulting from this protocol included the number and category (RP+, RP-, nRP) of the memories produced in the final test phase, along with the memory details which were examined according to their baseline. Recall was examined in terms of availability of autobiographical memories, changes to rated memory features (difficulty of access, positivity, and clarity: coherence, emotional intensity, and vividness).

Accuracy for memory details was established using two criteria following Noreen and McLeod (2013). Using jist criteria where the memory recall was considered accurate if the feature of interest was indicated as broadly matching that of the originally generated description e.g. 'where' could be 'in my house' but acceptable descriptions could be 'in the

kitchen' which by inference is not in conflict with the original information, while the strict criteria were that the description was the same i.e. the participant would have to have said 'in my house', and 'in the kitchen' would have been scored as inaccurate. The accuracy over the seven details of the memory were summed, and each participant had a proportional score for accuracy under the 'jist' and 'strict' criteria.

Table 6.2 shows the memory feature ratings for the categories of 'School' and 'University'. A series of ANOVAs (within: school or university; positive or negative) were carried out, once it was established that there was no difference between the autobiographical memories' ratings of difficulty of access, positivity, coherence, vividness, and emotional intensity at baseline for the categories of school and university, these were combined to create two RP+ groups, Negative rehearsal and Positive rehearsal.

Table 6.2: Mean (SD) baseline ratings for memory features in Study 4a

	Difficulty of recall	**Positivity**	**Coherence**	**Vividness**	**Emotional Intensity**
School	3.04 (0.97)	4.21 (1.77)	3.12 (1.01)	4.81 (1.42)	3.40 (1.16)
University	3.12 (1.90)	4.63 (1.44)	3.52 (1.54)	4.62 (2.41)	3.21 (1.74)
F(1, 38)	1.431, p=0.11	<1, n.s.	1.122, p=0.21	<1, n.s.	<1, n.s.

This table indicates the mean (SD) rated memory features for the memories cued by chapter categories 'School' and 'University' in Study 4a. Differences between groups were examined using a series of mixed-factorial (between: rehearsal valence, within: category (school, university)) ANOVAs

The impact of rehearsal on memory recall was examined for its impact on:

i) the mean number of memories from each category which were retrieved during the free-recall phase

ii) the change in memory features during the free-recall phase (*positivity, coherence, vividness*, and *emotional intensity*)

iii) the accuracy of memory details which were recalled correctly during the free-recall (*who, what, where,* and *when, cause, consequence, and personal meaning*)

For this analysis the RP- and nRP means were calculated only for the memories recalled of the opposite valence to the RP+ memories, to control for memory valence effects impacting on recall.

The mean (SD) number of memories recalled for each category were RP+ 3.70 (1.16), RP- 2.15 (1.31), nRP 2.73 (2.76), In order to test the primary hypothesis that rehearsal for RP+ memories would inhibit the recall of RP- memories, but not nRP memories, a repeated measures ANOVA (between: rehearsal valence, within: rehearsal category RP+, RP-, nRP (different from rehearsal)) revealed a main effect of rehearsal category $F(1,37)=15.614$, $p<0.001$, $\eta_p^2=0.61$ on the number of memories recalled at test, no main effect of rehearsal valence, $F(1,37)=1.010$, n.s., and no interaction between valence and category $F(1,37)<1$. RP+ memories were more likely to be recalled than both RP- $t(39)=6.125$, $P<0.001$, $d=0.48$ and nRP $t(39)=3.914$, $p<0.001$, $d=0.31$. A follow-up t-test revealed a significant difference between RP- and Nrp categories with the Nrp memories being more likely to be recalled, $t(39)=2.890$, $p=0.006$, $d=0.38$, indicating both a significant facilitation effect and a retrieval-induced forgetting effect of rehearsal.

Table 6.3: Mean (SD) change in ratings for memory features in Study 4a

		RP+	RP-	nRP
RP+ positive N=20	**Difficulty**	0.068 (1.50)	0.576 (1.32)	0.797 (1.75)
	Positivity	0.570 (1.84)	0.151 (1.03)	0.201 (1.03)
	Coherence	-0.181 (1.25)	-0.370 (1.24)	-0.532 (1.38)
	Intensity	0.013 (0.97)	0.630 (1.01)	0.220 (1.20)
	Vividness	0.514 (1.34)	-0.013 (1.08)	-0.211 (0.97)
RP+ negative N=20	**Difficulty**	0.824 (1.16)	0.051 (0.76)	0.107 (0.90)
	Positivity	0.071 (0.71)	0.220 (0.87)	0.011 (0.71)
	Coherence	0.431 (0.56)	0.057 (1.03)	0.032 (0.46)
	Intensity	-0.045 (0.77)	0.540 (0.71)	-0.320 (1.10)
	Vividness	0.624 (1.12)	-0.123 (0.81)	-0.011 (1.17)

This table represents the mean change in rated memory features for the two RP+ groups in Study 4a, a negative change indicates a decrease in the feature from initial generation, to free recall

The examination of the changes to memory features followed this primary analysis. A mixed factorial ANOVA (between: rehearsal valence, within: rehearsal category RP+, RP-, nRP (different from rehearsal)) was carried out to ascertain the degree of change in rated difficulty of recall between categories. There was a significant effect of rehearsal category $F(1, 37)=12.980$, $p=0.001$, $\eta_p^2=0.69$, a significant effect of rehearsal valence, $F(1,37)=8.742$, $p=0.005$, $\eta_p^2=0.54$, and no interaction $F(1,37)<1$. This indicated that following rehearsal (RP+) of negative memories, positive memories (both RP- and nRP) were more accessible. A further comparison t-test between the two non-rehearsed categories, revealed no effect $t(39)<1$. suggesting that the reduction in rated difficulty of recall was down to a short-term rehearsal effect.

To examine whether the rated positivity of recalled memories would relate to the rehearsal valence, i.e. that rehearsal of positive memories would increase the reported positivity of recalled memories, and vice versa, a mixed factorial ANOVA (between: rehearsal valence, repeated measures RP+, RP-, nRP (different from rehearsal)) was carried out to ascertain the degree of change. There was no effect of rehearsal category $F(1,38)<1$, rehearsal valence, $F(1,38)<1$, and no interaction $F(1,38)=1.786$, $p=0.189$. A further comparison t-test between the two non-rehearsed categories, matched by valence, revealed no effect $t(39)<1$. No significant changes occurred to the positivity of the recalled memories, indicating no short-term mood improvement, or reduction following rehearsal.

Three features of memories were used to indicate the clarity of recall, *coherence, emotional intensity, and vividness*. While tentative predictions were made concerning the changes brought about by rehearsal on the RP- memories, in that overall there would be a reduction in clarity relative to nRP, it was also anticipated that details of RP+ memories would be enhanced by facilitation effects.

It was predicted that coherence for RP+ would increase, as a result of rehearsal, a mixed ANOVA (between: rehearsal valence, within: rehearsal category RP+, RP-, nRP (different from rehearsal)) found a significant impact on change of coherence of the rehearsal category, $F(1,38)=4.862$, $p=0.034$, $\eta_p^2=0.27$, the valence of the rehearsed memories $F(1,38)=6.624$, $p=0.014$, $\eta_p^2 = 0.30$ and no interaction $F(1,38)<1$. The mean (SD) increase in coherence for the negative RP+ memories was 0.431 (0,564), for RP- 0.057 (1.029), and nRP 0.032 (0.455), and for the positive RP+ -0.181 (1.253), RP- -0.370 (1.236), nRP -0.532

(1.378). This indicated that rehearsal of negative autobiographical memories increased the reported coherence on recall of both negative rehearsed and positive non-rehearsed memories, while the rehearsal of positive memories has the reverse effect. Follow-up t-tests revealed that there was no significant difference in the changes for the non-rehearsed memories $t(39)<1$, but that RP+ memories were significantly more coherent on recall when compared to nRP memories $t(39)=2.233$, $p=0.031$ $d=0.23$, but not for RP- memories $t(39)=1.190$, $p=0.241$, and no difference between nRP and RP- $t(39)<1$. What appears to be occurring is that rehearsal of negative memories raises their subsequent coherence on recall, but rehearsal of positive memories reduces overall coherence of all memories recalled at test.

Again it was anticipated that rehearsal of RP+ memories would increase the emotional intensity at test, a mixed factorial ANOVA (between: rehearsal valence, repeated measures RP+, RP-, nRP (different from rehearsal) was carried out to ascertain the degree of change in emotional intensity between categories. There was no significant effect of rehearsal category $F(1, 38)=1.021$, $p=0.319$, no significant effect of rehearsal valence, $F(1, 38)=1.052$, $p=0.312$ and no interaction between category valence and rehearsal category $F(1,38)=4.049$, $p=0.051$. A further comparison t-test between the two non-rehearsed categories, thereby matching for valence revealed no effect $t(39)<1$, n.s. There was therefore no difference in the reported change in emotional intensity for any of the categories of recalled memory.

Finally a mixed ANOVA (between: rehearsal valence, within: rehearsal category RP+, RP-, nRP (different from rehearsal)) was carried out to ascertain the degree of change in vividness between categories the prediction, as before, was that RP+ memories would increase in reported vividness. There was a significant effect of rehearsal category $F(1,38)=4.246$, $p=0.046$, $\eta_p^2=0.19$, no effect of rehearsal valence, $F(1,38)=1.784$, $p=0.190$, and no interaction $F(1, 38)<1$. This effect was due to both the RP- and nRP memories being reported as less vivid on test than at initial production and t-tests revealed that neither category changed to a greater extent individually compared to the RP+ memories RP- $t(39)=2.011$, $p=0.051$ and nRP $t(39)=1.094$, $p=0.064$. A further comparison t-test between the two non-rehearsed categories, revealed no effect $t(39)<1$. These results indicate that, as expected, following rehearsal memories become more vivid, but that non-rehearsed memories do not.

Accuracy of memory recall

The accuracy of memory recall was expected to increase for RP+ memories, and that RP- memories would reduce in accuracy compared to nRP memories. This study used two measures of accuracy, 'jist' whereby recalled details were matched to those reported on memory generation but did not have to be exactly the same, and 'strict' criteria, where descriptions were required to match exactly. The mean (SD) accuracy using the 'jist' criteria for RP+ was 0.990 (0.01), RP- 0.810 (0.26), and nRP 0.781 (0.13). Accuracy of memory recall using the 'jist' criteria was examined using a mixed ANOVA (between: rehearsal valence, repeated measures RP+, RP-, nRP (different from rehearsal). This indicated no significant effect rehearsal category had no effect on recall accuracy $F(1,37)<1$, no effect of rehearsal valence $F(1,37)<1$, nor an interaction between these $F(1,37)<1$.

Accuracy of memory recall using the 'strict' criteria was examined using a mixed ANOVA (between: rehearsal valence, repeated measures RP+, RP-, nRP (different from rehearsal). This indicated that rehearsal category had a significant effect on recall accuracy $F(1,37)=2.947$, $p=0.046$, $\eta_p^2=0.36$, no effect of rehearsal valence $F(1,37)=3.812$, $p=0.058$, and no interaction between these $F(1,37)<1$. Follow-up t-tests revealed that compared to the RP+ memories RP- were recalled with less accuracy $t(39)= 2.011$, $p=0.021$, $d=0.25$, but not nRP memories $t(39)=1.114$, $p=0.072$. RP- memories were recalled with significantly less accuracy using the strict criteria compared to nRP memories, $t(39)=1.959$, $p=0.031$, $d=0.21$. The mean (SD) accuracy for RP+ was 0.917 (0.17), RP- 0.622 (0.21), and nRP 0.733 (0.12).

Overall these results indicate that the RIF procedure of rehearsal which included recall of memory details and autobiographical reasoning processes i.e. thinking about the cause, consequence, and personal meaning of the events, resulted in both facilitation as a result of rehearsal and inhibition of oppositely valenced within-chapter episodic memories. This was demonstrated in terms of the memories which were *recalled*, and in the *accuracy of recall* using strict criteria. Some mixed effects were seen in the memory features which were facilitated, but there is no support from examining these for an impact of retrieval-induced forgetting inhibition.

6.4 Retrieval-Induced Forgetting in dysphoric groups

This study carried out the same procedure as 4a, however, the participants were selected to be dysphoric, scoring greater than 10 on the PHQ-9 (Kroenke & Spitzer, 2002), which constitutes categorization as moderate (10-15), moderately severe (15-20), and severe depression (20+). A total of 52 participants aged between 18-25, mean (SD) 21.6 (3.9) years,were recruited on campus, seven of whom were not included as their reported events could not be confirmed as meeting the criteria for an episodic memory, and five of whom scored below 10 on the PHQ-9 scale. Those who were not included in the analysis were not required to complete part 2 of the study. Of the participants included two were male.

6.4.1 Study 4b Results

It was established using a series of mixed factorial ANOVAs (between: rehearsal valence, within: category) that there was no baseline difference between the autobiographical memories ratings of difficulty of access, positivity, coherence, vividness, and emotional intensity for the categories of school and university, these were combined to create two RP+ groups, Negative rehearsal, and Positive rehearsal.

Table 6.4: Mean (SD) baseline ratings for memory features in Study 4b

	Difficulty of access	**Positivity**	**Coherence**	**Vividness**	**Emotional intensity**
School	4.34 (1.78)	3.59 (2.87)	2.48 (1.32)	4.72 (1.02)	2.83 (2.76)
University	5.12 (1.90)	3.33 (1.84)	3.15 (2.01)	4.42 (2.23)	3.01 (1.78)
F(1, 38)	1.116, p=0.210	<1	1.091, p=0.311	<1	<1

This table indicates the mean (SD) rated memory features for the memories cued by chapter categories 'School' and 'University' in Study 4b. Differences between groups were examined using a series of mixed-factorial (between:rehearsal valence, within: category (school, university)) ANOVAs

The mean (SD) number of memories recalled for each category was RP+ 3.54 (1.76), RP- 2.46 (1.91), nRP 2.27 (2.11). To explore for a RIF effect of rehearsal on the memories recalled at test, with the prediction that RP+ memories would be more likely to be recalled, and that more nRP memories would be recalled than RP- memories, a mixed factorial

ANOVA (between: rehearsal valence, repeated measures RP+, RP-, nRP (different from rehearsal)) was carried out on the number of memories of each category recalled at test. This revealed a main effect of rehearsal category $F(1,37)=14.913$, $p<0.001$ $\eta_p^2=0.42$, no main effect of valence $F(1, 36)=1.481$, $p=0.232$., and no interaction $F(1,37)<1$.. Follow-up t-tests revealed that RP+ memories were recalled more than both RP- $t(39)=2.984$, $p=0.021$, $d=0.21$, and nRP $t(39)=3.011$, $p=0.013$, $d=0.27$, but that these groups did not differ $t(39)<1$. Indicating a significant facilitation effect of rehearsal but no retrieval induced forgetting at test for recall.

Examining ratings for changes to memory features

A series of tests were carried out to examine changes in memory features: reported *difficulty* of recall, *positivity*, and measures of clarity: *coherence, emotional intensity*, and *vividness* of memories. Each of these was tentatively anticipated to be impacted by rehearsal, and subject to a RIF effect. In addition positivity was expected to be impacted by rehearsal valence.

Table 6.5: Mean (SD) change in ratings of memory features in Study 4b

		RP+	RP-	nRP
RP+ positive N=20	**Difficulty**	-0.987 (1.08)	0.083 (1.32)	0.115 (2.01)
	Positivity	0.914 (0.92)	-0.032 (1.02)	0.117 (1.57)
	Coherence	0.452 (0.70)	-0.056 (1.13)	0.142 (0.99)
	Intensity	0.182 (0.64)	-0.060 (0.73)	0.116 (0.93)
	Vividness	0.301 (1.33)	0.554 (1.42)	0.559 (1.44)
RP+ negative N=20	**Difficulty**	-1.071 (0.89)	0.299 (1.09)	0.076 (0.98)
	Positivity	1.008 (1.09)	0.113 (0.62)	0.053 (0.61)
	Coherence	0.719 (1.07)	-0.002 (1.10)	-0.021 (0.76)
	Intensity	0.282 (1.20)	-0.094 (1.13)	0.076 (0.45)
	Vividness	0.170 (1.21)	0.320 (0.92)	0.546 (1.01)

This table represents the mean (SD) change in rated memory features for the two RP+ group in Study 4b, a negative change indicates a decrease in the feature from initial generation, to free recall

The rated difficulty of recall, a measure which corresponds to the subjective ability to bring a memory to mind, rather than the accessibility overall (which is evidenced by whether it is recalled or not) was examined first using a mixed factorial ANOVA (between: rehearsal valence, repeated measures RP+, RP-, nRP (different from rehearsal) and revealed a main effect of rehearsal category $F(1,37)=11.077$, $p=0.002$, $\eta_p^2=0.62$, no effect of rehearsal valence, $F(1,37)<1$, and no interaction $F(1, 37)<1$. Follow-up t-tests revealed that the RP+ memories were rated as significantly easier to recall on test than both the RP- memories $t(39)=4.173$, $p<0.001$, $d=0.36$ and the nRP memories $t(39)=3.335$, $p=0.002$, $d= 0.33$. The two unrehearsed categories were not significantly different in the degree to which they changed in accessibility $t(39)<1$. This follows the previous analysis, in that rehearsal increases accessibility, but gives no support for a RIF effect.

The prediction that RP+ valence would impact on the recall positivity of memories, was examined using a mixed factorial ANOVA (between: rehearsal valence, within: repeated measures RP+, RP-, nRP (different from rehearsal) and revealed a main effect of rehearsal category $F(1,37)=15.763$, $p<0.001$, $\eta_p^2=0.53$ on the change in positivity of the memory recalled, no main effect of rehearsal valence $F(1,37)<1$, and no interaction $F(1,37)<1$. Follow up t-tests revealed that the RP+ memories increased in positivity more than both the RP- $t(39)=4.888$, $p<0.001$, $d=0.34$ and the nRP $t(39)=4.011$, $p<0.001$, $d=0.37$, but that these categories did not differ $t(39)<1$. This suggests that RP+ memories recalled at test were more positive than at generation, independent of their initial valence.

Overall clarity was predicted to increase for RP+ memories, and reduce for RP- memories relative to nRP memories. Three features of memories were used to indicate the clarity of recall, *coherence, emotional intensity* and *vividness*.

The predicted increase in coherence of memories as a result of rehearsal was explored using a mixed factorial ANOVA (between: rehearsal valence, repeated measures RP+, RP-, nRP (different from rehearsal) revealing no significant effect of rehearsal category on the change in memory coherence $F(1,37)=3.617$, $p=0.065$, no effect of rehearsed memory valence $F(1, 37)<1$, and no interaction $F(1,37)<1$. The increase in coherence seen in Study 4a for RP+ memories, was not repeated, although the results indicate that there may have been a marginal effect.

The impact of rehearsal on rated emotional intensity using a mixed factorial ANOVA (between: rehearsal valence, repeated measures RP+, RP-, nRP (different from rehearsal) revealed no main effect of rehearsal category $F(1,38)<1$, no effect of rehearsal valence $F(1,38)<1$, and no interaction $F(1,38)<1$.

Similarly, that the vividness of memories recalled at test would change as a result of rehearsal examined using a mixed factorial ANOVA (between: rehearsal valence, repeated measures RP+, RP-, nRP (different from rehearsal) revealed no main effect on of rehearsal category $F(1,38)=1.617$, $p=0.212$, or rehearsal valence $F(1,38)<1$. and no interaction $F(1,38)=1.104$, $p=0.300$.

Accuracy of memory recall

The mean (SD) accuracy for RP+ was 0.890 (0.05), RP- 0.810 (0.09), and nRP 0.840 (0.06). Recall accuracy was predicted to increase for rehearsed memories, and as with Study one, was predicted to be impacted by the RIF effect. Accuracy of memory recall using the 'jist' criteria was examined using a mixed-factorial ANOVA (between: rehearsal valence, repeated measures RP+, RP-, nRP (different from rehearsal). This indicated no significant effect rehearsal category had no effect on recall accuracy $F(1,37)<1$, no effect of rehearsal valence $F(1, 37)<1$, nor an interaction between these $F(1,37)<1$.

The mean (SD) accuracy for RP+ was 0.810 (0.09), RP- 0.760 (0.06), and nRP 0.750 (0.03).Accuracy of memory recall using the 'strict' criteria were examined using a mixed ANOVA (between: rehearsal valence, repeated measures RP+, RP-, nRP (different from rehearsal). This indicated no significant effect rehearsal category had no effect on recall accuracy $F(1,37)<1$, no effect of rehearsal valence $F(1,37)=3.812$, $p=0.058$, and no interaction between these $F(1,37)<1$. This reveals no evidence for this group that recall accuracy is subject to facilitation or for inhibition.

6.4.2 Comparison between studies 4a and 4b

Initially the two studies within this chapter were designed to run separately, this is because previous research had found baseline differences between the cue-exemplar pairs recalled during the generation phase (e.g. Hauer & Wessel, 2006). In the experimental design for study 4a it was anticipated that an effective procedure could be established to examine the chapter-memory relationship in terms of within chapter relationships. Once established the procedure could be used on a dysphoric sample A comparison between the results of Studies

4a and 4b was carried out to examine baseline ratings of events, and post-rehearsal recall of memories within the RP+, nRP, and RP- catgories.

Baseline ratings for difficulty of recall, positivity, coherence, vividness, and emotional intensity are shown for the two groups in table

Table 6.6: Mean (SD) baseline ratings for study 4a and 4b

	Difficulty of recall	**Positivity**	**Coherence**	**Vividness**	**Emotional Intensity**
Non-Depressed (4a)	3.08 (2.13)	4.42 (2.28)	3.32 (1.84)	4.71 (2.80)	3.31 (2.09)
Dysphoric (4b)	4.73 (2.60)	3.46 (3.41)	2.82 (2.40)	4.57 (2.45)	2.92 (3.28)
t(39)	3.100 p=0.031 d=0.24	1.480 p=0.064	1.054 p=0.081	<1	<1

This table indicates the mean (SD) rated memory features for the memories recalled during the generation phase of Studies 4a and 4b. . Differences between groups were examined using a series of t-tests

The test phase recall performance for the study 4a non-depressed group and the study 4b dysphoric group were then compared, means can be found in table 6.7. Using a mixed factorial ANOVA (between: non-depressed; dysphoric, within: rehearsal category : RP+, RP-, nRP) results indicated no main effect of group F(1,77)=1.002, p=0.137, a main effect of rehearsal category F(1,77)=3.443, p=0.002, η_p^2=0.63 and an interaction between group and rehearsal category F(1,77)=2.111, p=0.014, η_p^2=0.30. These results indicate that the Study 4b dysphoric group do not display a RIF effect, and that there is no indication that within chapter priming has occurred to raise retrievability of memories from the RP- rehearsal category as a result of their similarity to RP+ memories.

Table 6.7: Mean number (SD) of memories by group and rehearsal category

	RP+	**RP-**	**nRP**
Non-Depressed (4a)	3.70 (1.16)	2.15 (1.31)	2.73 (2.76)
Dysphoric (4b)	3.54 (1.76)	2.46 (1.91)	2.27 (2.11)

This table gives the mean number of memories recalled in the test phase of the RIF procedure for the participants from Study 4a and 4b

6.5 Discussion

This study tested the hypothesis that differential rehearsal of episodic autobiographical memories from life-story chapters, can lead to retrieval-induced forgetting of oppositely-valenced within-chapter episodic memories. This question is relevant to the formation of chapters, in that memories become, over time, linked to chapters, and illustrative of the chapter content, but also that ultimately this could lead to chapters which exist as positive, or negative schematic representations.

The results of Studies 4a and 4b can be examined independently, but also used to give a comparison in the performance of the dysphoric and non-depressed groups as the protocols were identical. For the non-depressed group there was a significant RIF effect for memories within the chapter categories, and this impacted on the ability to recall oppositely valenced events compared to the rehearsed category. There was also a potential RIF effect for the accuracy at which memories were recalled, in that when applying the strict criteria (but not jist criteria) for memory features, RP- memories were recalled less accurately than nRP memories.

Secondary analysis was carried out to examine the impact of rehearsal and competitive inhibition on memory features of subjective difficulty in accessing memories, their positivity, and clarity ratings for coherence, emotional intensity and vividness. There were effects apparent in terms of changes over the study procedure (from initial production to test) of memory features which are likely to be a result of rehearsal but other changes which appeared to be the result of the valence of the RP+ memories. For example, an increase in the reported accessibility of memories following rehearsal, was independent of the RIF, and simply that the facilitation of access for non-rehearsed memories. The reported 'difficulty of recall' was for memories which were recalled at test, and therefore did not provide information on the memories which were not recalled which, logically, were harder to recall. No increase in positivity as a result of rehearsing positive memories or decrease in positivity as a result of rehearsing negative memories was seen, while this would have been predicted by studies which show a short-term mood effect of memory rehearsal and that mood congruence impacts on judgements of positivity (Barry, Naus, & Rehm, 2004; Bradley, Mogg, & Williams, 1995), it seems that the ratings of valence were either not influenced by mood, or that mood was not influenced by the rehearsal procedure.

Changes to the clarity of memories as a result of facilitation and inhibition was examined using three components of a clarity measure: coherence, emotional intensity, and vividness. Clarity of recall provides both a further measure of accessibility (Ritchie, *et al*, 2006), and is strongly correlated with memory relevance (Ritchie, Skowronski, Cadogan, & Sedikides, 2014), and so a reduction in the relative clarity of RP- memories, even if accessible, could impact on the construction of chapter-based information. Rehearsal increased coherence of recalled RP+ memories, and negative memories overall. This second result is suggestive of the differential role of rehearsal for negative memories, and was observed for all categories of memory, perhaps reflecting that in non-depressed groups negative memories represent more important information, and could raise the levels of attention allocated to tasks such as memory recall (Rasmusson & Berntsen, 2009). The reported vividness of RP+ memories of both valences remained constant compared to non-rehearsed categories which reduced in rated vividness, but this was not accompanied by a change in the emotional intensity of memories. This raises a question of whether the reduced rated vividness was a relative factor, whereby the rated vividness was comparative to other memories and the absolute score is not a factor, or if the rehearsal of RP+ memories decreases vividness of RP- and NRP memories overall.

The results from the second study in this chapter, examining the presence of RIF in the dysphoric group contrasted to those of the non-depressed group, first and foremost in that while there was a facilitation effect on the rehearsed (RP+) memories, no evidence was found for this having an inhibitory effect on same chapter memories of the opposite valence. This facilitation effect was seen in both the number of memories for each category recalled at test, for the rated difficulty of recall, and the increase in positivity (RP+ memories increased in positivity on test independent of valence). Unlike the non-depressed group, there was no overall change in coherence, emotional intensity, nor vividness at test. In addition, for the dysphoric group there appeared to be no effect of rehearsal category (RP+, RP-, nRP), or cued valence (positive or negative) of rehearsed memories on the accuracy of memory details and attribution of meaning to the events (who, what, where, when, cause, consequence, and personal meaning).

Returning to the factors which impact on the recall of a particular chapter-cued memory, the first is its baseline memorability or storage strength, which were controlled for in the matched design, thereby avoiding one of the key problems with previous RIF studies.

In this study the short-term effect of chapter-cued memory rehearsal was investigated, however rehearsal did involve a reasoning process asking participants to evaluate the cause, consequence and personal meaning of events. Results are suggestive of a process which could create homogeneity in chapter recall for affectively congruent memories in the short term, by inhibition of within chapter oppositely valenced autobiographical memories, but not out-with chapter memories, but also in that the accuracy of within-chapter memories could reduce from strict details to more general (jist) information.

Examining these results in terms of previous studies looking at the evidence for a RIF effect for autobiographical memory recall, we found similar results, for the non-depressed group, as Barnier and colleagues (2004) with a consistent RIF effect. Hauer and Wessel (2006) found evidence for an autobiographical memory RIF effect when using both positive and negative category cues (Study one), but this appeared to occur only for the negative category. In a second study the authors changed their categories, using traits and situations to cue negative memories, and again found a consistent RIF effect, although some category differences which could indicate underlying differences in the degree to which each episodic memory is an appropriate exemplar of the category.

This highlights the role of what can be considered a 'category' of memory appropriate for cuing. The current study uses life-story chapters as categories for recall, and found a RIF effect for both negative and positively valence episodic memories, and an opposite-valence inhibition effect for within chapter memories. This adds to the research findings that chapters act to both provide hierarchical structure in the autobiographical memory base, and act to prime episodic recall (Sections 1.1.3 and 1.3.1), and therefore represent a set of stably linked representations. Further to this it was proposed that the activity of chapter formation and perpetuation through a process of rehearsal of a sub-set of events from within a chapter could result in the inhibition, and ultimate down-grading of other events. In particular the RIF effect which could be influential in allowing memories which are highly representative of chapters to remain detailed, while other memories, which may be less rehearsed to undergo modification of detail, and drift. In this study the changes concerned details of events, but this could bring about a secondary affective impact, in that changing details can allow for changes in meaning and as a result positivity.

This study examined this in terms of valenced memories and for the non-depressed group this mechanism could be involved, however for the dysphoric group, while there were

the expected facilitatory effects, there was no evidence of RIF. In the only autobiographical memory RIF study which focussed on dysphoria Harris and Colleagues' (2010b) results indicated that for the dysphoric group and for controls, a RIF effect was only seen for categories of autobiographical memory which were associated with 'work' and not for 'home', which was suggestive of factors such as personal relevance or emotional importance which over-ride the inhibitory effects of retrieval. The self-relevance of memories in this study was not examined, with the implicit assumption that the life-story chapters were similar in personal relevance and thus this would be reflected in their content chapters. This may have affected the comparability of the groups with the rehearsal of autobiographical memories being overall less 'insulated' as a result of personal impact, and could be examined in future work by introducing and controlling for the 'centrality' ratings used in studies 1 and 3. That saying, the possible 'insulation' effect of very personally relevant 'home' category material seemed to be across both dysphoric and control groups in the Harris study, giving no indication that the groups differed in propensity to undergo RIF.

The absence of RIF in the dysphoric group impacts on the prediction that inhibitory mechanisms are at work during chapter formation and maintenance. Importantly, the absence of a RIF effect in the dysphoric group suggests that this is not the mechanism by which chapters are constructed, as an absence of inhibition cuing chapter formation would be expected to be represented at the chapter-level. Two possible explanations for the absence of RIF in this group are proposed, the first is that due to cognitive deficits found in depressed groups the inhibitory mechanism underlying RIF does not function. This is supported by research which shows impaired inhibition for depressive disorders (Moritz, Birkner, Kloss, Jahn, Hand, *et al*, 2002), but is countered by the results of Harris and colleagues (2010b). It may also be that the impact of horizontal priming, which would act to increase the activation of memory representations more closely linked to that which are being rehearsed, and which in practice is thought to counteract, or be the reason why inhibitory mechanisms are necessary, is at play (Mace & Clevinger, 2013). While it would be predicted that within-chapter priming would raise the availability of all within-chapter memories for both groups, and for the dysphoric participants a negative attentional bias might be predicted to show a differential effect, i.e that negative RP+ would be more accessible after rehearsal, and that negative RP- would be subject to both within-chapter priming and a negative recall bias resulting in a significantly different outcome for positive and negative RP+_rehearsal. The

three factors which may be at work (negative bias, horizontal priming, and RIF) on the group are not possible to parse within the result for study 4b.

A further proposal for the group difference is that the absence of RIF was due to cueing-chapters not being structured in the same way for the dysphoric group, the two chapters used to categorise memories were not chosen by participants, but reflect commonly used chapter categories used by this age group (in Studies one and three). The second suggestion is that the categories used to cue episodic memories are not valid and do not reflect the underlying category-exemplar representations of the participants. The impact of this use could, in those participants who did not have chapters for school and university, have resulted in memories being categorised incorrectly, and therefore the inferred associative links between category-exemplars would be weaker. While the presence of a RIF effect in the non-depressed group indicates that these links are valid, the absence of RIF in the dysphoric group could be a result of weaker links, therefore exemplar memories would be less competitive and result in less inhibition. People with depression are more likely to have experienced disrupted life histories (Barnhofer, *et al*, 2014; Ross & Mirowksi, 1999), and the culturally established period of school and university attendance may be less stable for this group.

The aim of this study was to examine the potential role of retrieval induced forgetting in the formation of life-story chapters. The process of life-period reasoning involves the retrieval of episodic memories on a particular life-theme, or from a particular life-period and allowing these to be linked and evaluated to create higher-order chapters (Thomsen, 2015). This study required participants to undergo an analogous process, the recall of selected episodic events, and a process of reasoning i.e. thinking about the cause consequence, and personal meaning of the events. Under non-experimental conditions, and subject to retrieval-induced forgetting inhibitory processes, chapters would be formed with enhanced homogeneity as single events are incorporated in the higher-order chapter structure while simultaneously inhibiting events which are categorically linked, but not cued. Thus episodic memories with higher levels of activation serve to inhibit those with lower activation levels. The problem for people experiencing depression is that chapter formation may result from accumulation of negative information and events, and further, a negative evaluation of this material. Thus it was hypothesised that dysphoric groups would experience a 'lock-out' of positive episodic memories, as a by-product of the reasoning process, however no evidence

was found for this inhibitory process. The results of this study only partially support this theory, there is good evidence that retrieval-induced forgetting does occur during the chapter-cued recall of episodic memories for non-depressed groups, suggesting this as a potential mechanism for chapter formation. However, there was no evidence for retrieval-induced forgetting occurring for the dysphoric group, and thus the potential for inhibitory 'lock-out' of positive events during chapter formation is not supported.

There are also a number of issues which reduce the applicability of these results to real-life situations. The first is that while the exploration intended to examine a process which could occur during the formation of chapters, the chapters used were already formed and as cueing revealed, already had established constituent memories. This means that this study is interfering with pre-existing structures, and indications of retrieval-induced forgetting may be more likely to be involved in the maintenance of chapter-structures, than the initial formation. The temporal stability of life-story chapters has not been examined in the existing literature, and the differential role of inhibition in the maintenance, or fluidity of chapter evaluations, and chapter content would shine some light on the role of rehearsal on short-term and long-term learning process. For example, if changes to chapter content and evaluation as predicated by Brewin (2006) could be brought about by selective rehearsal during therapy. Despite these aspects this study does provide evidence for the role of chapters in categorising episodic memories, and the validity of a shared culturally defined chapters such as 'life at high school' and 'life at university' while the content of these chapters may be unique and eclectic.

In summary, Chapter 4 represents two studies which show a differential effect of a RIF procedure on dysphoric and non-dysphoric groups. This RIF effect was seen only within the measure of availability of autobiographical memories for non-depressed participatns, and there is some indication that the accuracy of memory recall is also impacted by differential rehearsal. The dysphoric group did not appear to be subject to RIF, but the reason behind this absence of inhibition is not clear.

Chapter 7 Discussion

7.1 The role of life-story and life-story chapters in recall

Life-story chapters are a neglected, and ill-defined aspect of autobiographical memory and narrative, and this thesis has gone some way to define their role in the structure of autobiographical narratives, and in the facilitation of access to cognitive representations of autobiographical events. Second to this it highlighted the similarities and differences between the life-stories, chapter structures and memory recall and future-imagining for depressed and non-depressed groups.

An overview of study results can be found in Table 7.1. The aim of Study one was to establish a precedence for the use of chapter-level information in memory recall. In this study the use of a participant defined progression from life-story narratives through chapters, to chapter-cued events attempted to mimic the theoretical structure of the autobiographical self-memory system, and in essence the first study asked whether it is necessary to consider the influence of life-story narrative context on episodic recall when using chapter cues, but also included an analysis of the life-stories of participants to assess these for depresso-typic features. The results of this study indicated that, contrary to research which shows that verbal narratives of dysphoric groups have features such as temporal breakdown, prosodic slowing, negative bias, and ruminative self-focus (Section 2.2.1), the MDD group showed no indication of this, and on the contrary the narratives of the non-depressed control group were more self-focussed. A tentative explanation for this could have been that the depressed group were using a more distanced perspective on recall of past events as indicated by a significant difference in the episodic memory recall observer perspective of the MDD group, and that this self-focus reflected ruminative characteristics. For both groups negatively incongruent memories were rated with greater clarity, and were spoken about more than positively incongruent and congruent memories, but no difference was seen in the clarity, centrality, and rehearsal of memories for the MDD and control groups. Giving little support to the prediction of temporal monotony and affective congruence of life-stories either in narrative, or in terms of affective incongruence of episodic recall, this study did raise some interesting questions around the life-story narratives of people with depression. However, improvements to the experimental protocol were required to increase comparability of life-story narrative accounts, and in standardization of the chapter-memory recall process.

Table 7.1: Overview of Thesis results

Study one *examined three levels of life-story chapters, comparing 14 participants with major depressive disorder (MDD) to 11 never-depressed controls. Participants produced verbal life-story narratives, sub-sectioned these narratives in to life-story chapters, and these chapters were used to cue episodic memories. These episodic memories were then categorised as congruent or incongruent (either positively or negatively). Analysis explored the group differences in life-story narratives, chapters, and episodic recall, and the impact on recall characteristics of chaper-memory incongruence.*

It was hypothesised that

- Incongruence would impact on memory recall, and memory characteristics of clarity, centrality, and difficulty of access.
- That the MDD group would show a negative bias and reduced accessibility to incongruent events compared to controls.
- The chapters reported by the MDD group would reveal evidence of temporal breakdown in terms of sequence of production, number produced and degree of overlap.
- The MDD group would show evidence for a depresso-typic narrative structure and content, in terms of self-focus and negative bias in their life-story narratives, for word count, and proportions of positive words, negative words, self-referencing words, and social words.

It was found that

- Overall incongruence had no effect on clarity, centrality and difficult of access, however negatively incongruent memories were recalled with greater clarity compared to positive, and spoken about more than positively incongruent memories.
- For the MDD group there was no negative bias for either chapters or episodic memories.
- No evidence was found for reduced accessibility, or a difference in memory features for the MDD group compared to controls for incongruent memories.
- There was also no temporal breakdown in life-story narratives for the MDD group. Within the life-story narratives there was no difference between groups in the number of words used, and no difference in proportion of positive, or social words used, but controls used a greater proportion of negative and self-referencing words compared to the MDD group.

Study two *examined the transcripts of the life-story narratives of 15 dysphoric and 15 non-dysphoric participants. Each transcript was coded according to categories of components: chapters (lifetime periods, extended events, and mini-narratives), specific memories, categorical memories (general events), facts, inferences about personality, life-lessons, evaluations (positive), evaluations (negative), reflections, metacommunication and chapters for other people. It also compared the narratives for negative bias, rumination and overgeneral memory which would be associated with the dysphoric status.*

It was hypothesised that:

- Chapters are a primary feature of life-story narratives, and that they are not reciprocal to specific memories, which would be reflecting in longer narratives by more specific memories, fewer categoric memories, and fewer chapters.
- The dysphoric group would have different chapter representations as a result of reduced coherence of life-story chapters resulting in fewer chapters overall, longer chapters, and more overlapping chapters compared to controls.
- As a result of reduced autobiographical, or life-period, reasoning and past-present distancing, the dysphoric group, compared to the control group, would have fewer life-lessons, self-referencing facts, and reflections within their life-story narratives.
- The dysphoric group would also have life-stories with depresso-typic features reflecting overgenerality, in terms of fewer specific events, more general events, and evidence of rumination, indicated by higher levels of negative evaluations, and fewer positive evaluations compared to controls
- There would also be evidence for a depresso-typic narrative structure and content differences, in terms of self-focus and negative bias in their life-story narratives, and in proportions of positive words; negative words; self-referencing words, and social words.

It was found that:

- Chapters were a common feature of narratives, and coding of chapters in narrative accounts revealed a close convergence with participants when they defined their own chapters,
- There was no evidence was found for a reciprocal role between specific memories and chapters, indicating that chapters are not a method of collectively verbalising a number of specific events, but are an independent representational structure in autobiographical memory
- No differences were seen between the groups in the chapter-level structuring of the life-story narratives
- There was no evidence was found for reduced reasoning processes
- There was no evidence for overgenerality, but a relatively higher proportion of negative evaluations for the dysphoric group, with no fewer positive evaluations
- Group differences were seen in proportions of positive words, negative words, but not in self-reference and social word use.

Study three *compared the impact of affective incongruence on the recall characteristics of episodic memories for 40 dysphoric and 40 non-dysphoric participants. Past and future chapters were generated by participants, used to cue episodic events (memories and imagined future events), and these events were rated for characteristics of clarity, difficulty of access, positivity, and centrality. The events were then categorised in to congruence categories, and compared across groups*

***It was hypothesised that*:**

- Incongruence would impact on accessibility, in terms of overall ability to access, subjective difficulty of access, clarity, and centrality.
- The dysphoric group would show a negative bias in terms of recall and future imagining of chapters, and events.
- Dysphoric groups access event-specific knowledge in a way that favours material congruent with contextual chapters. This would be indicated by an overall reduction in affective variability of events, (with variability represented by the difference between contextual positivity and event positivity); increased difficulty in accessing incongruent events or reduction in the clarity of events; and a reduction in the centrality of incongruent events. In addition to this it was predicted that the dysphoric group would show a bias towards the access of negatively incongruent, compared to positively incongruent events.

It was found that*:*

- Incongruent events were rated as easier to access, had greater clarity, but were not more central overall.
- The dysphoric groups showed a negative bias in chapter and memory and future imagined event production.
- There was no reduction in overall affective variability between events and chapters in the dysphoric group, however congruent events were more common for the dysphoric group, and more common overall for future chapters. The dysphoric group also rated incongruent events as having less clarity compared to controls
- On comparison of positive and negative incongruence categories, positively incongruent events were easier to access overall, but an interaction between group and congruence indicated that for the dysphoric group access to positively incongruent events is the same as for negatively incongruent events, while for the controls access to negatively incongruent events is reduced.
- In addition the negatively incongruent events of the dysphoric group were rated as having greater clarity, and being more central, than their positively incongruent events, while the control group reported the opposite effect for clarity, and no difference between categories for centrality.

Study four *used a protocol for retrieval induced forgetting in two separate studies, the first for 40 non-depressed participants, and the second for 40 dysphoric participants. 20 episodic memories, 10 positive, 10 negative, were cued for the chapters 'school' and 'university'. Each episodic memory was rated for positivity, recall accessibility, coherence, vividness, and emotional intensity. As well as this details of who, what, where, and when, along with the cause, consequence, and personal meaning of the event were used to assess accuracy (jist and strict) on recall, and also the allow rehearsal to mimic the autobiographical reasoning process.*
Participants selectively rehearsed of five of these 20 events (RP+), and the proportion of within chapter (RP-) and out-with chapter (nRP) memories compared, in addition, those memories retrieved during a subsequent free recall were compared for changes to memory characteristics.

***It was hypothesised that*:**

- Recall practice of autobiographical memories from particular life-chapters (school and university) will cause inhibition of oppositely-valenced memories from these chapters i.e. a RIF effect, in terms of free recall,
- This effect will also be see in the memory characteristics of recalled memories in terms of changes in memory features of RP- memories: in terms of an increase reported difficulty in accessing memories; a rehearsal valence linked change in positivity (negative rehearsal results in more negative recall *vice versa*); decreases in memory clarity (vividness, coherence, and intensity), and reduced accuracy of memory details (who was present during the event; what occurred during the event; where the event occurred, and when it was, along with the attributed cause of the event; consequence of the event, and its personal significance)

It was found that*:*

- For the non-depressed group, rehearsed memories (RP+) were recalled during the free recall phase more than non-rehearsed memories, and within chapter memories (RP-) were recalled less than non-chapter memories (nRP), indicating RIF.
- RP+ memories increased in coherence, compared to the non-rehearsed memories.
- There was also an increase in the recall of nRP and RP- positive memories following negative RP+ recall (which appeared to be unrelated to RIF)
- While there was an overall decrease in the rated vividness of unrehearsed memories (RP- and nRP), this appeared to be unrelated to RIF.
- However within chapter non-rehearsed memories (RP-) were recalled with reduced accuracy in terms of the strict detail criteria compared to out-with chapter non-rehearsed memories
- For the dysphoric group there was no RIF effect, a facilitation effect of rehearsal was seen on proportion of memories recalled, and rated difficulty of recall. All RP+ memories increased in positivity from initial production to the free recall phase, but there was no change in recall accuracy.

Study two focussed on one aspect of Study one, that being the nature of life-stories produced by depressed and non-depressed groups. It returned to Thomsen's (2009) proposal that life-story narratives are representative of the components of the self-memory system and, further to this, the role of chapters within this structure, comparing groups to test the prediction that over-generality and dissimilarities in the structure and coherence of depresso-typic narratives may be the result of chapter level differences. Using an alternative and more in-depth method of component analysis of narratives compared to Study one there were few differences between the groups' transcripts, however the use of the LIWC procedure did find evidence of a significant negative bias in the narratives for the dysphoric group. The two significant differences between the narratives found using the component analysis were that the dysphoric group made more negative evaluations, and that they also used a greater number of metacommunicative statements. While this provided evidence of depression characteristics in negative evaluative speech construction, but no support for the prediction that narrative coherence breakdown occurred at a chapter-level for the dysphoric group.

Study three improved and refined the procedure for the chapter-based cuing method from Study one, by limiting the age of participants and recruiting from a pool of undergraduate and post-graduate students, to examine the impact of chapter-incongruence, or dissonance on the recall of episodic memories and future-imagined events in both dysphoric and non-dysphoric groups. This study asked specifically if the structure of life-story chapters impedes access to event-specific information which is incongruent, and that which would be useful in therapeutic interventions i.e. positively incongruent material, finding evidence for both of these effects in that fewer incongruent events are recalled by dysphoric groups and that positively incongruent events are recalled with reduced clarity compared to controls, while the control group experienced the opposite effect i.e. had reduced access to negatively incongruent events. Finally, drawing on the results of the first three studies, Study four examined the potential role of rehearsal in the formation and perpetuation of life-story chapters by retrieval-induced forgetting of within chapter episodic, memories for dysphoric and non-dysphoric groups and found a RIF effect for within-chapter autobiographical memories for the control group in terms of both spontaneous recall, and in recall accuracy, but an absence of RIF for the dysphoric group.

7.1.1 Chapters

The importance of chapter representations has been shown by their cognitive function in terms of their cataloguing effect on episodic events (Brown, *et al*¸1986; Friedman, 2004; Shum, 1998), but also reflected in everyday interactions where recollective experiences rely on personal semantics and life-story chapters which are frequently used to contextualise and create temporal reference points (Brown, Sheval, & Rips, 1986; Friedman, 2004; Shum, 1998). Study two revealed that chapters are the most frequent structural component of life-story narratives (see also: Mackavey, Malley, & Stewart, 1991; Thomsen, 2009). This thesis provides evidence for their primary role in enabling the organisation, contextualisation and communication of autobiographical events (Thomsen 2009; 2015). In the introduction a number of suggestions for why life-story chapters were neglected within the memory research were made (Section 1.3), these include difficulties in establishing a clear definition for them, and a lack of an established and systematic method of chapter elucidation. What is clear from the results of this thesis is that while chapters may vary in terms of time-span, thematic focus, and content, they are ubiquitous, and central to autobiographical information storage.

Chapters are a meaningful aspect of the perception of autobiographical events, participants are able to clearly identify their own chapters, and these are well-matched to those which are identified by researchers examining the life-story accounts, with an 87% convergence being seen in Study two. Thematic analysis of chapters (Appendix 10) indicates that they may align with the cultural life script (Rubin, *et al,* 2009), although life-script events are conceptualised as single (episodic) events, whereas chapters are considered in terms of a longer term structure. An indication of the degree to which chapter themes align to life-script events, suggests that chapter formation may be influenced by learnt cultural understandings rather than summations of actual experiences. Adding to Thomsen's (2016) suggestion that they are formed from life-period reasoning processes, with a role of cultural knowledge. Future research might explore the life-story chapter script, moving the focus away from specific events, and on to anticipated phases of life for a 'typical' person within a cultural context.

In Study one it was suggested that chapters are defined with a degree of flexibility, with participants appearing to be providing a similar number of chapters independent of participant age, or length of life-story, this is suggestive of a degree of temporal instability,

but it may be that this was due to the limitations of the task in hand rather than a free conceptualisation of chapters from their life. In Study two this was addressed to some degree by limiting the age of participants to the 18-25 age group which still resulted in a range of lengths and themes of chapters.

Building on this evidence for autobiographical organisation, the current thesis has explored the role of chapters as schema for self-knowledge, and as a result their impact on episodic memory recall. This questioned whether chapters exist as contextual schematic information, and as such are influential in the recall of episodic memory. Schema are a concept used to describe cognitive frameworks for understanding experiences, they serve to 'fill-in' absent information about events using knowledge of typicality, once constructed a schema will endow rules of expectation and generalisation for schema-linked information (Bartlett, 1932), schema have been shown to cause recall and recognition biases (Section 1.3.5). If, as proposed, chapters exist as schematic representations and are used to cue a memory, this was predicted to influence recall in several ways, for example, the typicality and relevance to the chapter of the memory is likely to improve its chances of retrieval, so a chapter about school is likely to cue a memory of a classroom-based activity. If a chapter is perceived as an unhappy period in life then retrieval of a negative memory for this time is more likely for the same reasons, first that there may be more memories which are congruent with this negativity, but secondly, according to dissonance theory, positive event memories may be atypical, and therefore create a dissonance with the chapter content, and be downgraded. Finally the atypicality of the event must be taken in to account as this is likely to make the event more memorable overall, being unusual and taking more cognitive effort to integrate. This differentiates the role of expectation on encoding, and that of recall likelihood. Dissonance theory proposes that automatic cognitive processes act to bring consistency between schema and recalled information (Festinger, 1957). This difference between atypicality enhancing encoding, and atypicality creating dissonance would have contrasting effects and would be difficult to control for within the experimental design used in this thesis. Some indication does come from the absence of a difference in the retrievability of incongruent events between groups in Studies 1 and 3, but the potential impact of rehearsal confounds the effect of incongruence on clarity. The final study looked at the impact of short-term rehearsal of chapter-based memories in creating and maintaining congruence within chapters, with the idea that if this occurred in the short-term could it have longer term impacts on chapter structures. In the non-depressed control group the RIF effect

was observed at the level of recall, with oppositely valenced within-chapter memories being inhibited by short-term rehearsal, giving a promising indication of how chapter construction and the maintenance of affective congruence could occur, as in the longer term, in non-depressed groups, chapters would form with an overall valence which was either positive or negative. In the dysphoric sample, while experiencing facilitation of episodic recall, results showed no within-chapter RIF effect, indicating that either chapter formation and maintenance is independent of these effects, or that chapters tend towards a less culturally prescribed categorisation i.e. different from the school and university chapters chosen by the researcher, which was not indicated by the chapter themes produced between all depressed and dysphoric participants during the completion of this thesis.

It can be postulated that there are broadly two ways in which chapters are created and maintained, the first being that they are an *emergent* feature of experience and subsequent unbiased memory recall, and that experiences which occur during the same time-period, or are connected thematically for example by being linked to activities or relationships, are categorised under the same chapter with autobiographical reasoning processes create links between these events, and repeated co-rehearsal results within-chapter horizontal activation. This constructive process is supported by evidence of a within chapter reminiscence bump for episodic memory recall (Thomsen, *et al*¸ 2011), although this study only examined highly significant event memories, it indicates that chapter formation is punctuated by experiencing significant life-events. The alternative is that life-script and cultural understandings structure experience, and that the recall of episodic memories is guided by relevance to the abstracted beliefs about the chapter, and that chapters are therefore *causative* of recall by acting as autobiographical 'files' of memories. It may also be the case that chapters and episodic memories are created and maintained by a combination of these processes. On balance this thesis provides some support for the emergent role of autobiographical recall, in that overall episodic memories matched the valence of their chapter, but more strongly for the causative explanation, in that there was significant overlap for participants in Studies one, two, and three who defined culturally common chapters of school and university, that incongruence raised clarity i.e. events which were affectively atypical to their schematic chapter tended to be more available and recalled with greater clarity. Finally, that future events are subject to the same incongruence effects as episodic memories indicates that life-scripts which are influential on future life expectations contain a chapter structure which influences future imagined episodic events in a way analogous to that of the autobiographical memory chapter

schema. However consideration should be given to dissonance reduction processes which are likely to reduce schema incongruence over time, as seen in the study by Koppel and Berntsen (2014), so one prediction from these results is that expectation overrides experience over time for life-script events, particularly for dysphoric groups who may rely more heavily on abstracted information.

7.1.2 Impact of depression on memory recall

Studies one, two, and four explored the relationship between the recall of autobiographical memories cued by life story chapters from narratives produced by depressed and non-depressed groups, and the role of affective incongruence in recall, a concept first introduced by Beike and Landoll (2001). Episodic memories recalled from the chapters-cues were examined for clarity, valence, centrality to self, perspective, and ease of access. In Study one the depressed group recalled memories overall with less clarity then controls; found recall more difficult, and in addition this group were more likely to recall events from an observer perspective supporting both the prediction that this group have an over-general bias in autobiographical recall, and the idea that depressed individuals may habitually avoid cognitive re-living of events through distancing functions. While this could be predicted for depressed groups (Kuyken & Moulds, 2009), the impact of affective incongruence was only revealed in that negatively incongruent events are recalled with greater clarity for both groups. In Study three the relationship, in terms of affective incongruence between life-story chapters and their component episodic memories, was further examined. This experimental study tested the impact of life-story chapters on specific event recall and future imagining in dysphoric (n= 40) and non-dysphoric (n=40) groups. Contrary to the findings of Study one, but aligning with the LIWC analysis in Study two, both recalled and imagined events, as well as the life-story chapters of the dysphoric group were rated as more negative than those of the control group supporting the expected pattern of a negative bias in dysphoric groups (Boulard, 2015). When chapter-cued events were classified as either congruent or incongruent with the affective rating for the chapter (positive or negative), an absence of affective variation was predicted for the dysphoric group compared to controls, and was seen in the proportions of incongruent vs. congruent events (Table 5.1), but when examined as a potential reduction in the rated difference between rated positivity of chapters and events for both past and future-imagined chapters this was not the case, the overall within-chapter variability in affective ratings was not different, indicating that the pattern of affective

variability between chapters and events was the same for dysphoric and control groups. When examined for accessibility (difficulty of recall), clarity, and centrality to self, it was found that whilst the two groups generated incongruent events with the same subjective ease, the mean rated clarity of incongruent events was reduced for the dysphoric group. This was a result of reduced clarity of positively incongruent events for the dysphoric group, when compared to the negatively incongruent events. These results suggest that people with depression show, in addition to experiencing a negative bias for memories, future events and life-story chapters, a propensity to represent incongruent events as more abstract rather than concrete cognitions, giving reduced access to positively incongruent 'exceptions' to negative chapters, while non-depressed controls appear to have reduced access to negatively incongruent events. This may reflect the use of dissonance reduction processes which re-enforcing the depressive cycle of 'global' negative thinking, and potentially impacting on the effectiveness of therapeutic interventions.

Drawing on evidence for the reduced proportions of incongruent events produced by the dysphoric group in Study three, the fourth study in the thesis manipulated the rehearsal of memories from life-story chapters for high school and university for dysphoric and control participants, in an attempt to establish the role of retrieval-induced forgetting in the formation of chapters, and the maintenance of intra-chapter affective homogeneity. For non-depressed controls the rehearsal of either positive or negative episodic memories from within a chapter resulted in the inhibition of oppositely valenced within-chapter memories, but not oppositely valenced memories from other chapters, a retrieval-induced forgetting (RIF) effect. This presented a possible mechanism by which autobiographical-, or life chapter-, reasoning could create evaluative judgements for chapter content, such as the belief that a chapter was broadly positive or negative. The second RIF study within this chapter explored this effect for dysphoric participants, in order to establish if this reasoning effect could explain the formation of negative chapters, with the concurrent reduced access to positively incongruent material seen in Study three. However the anticipated RIF effect was not present in the dysphoric sample, leading to the conclusion that it is unlikely to be the driving mechanism in the creation and maintenance of negative chapters in depressive disorders.

Study three found that the dysphoric group had reduced access to incongruent events, both in terms of the overall number of incongruent events recalled, and the rated clarity of events compared to control groups. In Study four the role of short-term rehearsal was

explored to test the hypothesis that RIF could be a factor in this difference, and Study 4b indicated that RIF did not occur for the dysphoric group. There are a number of suggestions as why these results are compatible, the first being that RIF does not have a long-term impact on chapter-event affective congruence, this question could be resolved by taking a more nuanced approach to the chapter-memory links for participants. For example, while in Study one it was possible to confirm the affective incongruence of chapters and events, in Study four the valence of the RP+ memories was contrived by the rehearsal of positive or negative events, and the unrehearsed oppositely valenced events were manipulated to be incongruent.

7.1.3 Impact of depression on life-story narratives

An examination of the life-story narrative accounts of the Study one participants, of which there are 25 (current or former major depressive disorder, n=14, never depressed control n=11) using LIWC software (Tausczik & Pennebaker, 2010) revealed that depressed participants used fewer negative and self-referencing words, which is suggestive of a 'distancing' effect for depressed groups as a result of the demand characteristics of the task. However, the narratives formed a heterogenous set of transcripts which varied in terms of length, focus, and detail. Study two carried out the same analysis on the life-stories of 15 dysphoric and 15 control participants aged between 18-25, and found different results, in that the dysphoric group used fewer positive and more negative words within their narratives, and were more likely than controls to make negative evaluations. The inconsistency in terms of these life-story accounts made it difficult to draw any strong conclusions about the impact of depressive status on structure and content. The second study refined the approach of Study one by repeating the LIWC analysis and examining group differences in the structure of life-story narratives, specifically for narrative structure in terms of chapters, and other narrative features predicted by the self-memory system this is likely to provide stronger evidence for the impact of depression on narrative accounts. The component analysis examined included a number of narrative features representative of the autobiographical self-memory system; features of autobiographical reasoning, and life-story chapters the latter of which were defined by participants and by researchers through narrative analysis. Overall Study two points to a negative bias in dysphoric narratives, but no evidence for a breakdown in structural coherence at a chapter level, nor that representations of the self-memory system such as episodic memories differ between groups. What is apparent from these results is that the characteristic differences outlined in Section 2.2.1 are absent, or not detected by the

methods used to analyse these transcripts. One of the best evidenced characteristics is that of narrative coherence, which in depression is reduced in verbal accounts, in Study two this feature was examined in terms of chapter progression and closure, but also in terms of past-present distancing, reflections, and evaluations.

7.1.4 What do we mean when we talk about coherence?

Coherence is a schematic feature of narratives which has been linked to mental health and well-being is structural coherence (Reese, *et al*, 2011). It is thought that when personal episodes are processed in to coherent narratives they become stable, are no longer cognitively and emotionally demanding and thus lend stability to the sense of self with concurrent well-being (Waters and Fivush, 2015). The nature of narrative coherence has been examined in terms of orientation, in that the reader is provided with appropriate contextual information, an internal structure that follows a culturally appropriate sequence, an affect index which indicates the importance of the events recounted, and integration whereby events are related back to a broader sense of selfhood, and life-story (Baerger & McAdams, 1999), this approach has been used to assess the links between mental well-being and coherence, and also changes in coherence of narratives over the course of therapy. McAdams later argued that coherence has a fundamentally cultural context as it is measured according to causal explanations; being reflective of a range of experiences, and finally that it provides a discourse reflecting social value (McAdams, 2006b). But the concept of narrative coherence varies amongst theorists and researchers, in some cases meaning the way in which a particular story or explanation will consistently track through a narrative for example, Habermas (2008) who used a measure of temporal order of events and past-present evaluations to measure coherence of life-stories from depressed and non-depressed participants, while his *Global Coherence* coding method (Habermas & Diel, 2005) focussed on temporal orientation, causal coherence, and thematic coherence (plausible transitions). This is clearly different from Baerger and McAdam's (1999) definition of coherence leaving questions about its role, first, whether narrative coherence is a consistent characteristic of depressive status (in which case chapter-level coherence as examined in Study two is not a factor); if coherence, as it is measured in a variety of ways, is too abstract a concept to be a single phenomenon, for example, does the coherence of client speech on entering therapy, which involves interactive explanations of a series of events or experiences, link to the coherence of life-story narratives, which are linked to cultural scripts and schemas? In order

to understand why this might be the case it is worth examining not only our interpretation of coherence, but also to examine a little closer the nature of life-story chapters.

7.1.5 Role of chapters in therapeutic interventions

As with the life-story narratives, there did not appear to be strong evidence for a breakdown in chapter structure for Studies one to three, while Studies three and four did provide an indication that perhaps for dysphoric groups chapters are structured differently (although this is only one possible explanation for the absence of a RIF effect). Given that chapters are potentially a stable structure in the life-stories of people with depression, and are, at least to some extent, influential in the access of episodic events from within the chapter we can consider if there is a place for them within Brewin's (2006) cross-therapy model defining the influence of autobiographical recall in therapeutic interventions. Key to this theory is that therapy aids the location and rehearsal of positive outcome and events which allow a person to maintain a more realistic and varied cognitive representation of autobiographical knowledge, and in turn for this to impact positively on expectations of future outcomes. In this thesis these positive outcomes are the positively incongruent events of Studies 1, 3 and 4, those episodic events which are more positive than their contextual chapter. The cognitive availability of these events for dysphoric groups was compared to that of non-depressed controls in on a number of measures, overall availability, and memory characteristics such as clarity and centrality.

Theoretically the development of a mix of congruent and incongruent events within autobiographical memory provides a structure for people to engage in realistic thinking, which benefits mental health (Beck, 1979). Therapeutic targets may be the positively incongruent events which allow a favourable evaluation of negative periods in a person's life, and the generation of these within the therapy room, and rehearsal to enhance spontaneous access is central to Brewin's (2006) model of therapeutic change. Brewin does not suggest how these target events should be defined or brought about, but suggests a role for retrieval-induced forgetting (Anderson, Bjork, & Bjork, 1994) in the cognitive changes that recall imposes.

While generally the focussed recall or imagining of positive autobiographical events has been shown to lead to improvements in mood and well-being (Josephson, Singer & Salovey, 1996; Rustiong & DeHart, 2000). Interventions which are effective change the

frequency, or manner of rehearsal, for example concrete rather than abstract processing (Werner-Seidler & Moulds, 2011, 2012) or focal interventions such as the Method of Loci approach (Dalgelish, *et al,* 2013; Werner-Seidler & Dalgleish, 2016), which trigger recall events for positive memories in the mental navigation of routes and sequences linked to every day activity. In addition the role of positive event representations improving mood in people with depression is complicated by evidence pointing to an absence of the preconscious recall of positive events in response to negative mood (Joormann & Siemer, 2004; Joorman, Siemer & Gotlib, 2007), and in differences in the processing mode used during positive memory recall (Werner-Seidler & Moulds, 2012). Research in this area has tended to assume equivalence between the autobiographical events which span the lifespan, but this thesis would suggest that targeted interventions are more appropriate.

Brewin's (2006) suggests that changes to the retrievability of memories is the foundation of change within talking therapies, and links the idea of focussed recall of positive events to a narrative context. Brewin supposed that repeated rehearsal of negative self-relevant material would act to facilitate negative self-schema, and that therapeutic interventions can raise awareness and therefore retrieval, of alternative, more positive, information. At a standing state, and in alignment with Becks proposal that raised self-relevance of negative events (Beck, 1987), this thesis proposed that by processes of negative bias, negative recall, and inhibition of positive events (Bjork & Bjork, 1992) negative events could act to inhibit positive events in a negative cycle. If this is the case then there would be a role for the therapist to create opportunities for focused expansive rehearsal of particular life events in order to counter the inhibitory mechanism. The finding that the recall of incongruent events is less likely in dysphoric groups, may link with the depressive experience of anhedonia (Pelizza & Ferrari, 2009), and absence of perceived affective variability, it may also be the result of over-general memory. But result indicate that impaired access imposes some challenges on to the responsiveness of people with depression to talking therapies.

7.1.6 How effective were the cueing methods used?

There is a small body of research outlined in the introduction which has used chapters (under various pseudonyms) to cue autobiographical recall. Some procedures use them to control for temporal distribution of recalled events (e.g. Borrini, *et al,* 1989), but this thesis has examined them in terms of the impact of chapter characteristics on recall, previously only examined in one study (Beike & Landoll, 2000). As a cueing method this study found that

this approach was broadly unproblematic, with dating information allowing check-backs to ensure the memory occurred within the given period. What may have confounded results was the manner in which categorisation was carried out in Study four.

A second feature to the cueing methods within this thesis is the absence of time limits to the retrieval of memories (as recommended by Borrini, *et al*, 1989), in favour of a subjective difficulty judgement. Several issues arise from the use of this approach, the first is the ambiguity in the statement 'I found it difficult to think of/recall an event' (Studies one and three) and 'comes to mind easily/with difficulty' Study four, which both could be interpreted as being a difficulty in the experience of recall, for example it is 'a highly negative event that I don't like thinking about', rather than locating an event from the range available from within the chapter. In Studies one and three there was also a concern that recall would result in within-chapter priming of events and that cued recall of a positive event would create a mood-congruent increase in the availability of associated events through horizontal priming. The tasks which required recall of sequential first to mind, positive, and negative memories could have resulted in a short-term positive impact on the recall of memories congruent with the mood of the first event memory. This was controlled for, to some extent with the counter balancing of the request for positive or negative events, however given that people with depression are more likely to spontaneously recall negative over positive events a negative priming effect could have occurred.

The potentially therapeutically important representations of interest in this thesis were the positively incongruent events associated with negative life chapters. Lemogne and colleagues (2005) found a similar recall deficits in depressed groups to our studies, and their examination of the autonoetic experience of recall illustrates that for depressed groups there was impaired access to positive memories revealed not by speed of access, but in the detail of representation. Study three in this thesis indicates that it is not simply the positivity of an event which impacts on this as overall clarity of recalled and imagined events did not differ between dysphoric and control groups, however the role of positive or negative incongruence had a differential impact depending on depressive status. Despite their recall advantage incongruent events had reduced clarity for the dysphoric group, and further to this, clarity of negatively incongruent events was higher for dysphoric compared to controls, and clarity of positively incongruent events was reduced for the dysphoric group compared to controls.

But how do these results translate – what does a 1.26 point reduction in clarity actually mean? Which leads this discussion to the uncomfortable problem of the use, through Studies one and three, of an untested summation scale to rate memory perceptions, and in Study four more simple, but also constructed scales to quantify degree of change in rated memory characteristics.

7.1.7 Use of memory feature rating-scales for this thesis

The rationale for the use of minimised scales was brevity, and that they formed part of an experimental design which was looking to pinpoint the impact of incongruent memory recall on accessibility. It did so by drawing on two established memory questionnaires, the Memeory Experiences Questionnaire (MEQ: Sutin & Robins, 2007), and the Centrality of Event Scale (CES: Berntsen & Rubin, 2006).

The memory experiences questionnaire (Sutin & Robins, 2007) is an instrument designed to assess phenomenological experiences of autobiographical memories. It contains 63 items within ten dimensions which have been identified as ways in which memories vary: These are *vividness, coherence, accessibility, time perspective, sensory details visual perspective, emotional intensity, sharing, distancing, and valence* which are rated on a 5 point scale. The time taken to complete the scales used in this thesis was around 30-60 seconds, in studies using the MEQ scale times given for completion for each memory are around 10 minutes (e.g. Montebarocci, Luchetti & Sutin, 2014). In the light of difficulties in using the MEQ for studies which require the sampling of a large number of memories, a 31-question short form for the MEQ has been developed (Luchetti & Sutin, 2015) with good internal consistency (median alpha=0.79). Unfortunately this occurred only following the studies carried out in this thesis. A number of studies have used shortened or modified version of the MEQ, for example, Grysmand, Prabhakar, Anglin & Hudson (2013) who shortened the form to 33 items by author consensus, and Østby, Walhovd, Tamnes, Grydeland and Westlye (2012) who despite not describing their decisional process, appear to have drawn on aspects of vividness and autonoetic consciousness to assess functional connectivity during recall and imagining. Other studies have simplified the scales further, for example Werner-Seidler and Moulds (2012b) who chose single items from the MEQ subscales and adjusted the scale to six-points to align with a further memory instrument used in the experimental procedure. Thus the amendment of the MEQ scale is not unprecedented, and as priority was given to the elucidation of a set of memories which were affectively

incongruent with their chapters the shortened scales were functionally effective for the dimensions of interest (Study one: clarity (vividness, coherence, time perspective); difficulty of recall; valence; rehearsal, and visual perspective, in Study three the rating of visual perspective as not used as there was no indication from Study one or the research literature that visual perspective would be impacted by incongruence and it functioned to reduce the time taken to complete the procedure.

Centrality of events was also rated in Studies one and , this measure was drawn from the Centrality of Event Scale (CES-20 and CES-7, Berntsen & Rubin, 2006) a seven item questionnaire that allows the rating of memory importance. This scale was reduced down to five items in the current thesis, once again raising questions around the validity of the results, although in this thesis centrality of events did not appear to be impacted by depressive status, or affective incongruence of events. Because the CES-7 has only seven items, it has not, to the author's knowledge, been used in a shortened form in previous studies. The scale was partially developed from research on the nature of traumatic events, and research in to PTSD. In 2003 Berntsen, Willet, and Rubin used what became items 2 and 3 on the scale to quantify the experience of intrusive memories for people with PTSD. Three items were used to examine the centrality of an event to a person identity in Berntsen and Thomsen's 2005 study, and these relate to items 2, 3 and 6 on the scale. Five items (1, 2, 3, 6, and 10) were used by Rubin and Berntsen (2004) to correlate these with both PTSD symptoms and depression. On developing the scale 23 items were originally used to address the importance of the event as a reference for understanding events and creating expectations; that the event was central to the development of the persons' identity; and whether the event was considered a turning point. A further issue with the centrality scale is that it was essentially developed to explore stressful and traumatic events, whereas the current studies used the measure to evaluate general importance to the person. Thus the current author drew on the implicit meaning of the CES-20 to derive five questions which reflected the importance of the event in the context of their life-story, identity, and connectedness to current and former life. The first three relate to the key themes identified by the authors of the CES-20, and the latter two are indications of importance of the event.

7.2 Autobiographical memory system

Two models of autobiographical memory system were introduced within this thesis, the Self-memory System (SMS: Conway, *et al*, 2000), and the Basic Systems Model (BSM: Rubin, 2006) and while it is acknowledged that the former model is used more commonly to conceptuatlise autobiographcail memory, an examination of some of the results can enhance our understanding of each of these. The first assumption of the SMS which contrasts it to the BSM is that once encoded there is a level of representation in memory which may be subject to the current recall goal of the individual, but not the context of the events within the memory system. So, for example an affectively contrasting event would be encoded in greater detail, and be more memorable because of its impact at the time. While we cannot examine the lives of particiants for the varicty of their reporting, it seems reasonable to assume equivalence in terms of variability of experience between them. Thus an equivalence would be seen across memory systems for both chapters and events.

The BSM diverges from the SMS in that the external representation of autobiographical events, in narrative form, influences the reconstructive process on memory recall, creating longer-term changes in the representations produced and the potential for large scale discrepancies between what occurred, and what is recalled. The finer detail of events ultimately being guided by narrative, rather than narrative being guided by the detail of events. Within the studies of this thesis it is not easy to differentiate the role of narrative, which would lend support to the SMS, there were few indications of narrative breakdown, or reduction in coherence for the depressed and dysphirc groups of Studies one and two, and os no differntial recall would be evident as a result. The results of Study three, which do indicate an effect of chapter context, might be explained differently by the two models. The SMS would predict that the tendancy for congruence within the dysphoric sample could be caused by over-generality of recall over the longer term, or that the cognitive effort of differential recall results in the greater monotony for this group, indeed the control group did report finding the recall of events easier overall. The same results would be seen but explained by the BSM as being the result of narrative monotony, and given the results of Study one and two, may be less likely.

A key finding for this thesis has been the ubiquity, and ease of access and definition of life-story chapters, and in alignment with other research, the finding that chapters are more

common than episodic events (Burt *et al*, 2003; Thomsen, 2009), and our conceptualisation of them should be developed. A potential outcome of this thesis is that it may influence the ways in which talking therapies are conceptualised as having a unitary mechanism of change, but also that it could aid the theoretical development of the autobiographical life-story chapters.

There are two important questions which should be asked about the nature of chapters in terms of the autobiographical memory system, the first is whether chapters are the same as life-time periods of the SMS. Used to tag and categorise, (e.g. Conway & Bekerian, 1987), and for inference of event occurrence (Arbruthnott & Brown, 2009), chapters are clearly not neutral representations and may themselves be adjusted according to self-concept and current goal by the conceptual-self and working-self suggested by Conway (2005). Unlike life-time periods however, and although it is common for chapters to be temporally represented, this is not always the case (Burt, Kemp, & Conway, 2003; Burt, 2008), and they are then perhaps more like the sematicized categorisation structures predicted by the BSM. Narrative aspects of chapters appear also to indicate that BSM is more likely to reflect the autobiographical memory system as it allows for affective links to take primacy over temporal links. It also allows for future imagining to directly reflect the memory representations using the same neural substrates.

Should we consider an amendment to the way we conceptualise the autobiographical memory system? The concept of life-time periods could be changed to represent a more variable structure in terms of time, content and importance. Consideration could also be given to the nature of specific autobiographical memories over time, in the SMS episodic memories are thought to be held within a separate storage system, and once cued reconstructed relatively reliably with the same constituent features such as visio-sensory information, and affect. This would suggest a relatively stable link between the category (chapter) and target (episodic memory). Contrastingly, within the BSM episodic memories exist as consistent patterns of activation within existing, independent, cognitive systems and as such differ from chapters only in the degree to which they are sensorially rich, and semantically linked to shorter time periods, this is suggestive of a somewhat looser category-target relationship, and a more fluid system of recall which may adjust to cultural expectations in the longer term. Either way the challenges of studying the clustering and categorisation of autobiographical information may be overcome by the adoption and

development of the concept of life-story chapters, to help progress our understanding of how what we believe impacts on what we recall.

7.3 Final conclusions

This thesis has highlighted the need for an examination of the autobiographical memory system and the assumptions which are being made as to the relationship between memory as represented in narrative, and memories as reconstructed as guided by narratives. Basing hypotheses within the literature which posits depressive narratives as being disordered, or lacking coherence led to predictions around the nature of internal autobiographical memory structures, however, both Study one and Study two indicated that in terms of the chapter and episodic memory representations of dysphoric and non-depressed groups there were broad similarities. In terms of the finer-grained links between chapter-linked it became clear, form the results of Studies Three and Four, that it may be the relationship between the perceived vlacen of the life-story chapter, and the differential rehearsal of the content memories of that chapter which feed back in to patterns of rehearsal and recall. Ultimately these dynamics could lead to a self-perpetuating cycle in people with depression where negative assumptions, and negative stories, limit access to positive exceptions

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Appendices

Tables

Appendix 1: Study 1 ethical consent

University of St Andrews

University Teaching and Research Ethics Committee

University of St Andrews

18 May 2011

Kate Smith
School of Psychology

Ethics Reference No: *Please quote this ref on all correspondence*	**PS7544**
Project Title:	Life story narration and the retrieval of autobiographical memories
Researchers Name(s):	**Kate Smith**
Supervisor(s):	**Dr Barbara Dritschel**

Thank you for submitting your application which was considered at the UTREC meeting on Wednesday 18th May 2011. The following documents were reviewed:

1. Ethical Application Form
2. Advertisement
3. Participant Information Sheets
4. Consent Forms
5. *Debriefing Forms*
6. External Permissions
7. Profile of Mood States (POMS)
8. BDI Test

The University Teaching and Research Ethics Committee (UTREC) approves this study from an ethical point of view.

Approval is given for three years. Projects which have not commenced within two years of original approval, must be re-submitted to UTREC.

Any serious adverse events or significant change which occurs in connection with this project and/or which may alter its ethical consideration, must be reported immediately to UTREC, and an Ethical Amendment Form submitted where appropriate.

Approval is given on the understanding that the 'Guidelines for Ethical Research Practice' (http://www.st-andrews.ac.uk/media/UTRECguidelines%20Feb%2008.pdf) are adhered to.

Yours sincerely

Convener of UTREC

cc. Dr Barbara Dritschel
Mary Latimer – SEC Convenor

UTREC Convenor, Mansefield, 3 St Mary's Place, St Andrews, KY16 9UY
Email: utrec@st-andrews.ac.uk Tel: 01334 462866

Appendix 2: Study 2 ethical consent

RL/MT/CR/SHS/14/S/004

15th October 2014

Kate Smith

Division of Nursing & Counselling

Kydd Building

Dear Kate

Re: ***Life-stories narrative and mood***

The School of Social & Health Sciences Research Ethics Committee has reviewed the above study and we are pleased to say that you have **conditional approval** to proceed. We would ask that you consider the following:

It is important that participant anonymity is maintained. You have ticked the box to indicate that you will not tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs. The SHSREC committee cannot see why participants cannot have confidentiality protected with simple pseudo names.
It is also not possible to protect anonymity where all participants must sign the same sheet to acknowledge compensation. You must have a separate form for each participant to sign.
You must follow complete the risk assessment sheet. Hazards identified can include standard risk procedures of the interview locations (exits etc.), data protection, and participant distress. This information needs to be on the risk assessment even if also located elsewhere as part of the proposal. This is a requirement of the University's Health and Safety Committee which the SHSREC must comply with.

Good luck with your research.

Yours sincerely

School Ethics Committee, School of Social and Health Sciences

Appendix 3: Study 3 ethical consent

University of St Andrews
from first to foremost

600 YEARS
1413 – 2013

Project Title	Life-story chapters, memories and future events
Researcher's Name	Kate Smith
Supervisors	Professor Malcolm MacLeod and Dr Akira O'Connor
Department/Unit	School of Psychology & Neuroscience
Ethical Approval Code (Approval allocated to Original Application)	PS9544
Original Application Approval Date	08 February 2013
Amendment Application Approval	06 August 2013

Ethical Amendment Approval

Thank you for submitting your amendment application which was considered by the Psychology & Neuroscience School Ethics Committee on the 5th August 2013. The following documents were reviewed:

1. Ethical Amendment Application Form 05/08/2008
2. Advertisement 05/08/2013
3. Participant Information Sheet 05/08/2013
4. Consent Form 05/08/2013
5. Debriefing Form 05/08/2013
6. External Permissions (Abertay) 06/08/2013

The University Teaching and Research Ethics Committee (UTREC) approves this study from an ethical point of view. Please note that where approval is given by a School Ethics Committee that committee is part of UTREC and is delegated to act for UTREC.

Approval is given for three years from the original application only. Ethical Amendments do not extend this period but give permission for an amendment to the original approved research proposal only. If you are unable to complete your research within the original three year validation period, you will be required to write to your School Ethics Committee and to UTREC (where approval was given by UTREC) to request an extension or you will need to re-apply. You must inform your School Ethics Committee when the research has been completed.

Any serious adverse events or significant changes which occur in connection with this study, and/or which may alter its ethical consideration, must be reported immediately to the School Ethics Committee and an Ethical Amendment Form submitted where appropriate.

Approval is given on the understanding that the 'Guidelines for Ethical Research Practice' (http://www.st-andrews.ac.uk/media/UTRECguidelines%20Feb%2008.pdf) are adhered to.

Yours sincerely

pp

Convenor of the School Ethics Committee

Ccs Prof M. D. MacLeod (Supervisor)
Dr A. O'Connor (Supervisor)
School Ethics Committee

Appendix 4: Study 4 ethical consent (St Andrews)

University of St Andrews

University Teaching and Research Ethics Committee
Sub-committee

13 December 2013

Ethics Reference No: *Please quote this ref on all correspondence*	PS10663
Project Title:	Autobiographical memory and retrieval induced forgetting
Researcher's Name:	Kate Smith
Supervisor:	Professor Malcolm MacLeod and Dr Akira O'Connor

Thank you for submitting your application which was considered at the Psychology & Neuroscience School Ethics Committee meeting on the 4th December 2013. The following documents were reviewed:

1.	Ethical Application Form	11/12/2013
2.	Advertisement	11/12/2013
3.	Participant Information Sheet	11/12/2013
4.	Consent Form	11/12/2013
5.	Debriefing Forms (Parts 1 and 2)	11/12/2013
6.	Inclusion/Exclusion Criteria	11/12/2013
7.	Questionnaires	11/12/2013
8.	Tayside Centre for Counselling Risk Management Strategy	11/12/2013
9.	Data Management Plan	11/12/2013

The University Teaching and Research Ethics Committee (UTREC) approves this study from an ethical point of view. Please note that where approval is given by a School Ethics Committee that committee is part of UTREC and is delegated to act for UTREC.

Approval is given for three years. Projects, which have not commenced within two years of original approval, must be re-submitted to your School Ethics Committee.

You must inform your School Ethics Committee when the research has been completed. If you are unable to complete your research within the 3 three year validation period, you will be required to write to your School Ethics Committee and to UTREC (where approval was given by UTREC) to request an extension or you will need to re-apply.

Any serious adverse events or significant change which occurs in connection with this study and/or which may alter its ethical consideration, must be reported immediately to the School Ethics Committee, and an Ethical Amendment Form submitted where appropriate.

Approval is given on the understanding that the 'Guidelines for Ethical Research Practice' https://www.st-andrews.ac.uk/utrec/guidelines/ are adhered to.

Yours sincerely

Convenor of the School Ethics Committee

Ccs Prof Malcolm Macleod (Supervisor)
Dr Akira O'Connor (Supervisor)
School Ethics Committee

School of Psychology & Neuroscience, St Mary's Quad, South Street, St Andrews, Fife KY16 9JP
Email: psyethics@st-andrews.ac.uk Tel: 01334 462071

Appendix 5: Study 4 ethical consent (Abertay)

Dr Ross Lorimer
Research Ethics Committee
School of Social and Health Sciences
Kydd Building, Dundee, DD1 1HG
Tel: 01382 308749

The School of Social and health Sciences **Research Ethics Committee** supports the proposed study "Autobiographical memory and retrieval induced-forgetting" led by Kate Smith. The Committee have no issue in principle with this study being run within the Division of Nursing and Counselling at Abertay University. The Committee would expect a copy of the ethical approval provided by St Andrews University to be submitted by the lead researcher before any data collection begins.

Good luck with your research

Committee Chair
Social and Health Sciences **Research Ethics Committee**

Appendix 6: Study 1 chapter and event rating scales

Title of chapter……..

Age at start of chapter……..

Age at end of chapter……..……..

Brief description:

Please rate this chapter for overall:

1. In terms of how I felt *at the time*, this chapter is….

very negative 1…….2……..3……..4……..5…… 6 very positive

2. In terms of how I feel *now*, this chapter is….

very negative 1…….2……..3……..4……..5…… 6 very positive

3. Life now is….

just the same 1……..2……..3…….4……..…..5……6 completely different

4. I feel I am…..

exactly the same 1…….…2…….3……..4… ….…5…….…..6 completely different

Instructions:

What is the first specific memory that comes to mind when you think of this chapter in your life?

Keeping this memory in mind please note down a suitable title or descriptor for the memory

Memory title…….

Age of memory…….

Give a brief description of the memory (optional):

and rate it on the following:

Subjective clarity

This memory is very vivid

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory feels coherent and complete

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Thinking about this memory is like travelling back in time

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I experience this memory as if I am looking through my own eyes (as opposed to watching myself)

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Importance to identity

This memory is of an event which was a turning point in my life

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory is of an event which is central to my sense of who I am

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I automatically see connections between the events in this memory and my present life

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory is of an event which was very important to what I was doing in my life at the time

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory is of an event which is very important to what I am doing in my life now

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Rehearsal and integration

I have spoken about this memory to other people

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I have thought about this memory a lot

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I found it difficult to retrieve a memory for this part of the task

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I feel positive when I think of this memory

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Specificity

This memory is of an event that lasted no more than one day…….Yes…..No

This event happened only once…….Yes…..No

I can recall at least two specific details about the event which differentiate it from other similar events……Yes…….No

Now I would like you to recall an event from this chapter which you could define as negative.

Keeping this memory in mind please note down a suitable title or descriptor for the memory

Memory title…….

Age of memory…….

Give a brief description of the memory (optional):

and rate it on the following:

Subjective clarity

This memory is very vivid

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory feels coherent and complete

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Thinking about this memory is like travelling back in time

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I experience this memory as if I am looking through my own eyes (as opposed to watching myself)

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Importance to identity

This memory is of an event which was a turning point in my life

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory is of an event which is central to my sense of who I am

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I automatically see connections between the events in this memory and my present life

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory is of an event which was very important to what I was doing in my life at the time

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory is of an event which is very important to what I am doing in my life now

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Rehearsal and integration

I have spoken about this memory to other people

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I have thought about this memory a lot

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I found it difficult to retrieve a memory for this part of the task

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I feel positive when I think of this memory

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Specificity

This memory is of an event that lasted no more than one day…….Yes…..No

This event happened only once…….Yes…..No

I can recall at least two specific details about the event which differentiate it from other similar events……Yes…….No

Now I would like you to recall an event from this chapter which you could define as positive.

Keeping this memory in mind please note down a suitable title or descriptor for the memory

Memory title…….

Age of memory…….

Give a brief description of the memory (optional):

and rate it on the following:

Subjective clarity

This memory is very vivid

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory feels coherent and complete

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Thinking about this memory is like travelling back in time

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I experience this memory as if I am looking through my own eyes (as opposed to watching myself)

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Importance to identity

This memory is of an event which was a turning point in my life

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory is of an event which is central to my sense of who I am

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I automatically see connections between the events in this memory and my present life

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory is of an event which was very important to what I was doing in my life at the time

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This memory is of an event which is very important to what I am doing in my life now

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Rehearsal and integration

I have spoken about this memory to other people

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I have thought about this memory a lot

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I found it difficult to retrieve a memory for this part of the task

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I feel positive when I think of this memory

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Specificity

This memory is of an event that lasted no more than one day…….Yes…..No

This event happened only once…….Yes…..No

I can recall at least two specific details about the event which differentiate it from other similar events……Yes…….No

Appendix 7: Study 3 chapter and event report and scales

Title of chapter……..

Age at start of chapter……..

Age at end of chapter……..……..

Please rate this chapter for overall:

In terms of how I felt *at the time*, this chapter is….

very negative 1…….2……..3……..4……..5…… 6 very positive

In the next part of the study you are going to be asked to retrieve some specific events relating to the chapters of your life story you have entered on the front of these response booklets. We would like you to try and retrieve specific memories and have included some instruction to help you do this.

Instructions for reporting an event:
The event must occur within the chapter specified, and be something which lasted less than one day and contain some details that make it unique (e.g. when you received/receive a letter of acceptance for a job).

It must be something that is directly related to yourself i.e. something you remember or will experience.

It doesn't have to be a particularly important event, just what comes to mind.

Please make sure that you do not make yourself upset while trying to think of an event. If you find any thoughts or events distressing, you don't have to report it and you can use the opportunity at the end of the session to seek further advice, if you wish.

Three events will be recorded for each of two past and two future chapters.

a) First specific event which comes to mind
b) A negative event ('*Now I would like you to recall an event from this chapter which you could define as negative'*.)
c) A positive event (*'Now I would like you to recall an event from this chapter which you could define as positive'*.)

Instructions: (*two versions will be presented 'memory' and 'was' is for past chapters, 'future event' and 'will be' is for future chapters; **one of each of the three prompts outlined above will be used for each chapter)

What is the first specific *memory/future event that comes to mind when you think of this chapter in your life?**

Keeping this memory in mind please note down a suitable title or descriptor for the memory/future even

Memory/future event

title…….

Age of memory…….

Give a brief description of the event:

and rate it on the following:

Subjective clarity

This (memory/imagined event) is very vivid

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This (memory/imagined event) feels coherent and complete

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Thinking about this (memory/imagined event) is like travelling (back/forward) in time

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I experience this (memory/imagined event) as if I am looking through my own eyes (as opposed to watching myself)

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Importance to identity

This (memory is/event will be) of an event which was a turning point in my life

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This (memory is/event will be) central to my sense of who I am

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

I automatically see connections between the events in this (memory/imagined event) and my present life

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This (memory/imagined event) is of an event which was very important to what I was doing in my life at the time

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

This (memory/imagined event) is very important to what I am doing in my life now

Not at all 1……..2……..3…….4…….5…….6 *Very much so*

Specificity

This is an event that lasts no more than one day……Yes…..No

This specific event *happened/will happen only once…….Yes…..No

I can think of at least two specific details about the event which differentiate it from other similar events……Yes.....No

Appendix 8: Examples of life-story transcripts

Life-story non-depressed participant study 2

Okay I was born on the west coast of Scotland eighteen years ago um and I was grown up there in H** with my family I've got I live at home I live with my mum and my dad and my older brother he's two and a half years older than me um I went to my local primary school it was just around the corner um with my brother also went there as well and I had two really good friend Alison and Caroline I went to nursery with them as well which was just round the corner, um I really enjoyed primary school and it was I was always quite I was quite bossy quite loud in primary school um and I got to primary seven and I was a bit of a favourite to be honest um I was always in school plays I was the lead in the wizard of oz and I was so gutted leaving primary school it was just horrible I went to high school um which was twenty minutes away I took a train to and there was only four or five people out of my primary school who went to that school um it was it was such a shock because I'd went from being kind of a top gun to being a little fish in a big pond basically um it was first year was horrible I didn't really like it at all but eventually I started getting in to the routine of things like as you do it was so overwhelming at first a bit like uni, um , I kind of, I was just a bit rebellious in my first couple of years in high school I just did what I wanted never really entertained anyone else but I always studies I it was just I just enjoyed it and no-one really noticed I was good at studying because I was so rebellious and it came to third and fourth year and like there was always the people in your year that you would you like the ones who were going to be doctors and that and Oxbridge candidates and no-one really expected that from me so when I got my ones in my standard grades people were quite shocked they all kind of thought that it was maybe kind of a fluke okay they were standard grades and um then I went in to fifth year and basically um had a really good group of friends in fourth year and one of my best friends, it was X Y and Z from primary school um but I had made different

friends and they all had different personalities it was crazy, there was always drama in our group, my best friend was D* and she'd moved in 5th year to go to the private school so that she could do three sciences because our school didn't offer it um and she wanted three advanced highers as well she's away to do vet medicine I found that really hard because it was always a group we had a group of friends but it was always separate split off it was me and D* so it was quite hard when she left I'd also spent basically from first year all the way up to fourth fifth year um on and off going out with this guy who basically I decided to go out with him because um my brother told me not to so I just kind of enjoyed being disobedient but I've learnt a lot from that because he's just a horrible person but I just, I look back now and see where his life's gone and where mines gone I feel, I know that's bad to say but I fell a lot better, um I when I went in to fifth year I basically cut myself off from everyone and just stayed at home all the time or went to the library and just studied my my parents were the only ones who noticed how hard I was working um but I was always someone, like I was always someone who thinks I do rubbish, so if I'd done well I never think I have, I came out of my prelims and I hadn't done very well in them, and I was a wee bit I was a bit disappointed but I kind of thought that was that was my standard kind of thing and I went in to my highers I was terrified like I'm such a nervous person and I went in to my highers and um I told my parents that I had just done terribly told everyone I'd done terribly um then I decided over the summer I would just get a job because I knew I would sit the whole summer and think about my exams so I got my first job and I worked in the spar, and at first I really enjoyed it because I'd never, I'd never had like a pay check before or anything I really enjoyed that but eventually it just got so tiring, five o'clock in the morning starts and everything so I just looked forward to holidays and nights out and stuff and then it came to the end of the summer and I got my exam results, me and my mum picked them up from the post office while we were driving over to my work and um basically I opened them and I just

I just couldn't believe that I'd managed to get five 'a's and I just opened them and it was just like these aren't right, instead of just being okay well done I did study hard I was like no wait a minute there must be a mistake here so I told my mum she nearly crashed the car um and then everyone like the people with five 'a's were in the newspaper and things and everyone said to me congratulations but I never expected it like no-one expected it and I kind of kind of quite liked that more than have that expected of me I quite liked being the dark horse in these situations, so in my sixth year I did my spent most of the year just um I did history which I'd wanted to do since um I'd had to choose my highers I'd wanted to do history but I couldn't because I was dedicated to languages um and I did history because it was my favourite teacher and it was his final year aswell he was retiring so it was really good spending both our final years in the same class, my sixth year was a bit horrible when it came to the social side of things, everyone says sixth year is great because you're you end up making friends with people you would never have expected to but I didn't enjoy sixth year for the social side within school because our year group never worked out like everyone else's year group did, I just had, there was a couple of girls that I was friends with but they were they put me in really awkward positions because in sixth year I put myself forward, I was head girl I put myself forward for all these things in school and leadership programmes and things like that um and basically these two girls that I was friends with kinda like they were bullies so they always put me in positions where I was supposed to tell them to stop but I couldn't because they're my friend so it was quite uncomfortable and I was desperate to leave I'd applied to St Andrews and I couldn't wait to go um eventually I got to the point where I just couldn't get any information I'd e-mail someone and they'd get back and say oh sorry yeh yeh you're in basically and I was like okay but I planned I've been planning to go here since I found out about my highers basically and I was so excited to go and I came and I just um it was hard leaving all my friends because we'd um I'd just starting going out with someone else and I

thought I don't know how this is going to work and we just thought we'd try it and we're still going out and it's great because I don't really have to see him every single day so um and then I um I enjoyed eh like the first initial part of coming to university meeting people moving in to my own little kind of flat like I liked all that just grasping my independence um obviously freshers' week was good because um exhausting but I find I find it quite difficult here because I find trying to balance my studies with living with people who always want to party really hard um I have studied quite a lot but not as much as I would have in school which bothers me because you need to study more here um I feel quite overwhelmed here like I'd quite like to honestly I've been looking in to trying to home and applying to, I phoned up Glasgow uni to try and get there but basically there they've their cut-off date has like passed um so my issue is I either go home and stay with my family and not go to uni or I stay here and might not find accommodation so it's ah I just feel very confused at the moment but um I'm, not one of these people that doesn't see like the end of the tunnel I really io know my life will go somewhere it's just in the moment I get very overwhelmed so um, I don't know what else to say, obviously I'm very family oriented because I want to go home to them and I quite like, um in St Andrews I've found aswell I'm one of these people I need to plan so I'll study for two weeks and then we've planned a big night out and in St Andrews people come to your window and say let's go out and that I under I'm just like not spontaneous so it's it's good for some people but I find that really hard because I've had a plan to study and then I I'd say to them no I'm studying tonight and they we're going away in a couple of weeks we won't be able to go out again it's quite difficult I like to plan for a big event rather than going out randomly kind of thing um and I've found recently that I'm going to be forced to go out like last night I was just point blank not going anywhere um and K* was like this, you need to go to our flat and just sit with people, you need to come out and I've never been the kind of

person who has been forced to socialise so um I feel like I've just changed quite a lot here already

Life-story depressed participant study 1

Starting from the beginning um well I was born in Namibia in above South Africa to a South African guy and an American woman I have a younger brother who if four years younger than me, um happy childhood, when I was four we moved to a farm which is where we still live um and we've got animals on the farm and as a kid it was really a great place to grow up lots of lots of space and lots of outdoors to play in I've always had lots of pets lots of cats lots of dogs um very close knit family uh very happy family life my parents are both lawyers they're both somewhat volatile people so I guess when I was younger I used to worry sometimes maybe after one of their fights they'd break up uh but now that I'm older I realise that they never would because they love each other and they are together for life um I started school when I was 2 ½ um at a Montessori kindergarten which is in German I then went to primary school for the early early part of school I was happy for the later part of primary school which ends in grade 7 which is about age 12 or 13 the later years I wasn't particularly happy um partly because I didn't feel very popular um it was quite a small pond um and I was the smartest kid in the grad then so and I was very very shy really shy as a kid and my mum used to make me phone phone the movie theatre to ask what time the movie was um kind of force interaction with people on the phone which it worked um eventually I stopped being quite so shy but I think a combination of being smart and shy didn't do me any favours and um I had a group of close friends but primary school kids can be pretty mean became I guess a bit self-conscious about the way I look because of being teased I guess you are also of an age when everything anyone says is takes on a much greater importance than it should and so um I moved to high school when I was 13 and it was better to be with a slightly different

group of people um I gradually made more friends started dating guys who were older than me um so that was also wasn't a strategy but I did get invited to parties and things like that because of because of it um and I guess I started feeling more confident about myself generally in high school, I did scouts which a lot of my group I have a lot of friends that our parents were friends so we've kind of known each other from a young age even though we weren't always friends they were just part of our group of acquaintances so a lot of them were at scouts which was boys and girls um and I really enjoyed that in when I was 15 I fell off a barrel at scouts on to my head and I had a mild concussion followed by post-concussion syndrome for six months so that was a difficult period um and then about between a year and two years later the depression started um so I guess for most of my teenage years being ill has been somewhat of a defining feature um I hadn't had major problems before that I'd seen I'd gone to a counsellor a couple of times some when I was very young because of um sleep walking headaches um I've seen someone a little bit to do with a bad body image in my earlier teens but I think that's common to a lot of girls um so but then from the sort of age I guess it was 17 uh the depression was really bad um I had I had to um stop going to school eventually so I didn't finish 12th grade first, I stayed in a I checked myself in to a clinic for a couple of months to help give me some time and um take a break from life generally I think um and from then on it was treatments um we tried pretty much everything eventually when all the different pills didn't work for me I had some bad allergic reactions then um I went to America and I had trans-cranial magnetic stimulation and when that on it's own wasn't enough I had that with ECT so I had 21 bouts of ECT which initially helped got me out of the deepest depths um but I wasn't well even then, so then the year after that which would have been I think 2009 I had a vagus nerve stimulator so things have been better since then um then I got in to St Andrews uh I guess almost two years ago I'm in second year now and that was one of the best moments of my life I really, really wanted to come here and um it had

been a real struggle to finish school so I really wasn't sure if if I'd be you know I'd have the right um grades and everything but so it was really great to get to St Andrews and um got a long-term boyfriend here made new friends um it's been a really good experience and kind of throughout everything it's always my family has always been really supportive and amazing my mum took off lots of time from work to go to America with me and stay with me so family's been very important right from the very beginning

Appendix 9: Chapter themes and examples

Table A.0.1: Examples of participant defined chapters

Theme	Sub-theme	Example (length)	Example memory
Education	University UG years	First year (8 months)	Freshers' fair
	School	Being Dux (18 months)	Challenging head
	Transitions	Coming to the UK (5 weeks)	Finding halls
	PG study or careers	PhD (6 years)	On-line supervision disaster
	Other	Changing trains (2 months)	Seeing tutor
Jobs	Temporary roles	Library work	Ice-cream day
	Professional roles	Nursing	Ward
Home	Houses/homes	Living in the lane (5 years)	Brothers foot
	Locations	Life in Alaska (2 years)	Grandma's kitchen drama
	Transitions	Mum's house dad's house (7 years)	Motorway services
Holidays/trips	Locations	Spain (2 weeks)	Falling out with Linda
	Holidays	Walking tour (5 weeks)	Blisters
	Living 'away'	African adventure (3 months)	Children singing goodbye
Relationships	Parenthood	Abbie (8 years)	Telephone call
	Marriage	Robert and me (3 years)	Letter home
	Friendships	Three musketeers (6 years)	Bethany's mum
	Partners	Corrie and me	love at first sight
Activities	Sports	Climbing (18 months)	Ben Nevis
	Theatre	Drama club (3 years)	Cat in the Hat
	Religion	Sunday school (4 years)	Lost the tape
	Music	Playing the flute (10 years)	Recital in Glasgow
Psychological	Therapy	Dealing with the abuse (5 years)	Writing the letter
	Periods of MH problems	Things turn to shit (2 years)	Wife leaving
	Emotionally described	'Happy' (3 months)	Beach hammock
None of the above	n/a	Court case (30 months)	meeting the priest

Table indicating examples of chapter themes and sub-themes from studies one and three

Appendix 10: Life-story chapters and the cultural life-script

In order to begin a tentative exploration of the nature of chapters, and their link to a cultural life-script. A preliminary analysis of chapters in relation to US undergraduate student life script events (as defined by Rubin, *et al,* 2009) as carried out. The current sample from studies one, two, and three contain varied numbers of life-story chapters and these were categorised as being representative or associated with life-script events, or non-representative. In addition study 3 incorporated future chapters which were predicted to be more likely to follow a scripted pattern. It should be noted that the participants in studies one, two, and three were a mix of native English speaking nationalities (primarily UK/USA).

Life-script events from the study by Rubin and Colleagues (2009) are listed below in column A, they were generated by asking 100 US undergraduate student to define seven key events which would occur during their life story (past and present). The list includes the twenty-five most frequent events. The number of times a chapter appeared to be associated with one of these events, or clearly contained the event is indicated in the column for each study.

Table A.0.2: Chapter themes mapped to life-script events

	Study 1 **N=25** **Ages ranged from 18 to 55**	**Study 2** **N=40** **Ages 18-25**	**Study 3** **N=80** **Ages 18-25** **Past and current**	**Study 3** **N=80** **Ages 18-25** **Future**
Marriage	4	0	0	64
Having children	2	0	0	52
College	25	30	79	6
Begin school	7	2	16	0
High school	25	30	80	0
First job	6	4	19	61
Begin talking	0	0	0	0
Begin walking	0	0	0	0
Own death	0	0	0	12
Go to school	19	9	80	0
Parents' death	0	1	4	28
Others' death	1	1	5	43
Retirement	0	0	0	64
Own birth	0	0	0	0
Fall in love	4	2	18	58
Begin driving	0	0	1	1
Grandchildren	0	0	0	5
Settle on career	1	2	3	35
Puberty	0	1	2	0
First sex	0	0	0	0
Leave home	12	18	26	3
Begin daycare	0	0	0	0
Empty nest	0	0	0	12
First kiss	0	0	0	0
Other	n/a			

This table shows the number of participant-defined chapters for each study which were judged to relate to life-script events according to Rubin and Colleagues 2009 study.

Appendix 11: NART

NART answer sheet

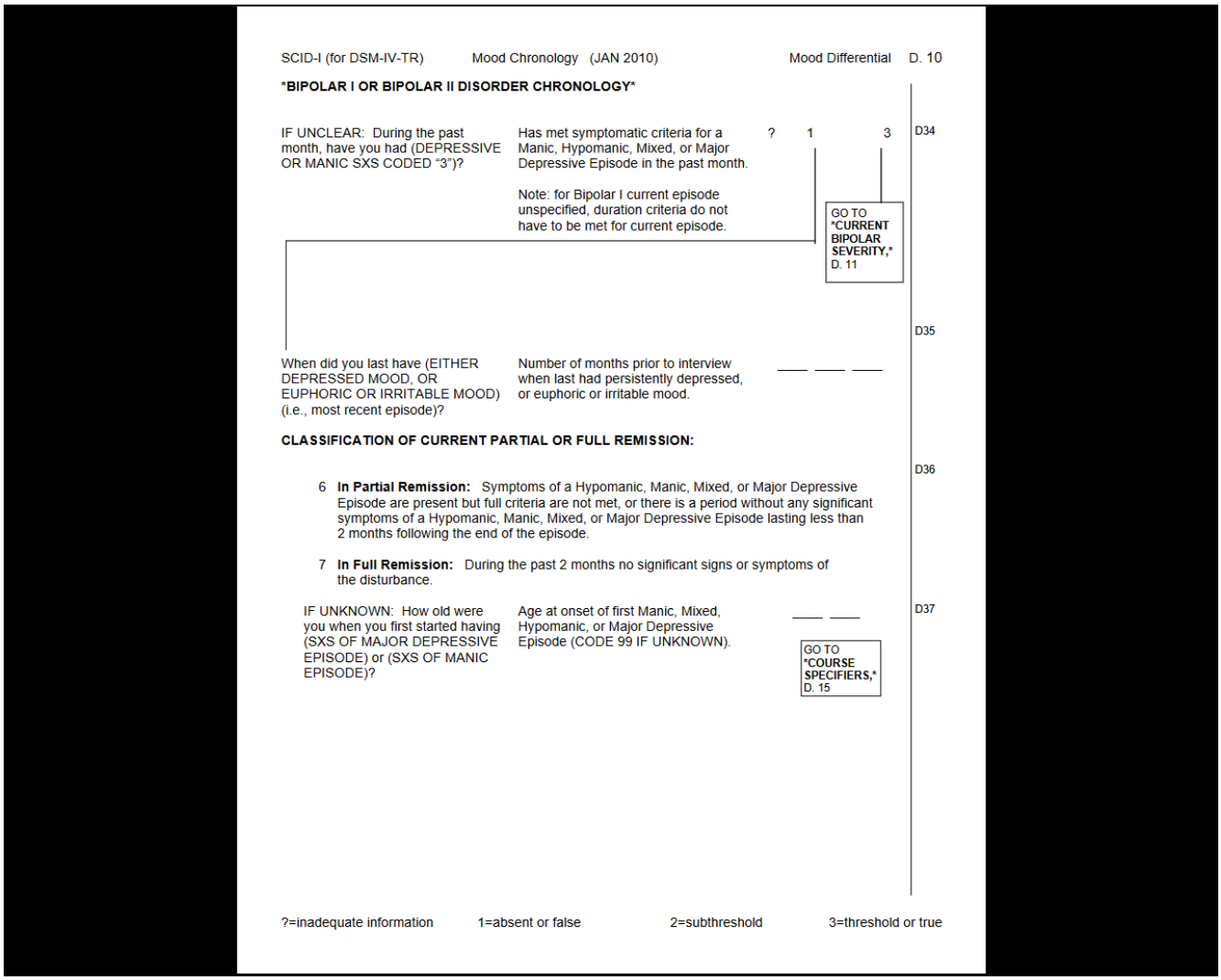
I want you to read slowly down this list of words, starting here <indicate>. After each word please wait until I say "next" before reading the next word. I must warn you that there are many words that you probably won't recognise, in fact *most* people don't know them, so just have a guess at these, ok? Go ahead.

Make sure read *slowly*, one at a time. Encourage to attempt every word; guess when necessary.

Reinforce all responses; "next". Can change a response if they wish, but must decide on their final choice. If participant displays anxiety, reassure that I didn't know all of them when I first did it, and we don't expect people to get 100%.

Word		R	W			R	W			R	W			R	W			R	W
Chord				Courteous				Hiatus				Facade				Gauche	Go/ shh		
Ache				Rarefy	Rare / a/ fii			Subtle				Zealot	Zell/ ot			Topiary	Top /ee/ a/ ry		
Depot				Equivocal				Procreate				Drachm	Dram			Leviathan			
Aisle				Naive				Jist				Aeon				Beatify	Be/ at/ i / fii		
Bouquet				Catacomb				Gouge	Gowj			Placebo				Prelate	Pre'/ lt		
Psalm				Gaoled	Jail/ ed			Superfluous	Soo / per/flew/ ous			Abstemious	Ab/ stee/me/ ous			Sidereal	Side/ ear/ rial		
Capon	Kay / pon			Thyme				Simile				Detente	De/ tant			Demesne	D/ main		
Deny				Heir				Banal	Ben/ arl			Idyll	Id/ ill			Syncope	Sync/ a / pea		
Nausea				Radix	Ray/ diks			Quadruped				Puerperal	Poo/ er/ p/ rul			Labile (label ok)	Lay/ bile		
Debt				Assignate				Cellist				Aver	A/ verr			Campanile	Kamp/an / ee /lii		

Appendix 12: SCID-I (DSM-IV) Extract



SCID-I (for DSM-IV-TR) Mood Chronology (JAN 2010) Mood Differential D. 10

BIPOLAR I OR BIPOLAR II DISORDER CHRONOLOGY

IF UNCLEAR: During the past month, have you had (DEPRESSIVE OR MANIC SXS CODED "3")?

Has met symptomatic criteria for a Manic, Hypomanic, Mixed, or Major Depressive Episode in the past month.

Note: for Bipolar I current episode unspecified, duration criteria do not have to be met for current episode.

? 1 3 D34

GO TO ***CURRENT BIPOLAR SEVERITY,*** D. 11

D35

When did you last have (EITHER DEPRESSED MOOD, OR EUPHORIC OR IRRITABLE MOOD) (i.e., most recent episode)?

Number of months prior to interview when last had persistently depressed, or euphoric or irritable mood. ___ ___ ___

CLASSIFICATION OF CURRENT PARTIAL OR FULL REMISSION:

D36

6 **In Partial Remission:** Symptoms of a Hypomanic, Manic, Mixed, or Major Depressive Episode are present but full criteria are not met, or there is a period without any significant symptoms of a Hypomanic, Manic, Mixed, or Major Depressive Episode lasting less than 2 months following the end of the episode.

7 **In Full Remission:** During the past 2 months no significant signs or symptoms of the disturbance.

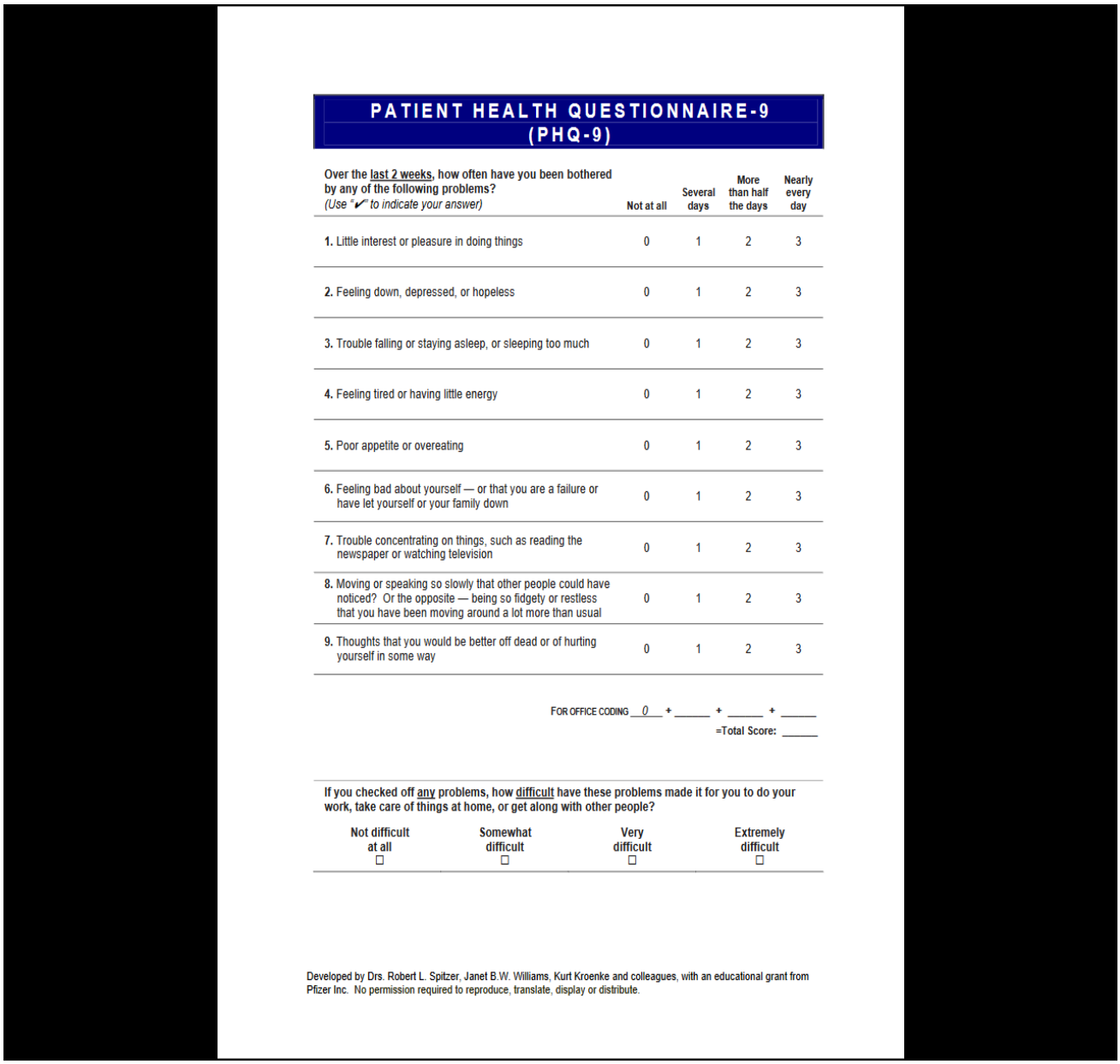
IF UNKNOWN: How old were you when you first started having (SXS OF MAJOR DEPRESSIVE EPISODE) or (SXS OF MANIC EPISODE)?

Age at onset of first Manic, Mixed, Hypomanic, or Major Depressive Episode (CODE 99 IF UNKNOWN). ___ ___ D37

GO TO ***COURSE SPECIFIERS,*** D. 15

?=inadequate information 1=absent or false 2=subthreshold 3=threshold or true

Appendix 13: PHQ-9



PATIENT HEALTH QUESTIONNAIRE-9
(PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✔" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING 0 + _____ + _____ + _____
=Total Score: _____

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
☐	☐	☐	☐

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Appendix 14: BDI-II Extract (removed for electronic copy)

FINAL PAGE