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# Recollection of repeated events

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Difficulties and possibilities

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Difficulties and possibilities

Rebecca Willén



**UNIVERSITY OF GOTHENBURG**  
**DEPT OF PSYCHOLOGY**

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*Remember all their faces  
Remember all their voices  
Everything is different  
the second time around*

*-Regina Spektor*



# Abstract

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Willén, R. M. (2015). *Recollection of repeated events: Difficulties and possibilities*. Department of Psychology, University of Gothenburg, Sweden.

Survey based research about self-reported incidents and legal investigations concerning sexual abuse, terrorism, and refugee status determination often involves reporting about self-experienced events that are similar to each other and has occurred repeatedly. Such repeated events tend to be recalled in a general manner and as a cluster of events. It can therefore be difficult for a respondent or witness to specify which individual episode a particular detail belongs to and to describe the individual episodes in detail. The overall aims of the present thesis were to investigate whether peoples' memories of repeated events can be improved by mnemonics and how memory specificity should be measured. Two studies were conducted and both were based on interviews with 95 dental care patients about all dental visits they had made during the past ten years. Objective truth was established by analysing their dental records. Both studies employed two measures of memory specificity (number of individual events recalled and recalled amount of details about the events). Amount of details was measured by categorising the respondents' utterances as generic, specific, or specific-extended in line with established coding procedures for measuring overgeneral memory. Study I investigated the effect of context-specific cues on peoples' ability to remember individual events and details about the events. The main results showed that context-specific cues tended to be more effective for recollection of individual events than cues commonly used in legal practice. The context-specific cues did also generate somewhat more details than the comparison cues. The results imply that recollection of repeated events can be enhanced by mnemonics such as context-specific cues. Study II showed that the two measures of memory specificity (i.e., number of individual events recalled and recalled amount of details about the events) were influenced differently by all five investigated factors (interviewees' age, number of experienced events, interviewer, perceived unpleasantness concerning the events, and how much the interviewee had rehearsed their memories). For instance, number of experienced events positively influenced the number of events recalled but had no effect on the amount of details. It was additionally found that the respondents often underestimated how many visits they had made. An important implication of the study is that future research should make clear distinctions between the two types of memory specificity. In sum, the studies suggest that mnemonics can aid recollection of repeated events, although the research on the subject has methodological issues that need to be resolved.

*Keywords:* Repeated events, Investigative interviewing, Mnemonics, Memory specificity.

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## Swedish summary

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Likartade händelser som man upplevt flertalet gånger tenderer man minnas på ett annorlunda sätt jämfört med händelser man upplevt endast en gång. Vardagliga exempel på sådana upprepade händelser är tandvårdsbesök och restaurangbesök. Mer allvarliga exempel på händelser som ofta är av upprepade karaktär är sexuella övergrepp, partnervåld och förföljelse.

Av olika skäl brukar man minnas upprepade händelser på ett mer generellt och övergripande sätt jämfört med en enskild och därmed mer distinkt händelse. Det kan också vara svårt att åtskilja händelserna från varandra: Vid vilket av restaurangbesöken råkade en gäst välta ut sitt vinglas? Var det vid samma tillfälle som du missade bussen och kom sent till restaurangen? Vad hände mer vid just det besöket? Det är sällan denna typ av minnesproblem utgör ett bekymmer i vår vardag. De kan dock utgöra ett desto större bekymmer inom två områden: 1. I forskning där man förlitar sig på att respondenter korrekt minns och återberättar om upprepade händelser de varit med om (t.ex. vilka hälsoproblem de haft under en längre period). 2. Inom rättsväsendet då framförallt målsägare behöver specificera det våld de varit utsatta för. Detta är ett erkänt stort bekymmer inom rättsväsendet och omfattar såväl brottmål som asylärenden.

### *Syfte och metod*

Det finns ett endast ett fåtal tidigare studier om hur man kan underlätta för just vuxna personer att minnas upprepade händelser. Ingen av dessa tidigare studier har undersökt effekten av en enskild minnesteknik utan har istället undersökt den blandade effekten av flertalet tekniker tillsammans. Den aktuella avhandlingens främsta syfte är därför att undersöka hur man kan underlätta för vuxna målsägare att minnas och berätta på ett specifikt sätt om de upprepade händelser de rapporterar att de utsatts för. Eftersom forskningen kring intervjuteknik och upprepade händelser använt sig av ganska olika instrument för att mäta minneskvantitet och minneskvalitet så ville vi även undersöka om olika minnesmått påverkas olika av potentiellt inverkanseffektorer.

Avhandlingen består av två empiriska studier. Båda studierna är baserade på intervjuer som gjordes med 95 tandvårdspatienter i Sverige. Respondenterna var i genomsnitt 43 år och de flesta hade gjort ca 17 tandvårdsbesök var (antalet varierade mellan 6 och 80) under den senaste tioårsperioden.

Deltagarna intervjuades vid två tillfällen med en kort paus emellan, om de tandvårdsbesök de hade gjort under de senaste 10 åren. I första intervjun om-

bads de försöka minnas så mycket som möjligt och berätta om detta. I pausen fick de ta del av sådant som eventuellt kan vara till hjälp för att minnas tandvårdsbesöken. I andra intervjun ombads deltagarna berätta om den ytterligare information de eventuellt kommit ihåg under pausen. En av tre typer av potentiellt minnesunderlättande material presenterades för deltagarna i pausen:

1. Sådant som andra personer i samma situation sagt sig ha haft hjälp av för att minnas sina tandvårdsbesök. Ca 30 deltagare fick ta del av detta som enbart kategorier, t.ex. *"Tänk tillbaka på sådant du pratat om med personalen"* och *"Tänk tillbaka på orsaken till besöket"*.

2. En annan grupp av lika många deltagare fick ta del av kategorierna tillsammans med citat från personer som varit i samma situation (t.ex. *"Tänk tillbaka på sådant du pratat om med personalen"* och fem tillhörande citat, t.ex. *"Jag fick instruktioner om hur jag skulle förebygga hål"* och *"Jag lovade tandläkaren att sluta snusa"*).

3. Den tredje gruppen fick ta del av sådant som ofta används i polisintervjuer idag i syftet att underlätta för målsägaren att minnas mer. T.ex. *"Tänk tillbaka på om något tillfälle skiljer sig från de övriga"*, och *"Tänk tillbaka på senaste gången det hände"*. Denna typ av instruktioner gavs till en tredje grupp om ca 30 deltagare.

Studie I undersökte effekten av de tre olika typerna av potentiellt minnesunderlättande material, och baserades således på båda intervjuerna. Studie I baserades på endast första intervjun och undersökte hur två olika mått på minnesspecificitet påverkades av intervjuarstil, ålder, antalet händelser man varit med om, hur mycket man tänkt på och pratat om händelserna, och hur obehagligt man tycker det är med tandvårdsbesök.

## *Resultat*

I Studie I fann vi att de deltagare som fått ta del av sådant som andra personer i samma situation haft nytta av mindes något fler tandvårdsbesök och något mer detaljer än den grupp som tagit del av sådant som idag ofta används i polisintervjuer. Det verkade dock inte spela någon roll om deltagarna fick enbart kategorier eller både kategorier och citat; båda dessa grupper mindes ungefär lika mycket. Vidare fann vi att ju mer man hade pratat med andra om sina tandvårdsbesök ju mer mindes man. Likaså tenderade obehag kring tandvårdsbesök överlag bidra positivt till antalet ihågkomna besök. Ett viktigt fynd i studien var även att minnenas korrekthet inte skiljde sig åt beroende på vilket typ av material man hade tagit del av.

I Studie II visade vi att våra två mått på minnesspecificitet (antalet händelser man minns och mängden detaljer man kunde återge kring dessa händel-

ser) påverkades olika av alla de fem faktorer vi testade (dvs, intervjuarstil, ålder, antalet händelser man varit med om, hur mycket man tänkt på och pratat om händelserna, och hur obehagligt man tycker det är med tandvårdsbesök). Vidare replikerade vi tidigare forskning som visat att man vanligen underskattar hur många upprepade händelser man har varit med om.

## *Slutsatser*

Forskningen om hur man kan underlätta för vuxna personer att minnas upprepade händelser är ännu i sin linda. Den aktuella avhandlingen har visat på såväl svårigheter som möjligheter när det gäller forskningen inom fältet och tillämpningen inom rättsväsendet.

Intervjuinstruktioner som baserats på erfarenhet från personer som varit i liknande situationer kan vara ett effektivt hjälpmedel för målsägare att minnas mer information om upprepade händelser. Det är möjligt att de minnesunderlättande instruktioner som idag används i polisutredningar på sikt kan kompletteras med eller till viss del bytas ut mot andra/ytterligare instruktioner. Det är dock viktigt att påpeka att denna typ av instruktioner som här undersökts inte främst är avsedda att användas i isolation från andra minnesunderlättande tekniker, utan möjligen kan användas som ett komplement till andra tekniker.

Framtida forskning inom intervjuteknik och upprepade händelser bör ta i beaktande ett flertal metodologiska svagheter. I Studie II lyfte vi framförallt problemet med att olika forskargrupper använder olika mätningar och instrument vilket gör det svårt att jämföra resultaten från olika studier. Vi tog första steget till en lösning av problemet genom att göra vårt forskningsmaterial fritt tillgängligt via en databank så att fler kan återanvända samma procedur.



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## Preface

---

This thesis consists of the following two empirical studies, and referred to by their roman numerals:

- I. Willén, R. M., Granhag, P. A., Strömwall, L. A., & Fisher, R. P. (2014). Facilitating particularization of repeated similar events with context-specific cues. *Scandinavian Journal of Psychology*. DOI: 10.1111/sjop.12180
- II. Willén, R. M., Granhag, P. A., Strömwall, L. A., & Fisher, R. P. (2014). *How to measure recollections of repeated events*. Manuscript.



# Introduction

---

How many times have you visited a dental clinic? Perhaps about once a year since you were around six years old. That would be about... 20 times? 40? Now try to recall individual episodes of your dental visits. You might remember the last visit you made. What about the one before that? Do you remember the first visit you made? Do you recall any visits that were somehow different from the others? You may end up recalling about a handful individual episodes or somewhat more, but what about all the rest? In contrast, you would probably find it an easy task to describe in detail how your dental visits are usually like: How you get there, what it looks like, what type of magazines they have in the waiting room, how the procedure goes with announcing your presence in the reception and then the waiting until it is your turn. You might recall names of the people working there, what they look like, what they like to talk about, and you probably recall whether you have any certain feelings towards them. But how detailed can you describe the specific episodes? Who worked in the reception the time you were going to a date afterwards? What did you do in the waiting room that day? What did you and the dentist talk about? Despite the many memories you probably have from the many dental visits you have made it will be difficult to answer such questions. Why is it so? Are the memories gone or is it possible to recollect them?

The present thesis provides an overview of how repeated and similar events typically are remembered and why it is difficult to ascribe details to individual episodes. It is outlined how the topic is important to the legal system: in criminal cases such as sexual abuse and intimate partner violence, but also to refugee status determination and detainee interrogations. The main purpose of the thesis was twofold. First, to empirically investigate the effectiveness of context-specific cues on adults' memories of events they had experienced repeatedly. Two measures of memory specificity were employed: number of events recalled and amount of detail provided about the events. The second main purpose was to shed light on methodological issues in research on memory for repeated events by exploring whether factors such as rehearsal, interviewee age, and number of experienced events had different effects on the two measures of specificity.

# An introduction to human memory

There is a large body of knowledge concerning the human memory function, although there is still a lot we cannot yet explain. One thing we know little about is actually the basics of memory: exactly where it is and how we can model it. The two most frequently employed psychological perspectives of memory are the multiple systems view (e.g., Tulving, 1983) and the process view (e.g., Kolers & Roediger, 1984). While the first models memory as consisting of several different systems (e.g., procedural, semantic, working, and episodic memory) that each has its own unique capacities, qualities and prerequisites, the processing view argues that memory capacity and quality is rather a result of encoding and retrieval processes – not of different structures. Both views have strengths and weaknesses and Surprenant and Neath (2009) summarises the current knowledge gaps as follows (p. 25):

*“We do not know how many memory systems there are or how to define what a memory system is. We do not know how many processes (or components of processing) there are or how to distinguish them. [S]hort-term memory and long-term memory seem to differ in some ways, as do episodic memory and semantic memory, but are they really fundamentally different?”*

Although consensus is lacking on the number of memory systems and how to define them, there seem to be some consensus on what we generally mean when we talk about the major systems. Major memory systems central to the present thesis are briefly described below.

*Autobiographical memory:* Baddeley, Eysenck, and Anderson (2009) described this as a system for information regarding ourselves and relations and events that we experience during our lifetime. It can be episodic as well as semantic (see below; Baddeley et al., 2009), although some view it as mainly episodic (Fivush, 2011).

*Episodic and semantic memory:* According to Tulving (2002), episodic memory enables us to relive our past and make plans for the future, and it makes it possible for us to have concepts about time (e.g., how long it will take until we meet our friend again). Episodic memory is believed to have developed out of semantic memory. Semantic memory refers to general knowledge of the world in absence of time. For example, we know that the capital of Germany is Berlin, that there once was a group of animals called dinosaurs, and we know that fire can be dangerous, but it is unlikely that we will recall how or when we learned this. In contrast, episodic memory refers to events that we have experienced, such as a holiday spent in Berlin, a visit

to a museum where we saw models of dinosaurs, or a time when we burned ourselves on a match. Episodic and semantic information is processed in both short-term and long-term memory.

*Short- and long-term memory:* Long-term memory is an uncontroversial system which researchers agree to be existent; individuals would otherwise be unable to hold memories and knowledge derived from the past (Cowan, 2008). In contrast, short-term memory and working memory are disputed and there is little agreement on how to define them, their functions, or whether they exist (Cowan, 2008; Neath & Surprenant, 2008). In spite of this, short-term memory and working-memory are frequently referred to as established terms whenever cognitive performance is an issue.

During retrieval from long-term memory, the short-term memory is continuously refilled with information stored in long-term memory (Cowan, 2000). Furthermore, short-term memory is needed for tasks such as planning, thinking, controlling the language and choosing retrieval cues (Shiffrin, 1993). This means that the capacity and functions of short-term (and working memory) is relevant also for retrieval of autobiographical memories from long-term memory. Disruptions in short-term memory may thus have a negative impact also on our memory for repeated events.

### *Established principles of memory*

A different way to introduce human memory is to focus on what we do know about its function. Surprenant and Neath (2009) presented seven principles (see Table 1) that describes “*fundamental empirical regularities*” (p. 25) in memory that today are supported by extensive evidence and are valid regardless of how we chose to model or explain memory. The purpose of listing established principles was to spur theory development concerning the basics of memory, and the authors emphasise that the list is not exclusive and may not include the most important principles. However, each of their seven principles is fundamental to the present thesis and thereby constitutes a meaningful introduction to human memory function.

First, whenever we remember something it will always start with a cue (Tulving, 1974). The cue can for example be a question, a thought, a visual stimulus, an emotion, a smell or a taste. There is always something that trigger remembering and that something is called a cue (Surprenant & Neath, 2009).

Second, the encoding-retrieval principle (e.g., Tulving & Thomson, 1973) states that whether you will recall something depend on the match between conditions during encoding (i.e., the point in time where you experience the

to-be-remembered stimuli) and retrieval (i.e., the point in time where you try to recall the experienced stimuli). No or weak association between the two conditions will have little potential to trigger remembering. For example, it is unlikely that pictures of vegetables will help you recall cities in Asia. According to Surprenant and Neath (2009) a consequence of this principle is that items, processes, and cues do not have an intrinsic mnemonic value. That is, whether a retrieval strategy actually facilitate recollection depends on the encoding conditions and the match between retrieval strategy and encoding conditions.

Third, cues will be more effective if they do not have too many associations (Watkins & Watkins, 1975). The word “Swede” may be an effective cue for someone outside of Sweden to recall a certain person, but it will likely be quite ineffective for most people living in Sweden.

Fourth, memory is reconstructive (e.g., Bartlett, 1932). It is created through a dynamic process that does not end with the to-be-remembered stimuli. We reshape our memory to better fit our expectations, beliefs and understanding of the world around us.

Fifth, the impurity principle (Surprenant & Neath, 2009) is a consequence of the reconstruction principle, and states that it is not possible for researchers to measure a particular memory system or process. Memory is not pure, and it is therefore impossible for outcomes to be pure whatever measure the researcher uses.

Sixth, we will better recollect items that for any reason – at the time of retrieval – stands out from the others (e.g., Fisher, 1981; Surprenant & Neath, 2009). An emergent and painful dental visit will likely stand out and therefore be recollected (as long as there were no additional such visits). However, even if the item did not stand out during encoding it might do so during certain retrieval conditions. A bundle of keys on the kitchen table may be encoded without having any particular meaning to you until you reach the office and realises that you cannot get in. The locked door becomes the cue that makes the memory stand out: The keys are on the kitchen table.

Seventh, the specificity principle states that specific information is more vulnerable to memory errors than general information (Surprenant & Neath, 2009). The specific information may involve details about events or items, such as colours, forms, names, dates, or single episodes in series of events. In contrast, general information regards the overall picture or typical features, for example how something usually looks like or how a certain type of event usually occurs.

**Table 1. Seven principles of memory.**

<b>1 The cue-driven principle</b>	Recollection will always begin with a cue.
<b>2 The encoding-retrieval principle</b>	Memory depends on the match between conditions at encoding and retrieval.
<b>3 The cue-overload principle</b>	Cues are less effective when they have too many associations.
<b>4 The reconstruction principle</b>	Memory is the result of many things – not only by information present at encoding.
<b>5 The impurity principle</b>	It is impossible to measure a particular system or process – memory is always impure.
<b>6 The relative distinctiveness principle</b>	Items that stand out from the others will be well recalled.
<b>7 The specificity principle</b>	Specific information is more vulnerable than general information.
<i>Notes.</i> Table adopted from Surprenant and Neath (2009; p. 7-8).	

There are several additional factors that affect whether and how well we might remember something and some of them should be mentioned here. First and foremost, the information needs to be encoded in order to later be recollected (Baddeley et al., 2009). It is for example impossible to encode the face of a perpetrator if the person is wearing a mask. In line with this, we better recall stimuli that we paid attention to, than stimuli that was peripheral to us during encoding (Christianson, 1992). Further, it is easier to recall the to-be-remembered information if it has meaning to us (Baddeley et al., 2009). For example an odontology student might recall more details about her dental visits than someone who studies law or sociology. Stimuli that evoked emotions are usually better recalled than stimuli that was emotionally neutral to us (Christianson, 1992), although very high emotional arousal can have a negative impact on memory (Deffenbacher, Bornstein, Penrod, & McGorty, 2004). Our memories of an event will also be strengthened if we repeatedly call it into mind (Linton, 1975).

The seven principles of memory (Surprenant & Neath, 2009) listed above is each fundamental to understand and discuss difficulties and possibilities related to recollection of repeated events and the study thereof. From these principles we can draw the following conclusions:

- a) Cues are needed for recollection – but not any cue will do (Principles 1-3).
- b) The recollections will be more or less distorted, and it is therefore not possible for a researcher to measure memory in exact ways (Principles 4-5).
- c) There are two main reasons for why individual episodes of repeated events will be more difficult to retrieve than single and unique events: Repeated events are less distinct and more vulnerable to memory errors (Principles 6-7).

In the next sections I will introduce research on remembrance of repeated events specifically, and factors related to retrieving them in applied settings.

### *Remembering repeated and similar events*

The topic of repeated events is important to investigate not only to extend our knowledge in general about human memory, but mainly due to implications for legal practice and research methodology. In surveys people are frequently asked to answer questions such as how often they have visited health clinics during the past year and how they experienced those visits. This made Means, Nigam, Zarrow, Loftus, and Donaldson (1989) and Means and Loftus (1991) investigate whether patients' recall of repeated and similar health visits are different from recollections of single and unique visits. This line of research was later followed up by for example Cohen and Java (1995).

Most research on repeated events has however been conducted within the area of legal and forensic psychology. The largest body of literature so far has concerned repeated abuse of children and more specifically child sexual abuse (e.g., Connolly & Gordon, 2014; Connolly, Price, Lavoie, & Gordon, 2008; Powell, Roberts, & Guadagno, 2007; Roberts & Powell, 2001). Reports of repeated events and abuse may to some extent face the same or similar difficulties regardless of age. However, research on adults' memory for repeated events has so far (to the best of my knowledge) not concerned abuse. When adult asylum seekers' statements about repeated events is discussed (e.g., UNHCR, 2013) it is instead literature on survey methodology (e.g., Cohen & Java, 1995) that is cited. In addition, Neisser (1981) presented a case study on John Dean's written and verbal testimonies of the Watergate events. John Dean was a key witness in the case against President Nixon in the 1970's, and the testimonies regarded repeated and similar meetings between Dean and Nixon. Adults' memory for repeated events has also been investigated within a new line of research that aims at developing techniques for interviewing detainees (i.e., individuals who are held at military bases suspected of terrorism or suspected to hold information about such activities). For instance, Leins, Fisher, Pludwinski, Rivard, and Robertson (2014) studied how to enhance recollection of individual episodes from a series of repeated and similar meetings that detainees might have visited, for example political or religious meetings during which activists and combatants sometimes are recruited to guerrilla warfare.

Thus, the study of memory for repeated events has some implications for research methodology but perhaps to a greater extent for legal matters (repeated abuse against children and adults, and repeated events of different

kind experienced by asylum seekers, detainees, or witnesses). Except from the research on survey methodology (e.g., Means & Loftus, 1991) and Neisser's (1981) case study, a common feature of the previous research is that the respondents/participants do not belong to the population that the research is generalised to. This means that conclusions about memories of abuse or detainees' recollections are uncertain. We may conclude that memories of repeated events in other populations suggest that it is in a certain way, but we should be careful when discussing implications for other populations or types of events. The reason why the experimental research has not been conducted with detainees or plaintiffs is difficulties to do so in an ethical way. An informed consent would simply not be enough to employ vulnerable individuals in such research. However, it is reasonable to believe that our memory for repeated events has some basic features that are common for all types of such events, although research on related topics needs to be taken into account as well (e.g., how our memory is affected by trauma and psychopathology, interrogation/interview methods, effects of long periods of isolation and humiliating treatment in custody, etc.).

### **Schemata, script, and repisodic memories**

The term "repisodic memory" was coined by Neisser (1981) to describe episodic recollection of repeated events that has an overall correctness although the specific details may be ascribed to the wrong event. The concept is closely related to – albeit different from – the terms "schemata" (Bartlett, 1932) and "script" (Schank & Abelson, 1977). The meaning of schemata is any general knowledge about the world around us; about events, people, things, places, and actions. We may have schematic knowledge about our own close relatives or family members in general (e.g., the role of mothers, fathers, siblings), and about places we may have visited or not (e.g., that you in France can visit the Eiffel tower, smoke Gauloise, and taste nice wines).

In contrast, script refers to schematic knowledge about events only (Baddeley et al., 2009), for example how a restaurant visit, pocket theft, or dental visit usually occurs. Script is thereby a key concept when discussing memory for events, although other types of schematic knowledge may influence our memory of particular details related to an event (e.g., script is relevant to our memory of a restaurant visit, although our memory of the waiter may be more shaped by other general knowledge we have). Hence, repisodic memories (Neisser, 1981) can be influenced by scripts we have for different types of events (Schank & Abelson, 1977) and by other schematic knowledge (Bartlett, 1932).

### **Gist versus verbatim memory**

Repeated events tend to be recalled in a general manner (e.g., Roberts & Powell, 2001). We tend to recall how it usually happened (the gist) but face difficulties when trying to specify details or describe individual episodes (verbatim memory). Gist-based information takes less effort to process and it may be stored independently of the details (Reyna & Brainerd, 1995). In addition, it is retrieved differently in the sense that different retrieval cues seem to evoke mainly gist or details (Brainerd & Reyna, 2004). For example, thematic cues as “*food*” tend to evoke gist memories, while specific cues as “*potato*” tend to generate detailed memories.

The gist of encoded information is usually remembered well while the specific details are more vulnerable to errors (Surprenant & Neath, 2009). According to an overview by Reyna and Brainerd (1995), specific details fade more rapidly than gist memory and there is a higher risk that details will be inaccurately recalled. For instance, gist information can be highly influenced by schematic knowledge (e.g., Koriat, Goldsmith, & Pansky, 2000) which in turn may lead to inaccurate remembrance of details. A frequently cited example of this is that when people are presented with a list of related words (e.g., table, sit, legs, sofa, rest, desk), they tend to falsely recognise another related word (e.g., chair) as present (Roediger & McDermott, 1995). In addition, it can be difficult to trace the origin of details, for instance pinpointing when a particular topic was discussed during a holiday with the family (a source monitoring problem; Johnson, Hashtroudi, & Lindsay, 1993).

Hence, people can often remain accurate by reporting gist-based information instead of specific details (Reyna & Brainerd, 1995). This implies that it should not always be preferable to extract specific information since it sooner or later most likely will be on the cost of accuracy. If one does however want to enhance recollection of specific details one should employ cues that are specific (Brainerd & Reyna, 2004).

### **Impairments in cognitive performance**

There is a wide range of temporary and chronic cognitive impairments that potentially can negatively affect our autobiographical memory for details; during encoding, retrieval, or both. It has for instance been shown that older adults have more difficulties reporting specific information than younger adults (Rabinowitz, Fergus, & Ackerman, 1982; Serrano, Latorre, & Gatz, 2007). The reason may be that they encode information gist-based instead of item-based, but it also possible that they simply fail to make proper use of memory cues (Surprenant & Neath, 2009). In any case, recollections tend to be somewhat less specific with advanced age.

Relevant to recollections of repeated events in legal investigations and health surveys is a cognitive disorder called overgeneral memory (OGM; Williams & Broadbent, 1986). Individuals suffering from PTSD (Moore & Zoellner, 2007), depression (van Vreeswijk & de Wilde, 2004), and other emotional and affective disorders (Williams et al., 2007), tend to report generic autobiographical memories (e.g., *“I feel happy when I read books”*) even when they are explicitly asked to recall specific memories (e.g., *“I felt happy the day I could not stop reading a book by Isabel Allende”*). This is relevant to the topic of repeated events for two reasons. First, individuals with affective disorders might be overrepresented among health care patients and as adult victims of repeated abuse (PTSD: Kemp, Rawlings, & Green, 1991; depression: Sorenson & Golding, 1990). Second, as will be discussed further in the next section, fighting OGM means finding ways to increase specificity, which is exactly what this thesis is about.

Raes, Williams, and Hermans (2009) stated that individuals with an overgeneral memory tend to face slow recovery from depression, and that OGM tend to linger even after recovery. They therefore concluded that psychological treatment for OGM itself could be valuable to reduce vulnerability to depression and thereby increase the chances of successful recovery. They developed a training programme to enhance memory specificity (see next section). Several causes of overgeneral memory has been proposed, for instance that overgeneral responses are the result of an inability to remain focused during retrieval (Williams et al., 2007). To some extent the outcome of OGM may thus correspond well to measures of sustained attention.

OGM is measured with a test called Autobiographical Memory Test (AMT; Williams & Broadbent, 1986), in which individuals are asked to recall specific memories associated with a number of cue words. A specific memory is defined as something which occurred within one day (e.g., *“the day we spent in the woods on our last holiday”*). This definition corresponds well to remembering individual episodes of repeated events and is therefore highly relevant to the present work. Individuals known to often have an overgeneral memory should thus be at risk of being less able than others to recall unique episodes from a series of repeated events. It could also be argued that simple tiredness could result in difficulties to remain attention or premature abortion of the memory search process and as a consequence generate overgeneral responding. To my knowledge, the effects of tiredness on the outcome of AMT have not yet been investigated, but could be valuable to study since tiredness is an everyday phenomenon: Most of us experience tiredness to some extent each day.

Although OGM tend to be stable over time (Sumner, Mineka, Zinbarg, Craske, Vrshek-Schallhorn, & Epstein, 2014) individuals can be conditioned

to provide more specific answers (Debeer, Raes, Williams, Craeynest, & Hermans, 2014). In contrast, it seemed to be more difficult to condition generic responding. This may indicate that overgeneral responding is not learned, but rather a dysfunction during retrieval that can be at least temporarily reversed. This has important implications for both legal investigations and survey methodology since it shows that recollection of specific memories might be enhanced – even for individuals prone to overgeneral responding – through adequate support before or during retrieval. Different methods that might be effective for this purpose are discussed in the next section.

### *Particularisation of repeated events*

Since recollections of repeated events tend to be recalled in a general manner (Roberts & Powell, 2001) and be difficult to distinguish from each other (Johnson, et al., 1993; Neisser, 1981), researchers frequently refer to the term “particularisation” (Powell et al., 2007) to name the process of unwinding this type of memories. Differently put, repeated events are often recalled as a general cluster of events that in applied settings (e.g., legal cases) needs to be particularised.

Specificity in recollections of a unique and single event refers to a detailed account about the event, for example what happened, when it happened and who was involved. However, when discussing repeated events, the reported memories can be specific in at least two different ways. One can be specific by providing details in general about the episodes (e.g.: “*I’ve had the same dentist since I moved to town 10 years ago. Her name is Paula. She is very gentle and I like her a lot, but sometimes she’s a bit confused and forgets things*”), and one can be specific by providing details about a particular episode (e.g., “*On one occasion my dentist misplaced her glasses and I had to wait while she looked for them, and on a different occasion we had to cancel the appointment because she had scheduled me on the wrong day*”). Although there are many details in the former example, there is no specificity of individual events which there is in the latter example. Both types of specificity are relevant when discussing particularisation of repeated events. Only one prior study (Leins et al., 2014) has distinguished between these two types of measures. However, although Leins et al. did employ different interview techniques for particularising individual events and extracting details about the events they did not discuss it as two different measures. The aim of the study by Leins et al. (2014) was to extract as much information as possible and they did so by using several techniques. As a consequence they implicitly suggested that there are two different types of measures.

The amount of details provided about the events has been operationalised differently by different researchers, which makes it difficult to compare the results across studies. An additional methodological issue is that it is common to measure the amount of details separately for different parts of the narratives (e.g., free recall only, specific questions only, and for the narratives in whole; see Leins et al., 2014, for an example of this). In addition, researchers employ different interview protocols in different studies. These factors together make comparisons of results across studies very complicated. These methodological shortcomings were investigated in Study II.

### **Interviews and memory cues**

Several scientific attempts to particularise episodic memories have proven successful. To my knowledge the first such experiments were conducted by Means et al. (1989) and Means and Loftus (1991). Their extensive studies consisted of several experiments and made at least two important contributions to this research topic. First, they experimentally confirmed Neisser's (1981) suggestion that repeated events are recalled in a more general manner (so called repisodes) than single and unique events. Second, they found that enhanced support during retrieval facilitated particularisation of repeated events. Their studies were later followed up by Cohen and Java (1995) who studied the effects of two types of retrieval support (see more below). They found that particularisation may be possible, although their results were not as clear as in the studies by Means et al. (1989) and Means and Loftus (1991).

Most research on this topic has concerned children's memories which have been studied extensively by researchers in Australia and Canada for about 20 years. For obvious reasons studies on children might not always apply to adults' memory. However, the literature on adults is scarce and the results from research on particularisation of children's memories are therefore succinctly reviewed in Table 2. The table is based on a recent article by Brubacher, Powell, and Roberts (2014) that aimed at presenting recommendations for legal practitioners grounded in current empirical knowledge. Most relevant to the present thesis are the specific techniques: episodic memory training, asking for the gist before asking for details, asking how many times something happened, and asking about differences. Although not yet tested with adults (except from memory specificity training, Raes et al., 2009, to be discussed below), these techniques might be beneficial for most plaintiffs regardless of age.

At least four<sup>1</sup> studies (Cohen & Java, 1995; Leins et al., 2014; Means et al., 1989; Means & Loftus, 1991; Rivard, Fisher, Robertson, & Hirn Mueller, 2014) have aimed at specifically testing the effects of interviewing techniques on particularisation of adults' memories for repeated events. All four employed an interview technique at least partly inspired by the Cognitive Interview (CI; Fisher & Geiselman, 1992). Three (Cohen & Java, 1995; Leins et al., 2014; Rivard et al., 2014) of them tested the CI alone (i.e., not accompanied by other mnemonics). The CI consists of several techniques aimed at optimising the prerequisites for accurate and thorough recollections, for instance rapport building and not interrupting the witness (Fisher & Geiselman, 1992). Cohen and Java (1995) found that although CI did increase recollections to some extent (an increase of 6%), it did so to lesser extent than a recognition check-list (29%; partly derived from the participants' own notes about their experienced events). Rivard et al. (2014) taught CI to professional interviewers at the Federal Law Enforcement Training Center and compared it to the standard interview that is routinely taught at the training center. The results showed that CI was the better technique for particularisation although the results were not statistically significant<sup>2</sup>. This is in line with the results from Leins et al. (2014) who found that CI was more effective for particularisation than a control interview.

Leins et al. (2014) tested the effects of a package of mnemonics on particularisation of family events. The package included the following mnemonics: Constructing a family tree, constructing a time-line, normative cues (e.g., naming holidays that are common for families to come together), derived cues (cues derived from other individuals who has experienced similar situations), self-generated cues (asking questions that can activate the interviewees associative network and help her generate own cues, e.g., asking why family events occur), and subcategorisation (e.g., asking the interviewee to think about events involving certain family members). Furthermore, the participants were asked about frequency, as suggested by Brubacher et al. (2014). The results showed that this package of mnemonics enhanced recollection of individual events. Similarly, Means et al. (1989: 1991) found that their package of mnemonics increased recollection of individual events.

The mnemonics in their studies included techniques from the CI (Fisher & Geiselman, 1992), the construction of a time-line, and specific probes such as thinking about the first visit, the last visit, and of whether there were events or details that were different in any way.

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<sup>1</sup> I count Means et al. (1989) and Means and Loftus (1991) as one study, since the results are partly the same and seem to be derived from the same dataset (only the second study is published in a peer reviewed journal).

<sup>2</sup> The result in Rivard et al. (2014) was statistically significant only after excluding one outlier whose recall was very much facilitated by the standard interview. The study involved 24 participants in all.

The above mentioned studies investigate similar mnemonics. However, there seem to be a lack of overbridging structures across studies: What mnemonics should we test and why? How shall we test them (packages vs. individually)? What should we compare them with? How shall we measure the outcome (e.g., details vs. events)? Especially details can be measured in a variety of ways which makes it difficult to compare outcomes of different studies. These weaknesses in current research on particularisation of adults' memories need to be addressed to make the research more effective.

<b>Table 2. Recommended interview techniques.</b>	
<b>Throughout the interview</b>	
<b>Open-ended prompts</b>	Employ open questions such as "What happened?" and "Tell me more about that."
<b>Language specificity</b>	Employ specific language to generate specific responding, and generic language to generate generic responding.
<b>Adopt labels</b>	Adopt the plaintiff's own words when referring to reported events and details.
<b>Specific techniques</b>	
<b>Episodic memory training</b>	Let the plaintiff practise memory specificity for non-criminal events at the beginning of the interview.
<b>From gist to detail</b>	Ask for the gist of events prior to asking for specificity.
<b>Ask about frequency</b>	Ask how many times events and details occurred to ensure whether it happened once or repeatedly.
<b>Ask about differences</b>	Ask if there were events or details that were different from the other.
<i>Notes.</i> Summary of recommended techniques that can be used for interviewing children about repeated events (Brubacher et al., 2014).	

### **Cognitive training in clinical settings**

Individuals with affective disorders tend to recall memories that lack specificity (Williams et al., 2007): They suffer from an overgeneral memory (OGM; see above). Individuals with OGM tend to recover more slowly from depression (than individuals who recall specific memories) and after recovery from depression they often continue to have an OGM (see Raes et al., 2009, who summarises key findings from several studies). In addition, it has been reported across studies that individuals from non-clinical settings who have an OGM are at higher risk of developing emotional stress and depression (Raes, Hermans, Williams, & Eelen, 2007). Several training programmes have therefore been developed during the past years, aiming at increasing memory specificity in individuals with different types of psychological disorder.

ders. This is relevant to the present thesis since the goal with particularisation is exactly the same, namely to increase the specificity in recollections.

The *MEemory Specificity Training* programme (MEST; Raes et al., 2009) originally consists of four training sessions of one hour each. The programme runs over four weeks and the sessions are held in groups led by an instructor. In the first session the instructor holds a lecture about memory function related to depression and the meaning of OGM is explained to the participants using examples. In the subsequent three sessions memory specificity is thoroughly practised. Between sessions participants have homework consisting of further practise in retrieving specific memories. The overall results across the three studies (Neshat-Doost et al., 2013; Moradi, Moshirpanahi, Parhon, Mirzaei, Dalgleish, & Jobson, 2014<sup>3</sup>; Raes et al., 2009) conducted so far is that MEST successfully increases the number of specific memories recalled. The positive effects of the training remained after two (Neshat-Doost et al., 2013) and three months (Moradi et al, 2014).

Similar training programs have been conducted with older adults (Serrano et al., 2004; Serrano et al., 2012) and with individuals diagnosed with schizophrenia (Ricarte et al., 2012; Ricarte et al., 2014). Again the overall findings are that memory training has a positive effect on retrieval of specific memories. One training programme was administered online to non-depressed college students (Maestas & Rude, 2012). The programme consisted of training in expressing oneself in one of three different ways of writing. The results showed that writing about ones feelings and thoughts, as well as writing vividly with a lot of details increased memory specificity. Surprisingly though was the largest increase found at a 6-month follow-up and not immediately after training. In addition, training in mindfulness has proven successful in increasing memory specificity (Hargus, Crane, Barnhofer, & Williams, 2010; Heeren, Van Broeck, & Philippot, 2009; Williams, Teasdale, Segal, & Soulsby, 2000).

Only one training programme so far has failed to increase memory specificity. Mogoşe, Brăilean, and David (2013) had dysphoric undergraduate students going through concreteness training (originally developed by Watkins, Baeyens, & Read, 2009, and Watkins & Moberly, 2009) that was administered online. The training consisted of reading two written scenarios each day for about a week (e.g., “*It is your birthday. Your family organized a great surprise party for you at home.*”). The participants were instructed to concentrate on each scenario for two minutes and try to picture them in thought as a movie. This training did not enhance specific recall compared to students who did not receive any training at all.

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<sup>3</sup> The participants in Moradi et al.’s (2014) study were diagnosed with PTSD.

The above review of studies indicates that cognitive training might be a useful tool for particularisation of repeated events, although such training has never been tested for this particular purpose. It is important to note though that none of the studies above has controlled the accuracy of retrieved memories. This is a weakness in the OGM/AMT research overall (Zlomuzica, Dere, Machulska, Adolph, Dere, & Margraf, 2014). Furthermore, most of the studies had very few participants (sometimes less than 10). The findings should therefore be interpreted with caution.

### **Bridging past and present research**

Specificity in recollections of repeated events is twofold: the number of events that can be referred to and the amount of details provided about the specific events. Study I and II in the present thesis is the first studies that have made this distinction explicit. Although Leins et al. (2014) implicitly distinguished them by having two separate phases of which the first aimed at extracting a number of events and the second phase aimed at extracting details about the events. In Study II we investigated this issue further by exploring to which extent the two different specificity measures are equally affected by potentially influencing factors such as age and number of events experienced. Although number of referred events is a quite uncontroversial measure since the alternatives for operationalisation are limited, the alternatives for operationalising amount of details are several and comparisons across studies are complicated by this fact. These issues were addressed in Study II.

No previous study has investigated the effects of individual mnemonics on particularisation of adults' memories or to which extent context-specific cues may enhance remembering (except from an unpublished study by Philips & Fisher, 1998). Study I was primarily designed to investigate both these issues.



# Summary of the empirical studies

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This thesis consists of two empirical studies that origin from one data collection carried out in Gothenburg, Sweden, during the spring 2012. The project was approved (id: 1007-11) by the Regional Ethical Review Board, University of Gothenburg, Sweden.

The purpose of the studies was twofold. One, to investigate the effectiveness on particularisation of adding one interview after presenting interviewees with one of three types of memory cues (mnemonics). Specifically, we investigated the effect of context-specific cues (we called them “derived cues”) that had been derived from other respondents in an initial study. No previous studies have investigated the effects of specific mnemonics on particularisation of adults’ memories for repeated events. In addition, there is no published research on the effect of derived context-specific cues on particularisation of repeated events. Study I therefore aimed at increasing our knowledge about the effectiveness of specific mnemonics – more specifically, the effectiveness of derived cues – on adults’ memories for repeated events.

The second purpose was to critically review how research on recollections of repeated events is conducted and how it may be refined. We specifically investigated the influence of five factors on two measures of specificity. Moreover, different coding procedures have been employed in different studies on repeated events which make the results difficult to compare across studies. These methodological issues were addressed in Study II and suggestions were made that facilitates employment of the same coding procedure across studies.

## General method

### *Participants*

The respondents were originally recruited through advertisements in the waiting room of 20 dental clinics in the Gothenburg area who graciously allowed us access. Due to difficulties recruiting the large number of participants we needed, we also emailed enquiries to individuals who had announced interest to participate in research at the Department of Psychology. We further asked personnel at a few of the 20 collaborating clinics to verbally inform some of their patients about our study: Patients younger than 30 years because they were initially underrepresented in our sample, and respondents who have made very large number of visits ( $\geq 20$  visits during the past ten years). The criteria for participating (Swedish-speaking adults having made about 8 visits or more) were however the same and the differences in recruitment process are therefore not expected to have influenced the results in significant ways. Participation was voluntary and compensated with a gift card to each respondent (worth about 28 Euro, valid at stores and restaurants in Sweden).

Ninety-nine respondents participated in the study although four had to be excluded (because they did not bring their dental records and because of interviewer mistakes). The final sample consisted of 95 respondents (71 women) with a mean age of 43 years. They reported to have made on average about 17 dental visits each (ranging from 6 to 60) during the past 10 years.

### *Deriving the memory cues for Study I*

Prior to the major data collection an initial study was conducted to derive the cues to be used in Study I. Twenty-seven university students (27-54 years) answered a short questionnaire and were compensated with one lottery ticket each worth about 3 Euro. They were asked to recall as many dental visits as possible made during the past ten years. For every visit they recalled they were additionally asked to answer what made them remember that particular visit. Their answers to the latter question was categorised to form two types of context-specific derived cues (derived specific cues and derived categories). Eight categories (Table 3, left column) were identified by the first author and a research assistant. These categories were presented to participants in the derived categories condition when collecting data for the major study. To create the specific cues, subcategories within each of the eight categories were selected five quotations within each main category (resulting in a total

of 40 quotations). A selected quotation was either a representation of its sub-category or considered to have high associative potential as a memory cue. These 40 quotations together with the eight categories formed the memory cues in the derived specific cues condition. Both types of derived cues are presented in Table 3.

Comparison cues were selected with the aim of choosing cues that are commonly used in police interviews with plaintiffs and witnesses. The following six cues were selected:

- The last visit
- The second last visit
- The first visit
- The second visit
- Visits that stands out from the others
- Visits that co-occurred with a holiday or similar

All cues in all conditions were printed on cards and started with an instruction to think back and see whether the cue (which was underscored) would help them recall additional information about their dental visits. For example: “Think back at times and dates” and “Think back to the last visit you made”. In the derived specific cues condition the quotations followed immediately its category. An example of a card in the derived specific cues condition is found below (the cards without quotations were shorter).

Think back at conversations you had with the personnel.

“I promised the dentist to stop using snuff”  
“I was instructed how to prevent caries”  
“As usual, I asked if they could make my teeth more white”  
“She said I had bad dental hygiene”  
“I got calming information”

*Does this help you recall additional visits?*  
*Does this help you recall additional details about the visits you have already reported?*

**Table 3. The derived cues.**

<b>Categories</b>	<b>Quotations</b>
<b>Emotions and sense-experiences</b>	<p>“Worried that there would be an invasive procedure”</p> <p>“It was unpleasant and painful”</p> <p>“Afterwards, I had speech difficulties from the anesthesia”</p> <p>“It smelled bad when the dentist drained the tooth”</p> <p>“Afterwards, my mouth felt clean”</p>
<b>Conversations</b>	<p>“I promised the dentist to stop using snuff”</p> <p>“I was instructed how to prevent caries”</p> <p>“As usual, I asked if they could make my teeth more white”</p> <p>“She said I had bad dental hygiene”</p> <p>“I got calming information”</p>
<b>Times and dates</b>	<p>“The last two times, I had to make several fillings”</p> <p>“I had to come back a couple of weeks after the routine visit”</p> <p>“My birthday was to come”</p> <p>“I usually get a dental recall card around summer time”</p> <p>“It took several visits to fix”</p>
<b>Places and locations</b>	<p>“Met with a specialist in a new department”</p> <p>“It was when I moved to Sweden”</p> <p>“Had to go in emergency to a different clinic than the usual one”</p> <p>“I still lived in my old flat”</p> <p>“First and only time since I moved to Gothenburg”</p>
<b>Personnel</b>	<p>“Heavy-handed dental hygienist”</p> <p>“I noticed the name of the dentist”</p> <p>“New dentist”</p> <p>“My first visit to a dental hygienist”</p> <p>“The dental hygienist was nice, explained well”</p>
<b>Economy</b>	<p>“I had income support from the social services and they were supposed to pay, but it got too expensive so they didn’t want to”</p> <p>“The quality of my teeth was downgraded”</p> <p>“First visit since I had to pay for it”</p> <p>“Cheaper than usual”</p> <p>“I forgot my bank account number and couldn’t sign for a dental insurance”</p>
<b>Treatments</b>	<p>“Impressioning”</p> <p>“It didn’t bleed when the dentist removed the calculus”</p> <p>“Had to sew in the mouth”</p> <p>“She took some x-rays”</p> <p>“The dentist’s drill”</p>
<b>Reasons for visit</b>	<p>“Recommendation from my sister”</p> <p>“Got problem with the same tooth again”</p> <p>“Destroyed a tooth while biting and lost a filling”</p> <p>“I had chipped one tooth”</p> <p>“It was a different reason than usual”</p>
<p><i>Notes.</i> Derived categories and specific cues. Both categories and quotations were presented in the derived specific cues condition. Only the categories were presented in the derived categories condition. All cues are here translated from Swedish.</p>	

## *The interviews*

All participants were interviewed twice. Both interviews are included and compared in Study I, while only the first interview forms the basis for Study II.

Participants brought their dental records to the experiment in envelopes that had been sealed by the personnel at the dental clinics. Everyone signed an informed consent form before the experiment started. The experimental session lasted between 90 and 120 minutes for each respondent. The interviews were conducted by one of four interviewers who followed a structured interview protocol. The length of the first interview was usually around 30 minutes.

After the first interview, participants were presented with one of three sets of memory cues (derived specific cues, derived categories, or comparison cues). The cues were printed on cards. For each condition there were 6 or 8 cards. The presentation order of the cards was randomised in different orders. All participants received between 15 and 20 minutes with the cards, and all were offered an additional 5 minutes if they wanted to. Participants were encouraged to make notes on a paper to use as support during their second interview. They were subsequently interviewed a second time in which they were asked whether they recall anything that they did not report in their first interview. If their answer was positive they would receive the same questions as in the first interview. The second interview usually lasted about 10-15 minutes.

## *Post-interview procedure*

After the second interview, respondents answered a post-interview questionnaire about demographics and how they had experienced the interview. They subsequently opened their sealed envelopes and had some time to review their dental record if they wished. When they were ready they received instructions from the experiment leader on how to anonymise the dental record. The records were then copied, and the copy was later used in the studies to establish objective truth.

## *Data preparation*

### **Number of events**

One research assistant coded all statements and the corresponding dental records. He counted the frequencies for each measure that is included in both studies (Study I and II). Another research assistant conducted independently the same coding procedure for 21% of the material. Intraclass correlations were calculated and showed an excellent agreement for all measures (no measure had an agreement less than .94).

### **Type of memories**

Type of memories measured the incidence of generic, specific, and specific-extended memories (see below) and these variables were employed in both Study I and Study II.

All transcripts were broken down in short utterances similar to the procedure employed in Orbach, Lamb, Sternberg, Williams, and Dawoud-Noursi (2001). The work resulted in about 70.000 utterances. Each utterance was then categorised into one of four categories that are commonly used in the Autobiographical Memory Test (see for e.g., Griffith, Sumner, Raes, Barnhofer, Debeer, & Hermans, 2012, and Hargus et al., 2010):

**Generic** – Summaries of how something usually or typically occurs (e.g., “because I’m often very dry in my mouth when being stressed”)

**Specific** – A memory of something particular which lasted less than one day (e.g., “they had a trainee there during that visit”)

**Specific-Extended** – A memory of something particular which lasted more than one day (e.g., “During that period I had a lot of acne”)

**Error** – Not related to the dental visits or not containing any information (e.g., “I don’t know”, “I can’t say which day it was”)

One assistant categorised all statements, and a second assistant categorised 21 % of the statements. The interrater reliability was initially not impressive but after a training session with both coders the agreement reached an acceptable level (.66; Cohen’s unweighted kappa).

In addition, each utterance in the three categories (generic, specific, and specific-extended) was verified by comparison with the dental records. This work was conducted by two other assistants. Each utterance was coded as confirmed, refuted, or unverified. Again the interrater agreement was initially considered too low and a training session did not improve the agreement enough. Instead the two assistants worked together with each utterance they disagreed upon until they reached an agreement of 100%. The main coder was thereafter instructed to apply their common rules when alone coding the rest of the material.

# Study I

## *Aims*

Previous studies on particularisation of adults' memories of repeated events have either examined the effect of the Cognitive Interview (Cohen & Java, 1995; Rivard et al., 2014) or the effect of interview techniques involving a package of several mnemonics (Means et al., 1989; 1991; Leins et al., 2014). No study has examined the effect of single mnemonics on particularisation of adults' memories. The main aim of Study I was therefore to investigate the effect of one particular mnemonic that has previously been used in the study by Leins et al. (2014), namely derived cues.

Three packages of cues were compared: derived specific cues vs. derived categories vs. comparison cues. We predicted that derived cues would generate more individual events (Hypothesis 1a) and more detailed memories (Hypothesis 2a) than the cues that are commonly used in police practice. In addition, we expected that derived specific cues would generate more individual events (Hypothesis 1b) and more detailed memories (Hypothesis 2b) than the derived categories. We further expected rehearsal to be positively associated with participants' recollection (Hypothesis 3), and that higher levels of unpleasantness would be associated with better recall of the dental visits (Hypothesis 4).

## *Results*

In line with Hypothesis 1a and 1b, derived cues tended to be more effective for recollection of individual events ( $p = .055$  [1-tailed],  $r = .17$ ) and details about the events ( $p = .08$  [1-tailed],  $r = .14$ ) than the comparison cues. The results were however only marginally significant. In contrast, there were no statistically significant differences between the two types of derived cues for any of the two measures.

Rehearsal of the memories by telling them to others was associated with an increased number of recollected events and details which supported Hypothesis 3. It mattered most how much the respondents had talked about the events and to less extent how much the respondents had thought about their dental visits. Partly in line with Hypothesis 4, higher levels of unpleasantness predicted a small increase in number of referred visits but not in number of details about the recalled visits. Importantly, derived cues did not decrease accuracy compared to cues that are commonly used in police practise.

## *Conclusions*

The findings suggest that derived cues can be a valuable contribution to packages of mnemonics that aims at facilitating particularisation of repeated events for adults. It should however be further investigated how specific (derived specific cues vs. derived categories) the cues need to be in order to be as effective as possible. Future research on the usefulness of single mnemonics may consider increasing statistical power by employing much larger samples. The effects observed in studies of interview techniques including several mnemonics cannot be used for drawing conclusions about the size of effects in studies of single mnemonics, since the merged effects of several mnemonics likely are stronger than the effects of single mnemonics.

# Study II

## *Aims*

The overall aim of Study II was to investigate the influence of five factors (interviewees' age, number of experienced events, interviewer, perceived unpleasantness concerning the events, and how much the interviewee had rehearsed the memories) on two measures of specificity: number of individual events recalled and amount of details provided about the individual events. These particular five factors were chosen because they all have implications for legal settings and could relatively easily be controlled or investigated in such applied settings (e.g., the age of the witness and how many events the witness estimates to have occurred).

In addition, it was investigated whether previous applied research on frequency estimations (e.g., Sharman et al., 2011; Thompson & Mingay, 1998) would be replicated by showing that people tend to underestimate how many times they have experienced repeated and similar events.

## *Results*

As summarised in Table 4, the results showed that the two measures of specificity (number of events and amount of details concerning the individual events) were affected differently for all five factors. In addition, previous research (Sharman et al., 2011; Thompson & Mingay, 1998) was replicated by showing that many respondents underestimated how many dental visits they had made. After excluding likely rounding errors, one third of the respondents underestimated the number of made visits with between 6 and 45 visits.

## *Conclusions*

The results show that the two measures of specificity (recalling individual events vs. amount of details recalled about the events) differ from each other and that it is important to operationalise both when considering how complete or specific memories of repeated events are. Although a number of events can be referred to it does not necessary mean that the narrative also is detailed, and although a statement include a large amount of details it does not necessary mean that it also includes descriptions of several individual events.

Moreover, we concluded that different coding procedures have been employed in different studies which make the results difficult to compare across studies. The coding manuals employed in our study were therefore made available through an online repository, to enable other researchers to employ the same procedures and thereby strengthen research on repeated events.

<b>Table 4. Influence of five factors on two measures of specificity.</b>		
<b>Factor</b>	<b>Referred events</b>	<b>Referred details</b>
<b>Age</b>	No	Yes
<b>Experienced events</b>	Yes	No
<b>Interviewer</b>	No	Yes
<b>Unpleasantness</b>	Yes	No
<b>Rehearsal</b>	Partly <sup>a</sup>	No

*Notes.* <sup>a</sup> It did matter how much the respondent had talked about the events, but not how much they had thought about them.

## General discussion

The results from our two studies point out several difficulties of remembering repeated events, but also demonstrate possibilities in findings ways to facilitate recollection. Study I showed that derived cues could be a meaningful mnemonic for enhancing recollection of individual events, while Study II highlighted methodological weaknesses in the study of repeated events that needs to be addressed in order to strengthen the field. The difficulties and possibilities are, respectively, discussed below.

### *Difficulties*

The difficulties are mainly of two kinds: issues that concern how research on the topic is conducted and issues that concern how repeated events can be better recalled. Study II showed that all five investigated factors had different influence on the two measures of specificity (namely, number of events recalled and amount of details provided about the events). This finding has implications for methodological practice as well as for how techniques can be developed for improving recollections. Future study designs should consider both specificity measures, even if choosing not to study both in the same study, and particularisation of repeated events could possibly become more effective if a clear distinction is made between the two measures. Differently put, mnemonics may become more effective if customised to enhance recollection of either events or details, instead of developing mnemonics with the general aim to enhance particularisation.

A valid question is why the two measures are affected differently. One reason may be that it is more difficult to specify individual events than it is to describe details about them. Study I showed that the number of recalled events increased from 6 to 8 in the second interview (i.e., after the participants had taken part of the cues). Hence, the increase was only about two events on average. In contrast the amount of details (specific and specific-extended memories) was increased from about 300 to almost 400 utterances. Thus, there are likely more opportunities to trigger memories of details than to trigger memories of individual events. In line with this explanation, the findings in Study II regarding influence of age on recollection of individual events (no effect) and recollection of specific memories (a decrease with age, in line with previous research, Phillips & Williams, 1997; Rabinowitz et al., 1982) may be due to the fact that the number of referred events was relatively small for most participants.

A number of studies with children have shown that recollections of repeated events tend to be more generic and less specific than recollections of single events (e.g., Roberts & Powell, 2001; Schneider, Price, Roberts, & Hedrick, 2011). Somewhat in line with this, Means and Loftus (1991) found that adults' reports about repeated events were less complete than reports about single events. An implication of these results may be that accounts about repeated events will include a larger portion of generic memories as the number of experienced events increases. In Study II we did not find such a relationship. The proportion of generic memories did not increase significantly as the number of events increased. This indicates that the actual number of events is not very important to the proportion of generic memories, as long as it regards a series of many events (our respondents had experienced between 6 and 80 events). Hence, adding our findings to previous research we can conclude that an individual who has experienced a number of similar events – regardless of how many – is likely to provide less specific memories than someone who has experienced a single event.

Study II also showed how difficult it is for people to make accurate estimations of how many times they have experienced a particular type of event. The number of experienced events was frequently underestimated, especially among those who had made large number of visits. This finding is supported by previous research. Underestimations of repeated and similar events have been reported for adults by for example Thompson and Mingay (1991) and for children in a study by Sharman, Powell, and Roberts (2011). Estimations of event frequency are common in legal settings (Powell et al., 2007) as well as in surveys (Means et al., 1989; Thompson & Mingay, 1991), and it is important for researchers and practitioners to consider these findings when deciding how to interpret and weight the estimations.

Finally, an important difficulty to point out regards the different coding procedures employed in research for measuring amount of detail in narratives about repeated events. It is a serious problem that needs to be addressed since it hinders proper comparisons across studies.

### *Possibilities*

Despite the many difficulties, Study I adds to the literature (Brubacher et al., 2014; Leins et al., 2014; Means et al., 1989; 1991) showing that successful particularisation is possible. Specifically, it demonstrated that derived cues aided particularisation, and did so to a greater extent than the comparison cues.

Four specific mnemonics has been recommended for use in forensic interviews with children who reports about recurring incidents (Brubacher et al., 2014; see Table 2 above): episodic memory training, asking for the gist before asking for details, asking continuously how many times something happened, and asking whether there were details or events that stood out from the rest. The last mnemonic, asking for differences, have not yet been tested empirically according to Brubacher et al. (2014) while the others have. To my best knowledge, our Study I is the first to empirically test the effect of specific mnemonics on particularisation of adults' memories . More research on adults is needed to enable similar recommendations to legal practitioners and fellow researchers.

Particularisation of adults' memories is sometimes needed in legal settings (e.g., Leins et al., 2014; UNHCR, 2013) as well as in research designs where memories of repeated events are studied (e.g., Means et al., 1989). Different types of mnemonics may be suitable for different purposes. Asking certain questions as those suggested by Brubacher et al. (2014; e.g., asking for differences) may be suitable for both purposes, as well as employing a time-line (Gosse & Roberts, 2013; Leins et al., 2014; Means et al., 1989). Several questions and a time-line may also be employed in studies conducted online. The case of derived cues is a bit more complex since it is event-specific, but there is nothing suggesting that it would not work in both settings. Other techniques, such as the Cognitive Interview (Fisher & Geiselman, 1992; Geiselman, Fisher, MacKinnon, & Holland, 1985), may be foremost suitable for forensic settings because interaction is needed or the technique would be so time demanding that online respondents would be fatigued. Development and refining of interview techniques for legal settings may also gain much from turning to clinical research conducted on overgeneral memory (Williams & Broadbent, 1986) and training in retrieving specific memories (e.g., Raes et al., 2009). It is possible that a similar training could be worthwhile in legal cases concerning repeated events, or that specific and more succinct techniques could be elicited from the clinical training programmes. It is important to note though that the clinical programmes do not consider accuracy of retrieved memories but only how to increase the amount of specific memories. In legal settings however (as well as in research methodology), accuracy is of key importance.

The distinctiveness principle (Surprenant & Neath, 2009) states that items are better remembered if they differ somehow from the other items. This distinctiveness must not be present at encoding, but could be created at the time for retrieval. Events that have occurred repeatedly are by definition less distinct, simply because there are many items that are very similar to each other. We therefore need to help interviewees making their memories more

distinct. We can do this by developing and testing mnemonics that are effective for this particular purpose. Study II suggests that such mnemonics should be aimed at *either* enhancing particularisation of individual events *or* extracting details about the events. Recollections of repeated events can be inaccurate for several reasons (Bartlett, 1932; Johnson et al., 1993; Neisser, 1981; Schank & Abelson, 1977) and we therefore need a specialised toolbox of techniques for memories of recurring events. Both empirical studies in the present thesis aimed at contributing to the development of such a toolbox. Importantly, we have chosen to openly share our coding procedures and manuals in order to enable others to employ the same procedures. This could facilitate proper comparisons across studies and further strengthen the research on particularisation of repeated events. High quality research that is replicable is crucial for making legitimate recommendations to investigative interviewers.

### *Limitations*

Two important limitations of the present research concern its design and sample size. While Study I was mainly confirmatory in its nature the research questions in Study II were formed after the data collection and should therefore be viewed as exploratory. Consequently, the grounds for drawing conclusions about the findings can be viewed as somewhat stronger in Study I than Study II. However, Study I suffered from low observed power (about 35%; the same low power that is observed in most psychological research, Bakker, van Dijk, & Wicherts, 2012) and the observed effects may therefore be inflated (Button et al., 2013). In addition, both studies were partly based on data with large variations. This was especially the case for type of memories and number of experienced events. It is thus important to consider these limitations when interpreting the findings, and await future (high powered) studies to see whether the results are replicated. Future research should specifically aim at recruiting respondents who have made very large number of events, about 30 visits and more, to enable in depth analyses on the effects of number of experienced events.

### *Conclusions*

Research on particularisation of adults' memories for repeated events is still in its infancy. There are however many possibilities, for instance established findings from studies with children (e.g., Brubacher et al., 2014) could be

integrated and the usefulness of memory training programmes (e.g. Raes et al., 2009) developed for clinical populations could be tested in new settings. Furthermore, the results from Study II suggested that we may be able to develop more effective mnemonics if we distinguish between recollection of individual events and recollection of details about the events. Study I indicated that derived cues can be a valuable mnemonic for increasing the recollection of individual events. There is a need though to investigate why the two specificity measures are affected differently, since an answer to that question could enable the development of even more effective techniques.

Overall, the prospects for particularisation of repeated events seem promising, although there are methodological issues that need to be resolved.

### *Coming research*

The current research project comprises three studies of which two are included in the present thesis. The main focus of the remaining study is to empirically investigate the incidence of overgeneral memory (OGM; Williams & Broadbent, 1986) among women who have been repeatedly abused by an intimate partner. As mentioned in the Introduction, OGM as a concept refers to a tendency to recall all type of autobiographical memories in an overgeneral manner. This means that the tendency among plaintiffs to recall repeated events in a general manner may not be limited to the traumatic events. In line with previous research (e.g., Moore & Zoellner, 2007) we predict that OGM will be common among women who have been repeatedly abused. Support for this prediction may spark additional research on a new application of memory specificity training that originally was developed for clinical samples (Raes et al., 2009): memory specificity training for plaintiffs. It is possible that a training programme aimed at increasing the amount of specific memories in everyday life may result in a spillover effect on the memories for the traumatic events. If the study would show a rare incidence of OGM in this target group, then it is likely that the observed lack of specificity in cases of repeated events is a cause of the recurrence itself. Such a result would not be predicted by previous research on OGM (Williams et al., 2007). Our sample would however be larger than most previous OGM-research and could therefore be a valuable contribution to both memory fields regardless of the outcome.



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