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The Unpredictable Past: Spontaneous Autobiographical Memories Outnumber Autobiographical
Memories Retrieved Strategically

Anne S. Rasmussen & Dorthe Berntsen

Center on Autobiographical Memory Research

Department of Psychology

Aarhus University, Denmark

Corresponding Author

Anne S. Rasmussen

E-mail: annesr@psy.au.dk

Abstract

Involuntary autobiographical memories are spontaneously arising memories of personal events, whereas voluntary memories are retrieved strategically. Voluntary remembering has been studied in numerous experiments while involuntary remembering has been largely ignored. It is generally assumed that voluntary recall is the standard way of remembering, whereas involuntary recall is the exception. However, little is known about the actual frequency of these two types of remembering in daily life. Here, 48 Danish undergraduates recorded their involuntary versus voluntary autobiographical memories during a day using a mechanical counter. Involuntary memories were reported three times as frequently as voluntary memories. Compared to voluntary memories, they were associated less with problem solving and social sharing and more with day dreaming, periods of boredom, no reasons for remembering and predominantly came to mind during unfocused attention. The findings suggest that involuntary recall is a typical way of accessing the personal past.

Keywords: Autobiographical memory; involuntary memories; frequency; function

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1. Introduction

Involuntary autobiographical memories are memories of personally experienced events that come to mind spontaneously – that is with no preceding attempts at retrieval. Their activation is largely associative, based on bottom up processes, and they are usually cued by aspects of the surrounding environment matching the past event (e.g., Berntsen, 2009, for a review). A number of studies have shown that involuntary memories predominantly come to mind when attention is unfocused (e.g., Berntsen, 1998; Berntsen & Jacobsen, 2008; Schlagman, Kvavilashvili & Schultz, 2007), which may reflect that concentrating on a task interferes with the spreading activation that may otherwise lead to the activation of involuntary memories. In contrast, voluntary (i.e., deliberately recalled) memories are based on a top down strategic retrieval process, reflecting a goal-directed search. They are intended and called for, and may therefore pose a more convenient research object for cognitive scientists than their involuntary counterparts (e.g., Miller, 1962/1974). In the present study, we compare the frequency of involuntary and voluntary autobiographical memories in daily life.

Several studies have challenged the supposed difficulty of studying involuntary autobiographical memories (e.g., Ball & Little, 2006; Berntsen, 1996; 2009 for a review; Schlagman et al., 2007, Rubin, Boals & Berntsen, 2008). In addition, the distinction between involuntary and voluntary autobiographical memories has been described by prominent memory researchers (e.g., Conway & Pleydell-Pearce, 2000; Ebbinghaus, 1885/1964; Mandler, 1994; 2007;

Moscovitch, 1995; Neisser, 1982). Ebbinghaus (1885/1964) identified involuntary conscious memories as one of three basic modes of remembering, the other two being voluntary conscious memories and unconscious memories. Conway outlined two kinds of retrieval, corresponding to voluntary and involuntary memories. Generative retrieval, adapted from Norman and Bobrow (1979), constitutes a three-stage cyclic process initiated by an elaboration of a cue, followed by a process of matching the description of the cue to records in memory, and finally a verification of the memory record. Direct retrieval, on the other hand, does not entail a conscious memory search; memories are activated directly from the autobiographical knowledge base (Conway, 2005).

Although occasionally mentioned in the literature, involuntary as compared to voluntary memories have been considered a rarity by cognitive theorists (e.g., Davachi & Dobbins, 2008; Mandler, 1985; Miller, 1962/1974; Tulving, 1983). For example, Tulving (1983) argued that “access to, or actualization from, the episodic memory system tends to be deliberate and usually requires conscious effort” (p. 46). Mandler (1985) observed that episodic retrieval in general is “deliberate and consciously accessed” (p. 94), while at the same time acknowledging that “much of everyday memory experiences are in fact non-deliberate” (pp. 102-103). Also in clinical psychology, involuntary memories are assumed to be rare in the daily life of healthy individuals, but highly frequent in individuals diagnosed with Posttraumatic Stress Disorder (PTSD), since intrusive trauma memories are one of the key symptoms for this disorder. The assumption made by many clinical researchers is that involuntary memories are more common than voluntary memories for traumatic and emotionally stressful events, whereas the opposite is true for other kinds of events (e.g., Brewin, Dalgleish & Joseph, 1996; Ehlers & Clark, 2000). This suggests that voluntary retrieval mainly is regarded as the functional mode, whereas involuntary recall is seen as largely

dysfunctional. Thus, both cognitive and clinical researchers have argued that voluntary retrieval is the standard way of accessing autobiographical memory, whereas involuntary conscious recall is the exception.

In contrast, Berntsen (2009, 2010) claims that involuntary autobiographical memories are a basic mode of remembering that is universal (thus present in everyone with an intact autobiographical memory), adaptive (although it may have dysfunctional side effects), about as frequent as voluntary remembering, and operating on the same episodic memory system as voluntary remembering. However, involuntary remembering reflects a more associative, context-sensitive and presumably evolutionarily earlier type of retrieval that requires little executive control to monitor the retrieval process. Viewing involuntary memories as a frequent and functional everyday phenomenon is consistent with recent studies of spontaneous thought processes. Such processes have been referred to as mind wandering (e.g., Smallwood & Schooler, 2006) task-unrelated thought (e.g., Giambra, 1989), stimulus-independent thought (e.g., Antrobus, 1968), daydreaming (e.g., Singer, 1966), and fantasy (e.g., Klinger, 1971). These notions are described very broadly in terms of contents, but all seem to include involuntary memories as one among several kinds of spontaneously arising mental representations. Spontaneous thought processes may also be directed against the future (e.g., D'Argembeau, Renaud & Van der Linden, 2011) and there is evidence to suggest that spontaneous representations of future events may be as common as spontaneous memories (Berntsen & Jacobsen, 2008). Studies on mind wandering suggest that spontaneous thought processes are frequent in daily life. For example, using personal digital assistants, Kane, Brown, McVay et al. (2007) signaled participants to report whether or not their thoughts had been wandering away from the current task eight times per day over a seven day

period. On average, the participants reported mind wandering at the time of the signal more than 30% of the time.

We have no precise estimate of the frequency of involuntary versus voluntary autobiographical memories in daily life. When interviewed after the completion of a diary study and asked to estimate the daily frequency of involuntary memories, participants typically suggest five to six involuntary memories at average per day, but this varies greatly between as well as within subjects, for example as a result of variations in work load (e.g., Berntsen, 2009). So far, no studies have involved on-line recording of the frequency on involuntary memories on a daily basis. Ironically, the same is true for voluntary memories. In spite of being the subject for extensive investigations in numerous laboratory experiments, little is known about the daily frequency of voluntary episodic retrievals. In other words, how often during a day do we voluntarily instigate a goal-directed search for a particular autobiographical event in memory? Does such voluntarily instigated search happen more or less frequently than involuntary, spontaneous recall of autobiographical events? If involuntary remembering is indeed a basic and evolutionarily earlier mode, one might speculate that this mode is at least as frequent on a daily basis as is voluntary recall.

In a survey study, Rubin and Berntsen (2009) asked large stratified samples of Danes to assess how often they had involuntarily as well as voluntarily thought about a self-chosen important event from the last week and an important childhood event selected by the experimenter. Consistent with the idea that involuntary remembering forms a basic mode of remembering, the participants reported the involuntary remembering of the events to have taken place about as frequently as the voluntary counterpart. However, these survey data only speak about the estimated frequencies of

selected important events, and therefore not about the moment-to-moment frequencies of involuntary and voluntary recollections in daily life. Involuntary memories are transient by nature, and often concerns trivial everyday events that are less central to the life story than events remembered voluntarily (e.g., Berntsen, 2009), for which reason retrospective assessments addressing important events may underestimate the actual frequency of involuntary memories.

In the present study, we compared the frequency of involuntary and voluntary memories in a natural setting through an on-line recording of all voluntary and involuntary autobiographical recollections that happen during a day in the participants' life. After they had finished the recording, we asked the participants to retrospectively assess the perceived function, emotional valence, time of day, type of cue and level of concentration at the time of retrieval.

2. Method

2.1. *Participants*

Forty-eight undergraduates participated in the study. They were randomly allocated to the two conditions, balanced across age and gender. There were 24 participants in the voluntary condition (20 females, mean age 23.00 years, SD = 1.41, range 21-26 years) and 24 in the involuntary condition (20 females, mean age 22.96, SD = 1.46, range 21-27). They each received two movie tickets in return for their participation.

2.2. *Materials*

2.2.1. Mechanical counter. The participants were equipped with a mechanical counter in order to assist them in keeping track of the number of involuntary/voluntary memories. The

mechanical counter (www.elektronik-lavpris.dk/product_info.php?products_id=96168; product number: BN204041) is a thumb or finger-actuated counter that fit in the palm of a hand. It is lightweight (80 g.) and compact and easy to carry around. It can be used for a variety of counting chores and is ideal for simple item and piece counting.

2.2.2. Questionnaire. The questionnaire addressed all involuntary/voluntary memories that had occurred during the day. For Questions 1, 2 and 4, the participants were asked to choose just one of the response options, whereas for Question 3, they were allowed to choose more than one option: Question 1 addressing type of cue was: *“Did anything in your surroundings or in your thoughts typically seem to trigger the involuntary/voluntary memories?”* The response options were: something external, something internal, something both external and internal, or none of the above. Question 2 addressing time of the day was: *At what time of the day did the involuntary/voluntary memories typically occur?* The response options were: In the morning, in the afternoon, in the evening, or all day. Question 3 addressed the perceived function of the recall: *What do you think typically caused you to have the involuntary/voluntary memories?* The response options were: Problem solving, decision making, establish/achieve goal, emotional regulation, identity, beliefs and values, share with person, think about person, show interest in person, boredom, daydreaming, entertain myself, no purpose, other – please specify. Question 4 addressing emotional valence was: *What kind of emotion did the involuntary/voluntary memories typically come with?* The answer categories were: Positive emotion, negative emotion, both positive and negative emotion, or none of the above. Finally, Question 5 addressing the participant's concentration level at retrieval was: *The involuntary/voluntary memories typically came in situations, where I was highly concentrated.* This question was measured on a 5 point Likert scale (1 = Not at all; 5 = to a high degree).

2.3. Procedure

Both verbal and written instructions were given. The verbal instructions were given at a meeting at which only the experimenter and the participant were present. The participants were informed that they were to record the frequency of their voluntary versus involuntary memories during a normal day in their lives. They were presented with the mechanical counter, the one page questionnaire to fill out at the end of the day, and written instructions to take home. The verbal instructions given at the meeting clarified and elaborated the written ones. An involuntary memory was defined as a memory about a past event that is brought to consciousness with no preceding conscious attempts at retrieval. Involuntary memories could be cued by the present surroundings or aspects of current thought as long as the association in question had been established without intentional attempts. A voluntary memory was defined as a memory retrieved in a goal-directed and controlled fashion. It was emphasized that the memory did not simply pop up by itself. Its retrieval had to be initiated in an intentional fashion in order for it to be considered a voluntary memory. Both types of memories were illustrated by similar examples from instrumental, social and neutral contexts. The participants were instructed to press the button on the mechanical counter each time they had an involuntary/voluntary memory, and make a note of the final number by the end of the day.

For both conditions, the participants were instructed to include all memories, regardless of their age, emotional valence, amount of rehearsal or level of importance. It was stressed that the memories had to be autobiographical and specific, that is, dealing with a personally experienced event that took place on a specific day in the person's past.

3. Results

In contrast to the view that involuntary autobiographical memories are the exception and voluntary memories the norm, involuntary memories were reported three times as frequently ($M = 22.13$, $SD = 16.74$) as their voluntary counterparts ($M = 7.04$, $SD = 6.40$; $t = 4.12$, $p < .0005$, $d = 1.19$). The voluntary memories occurred in situations in which the person was more concentrated ($M = 3.22$, $SD = .87$) as compared to the involuntary memories ($M = 1.79$, $SD = .59$; $t = -6.50$, $p < .0005$, $d = 1.92$). Finally, the results for perceived function are presented in Table 1. As shown by the table, voluntary recall was more associated with problem solving and social sharing functions than involuntary recall, whereas involuntary recall was more associated with day dreaming, periods of boredom and no reasons for remembering. There were no significant differences between the two retrieval types with regard to cue type, emotional valence or time of day.

4. Discussion

The present study is the first to examine the moment to moment frequency of involuntary as well as voluntary autobiographical recollections in daily life. The results suggest that spontaneously arising autobiographical memories are more frequent in daily life than are strategically retrieved autobiographical memories. This is contrary to prevalent assumptions in mainstream cognitive and clinical psychology but consistent with the idea that involuntary memories form a basic and evolutionary earlier mode of remembering. Voluntary recall was more frequently associated with problem solving and social sharing functions than involuntary recall, whereas involuntary recall was more frequently associated with day dreaming, periods of boredom, “no reasons for remembering”, and predominantly came to mind during unfocused attention. The main function of

involuntary compared to voluntary memories may therefore lie in their relative abundance, optimizing their potential relevance for the current situation with little expense (Rasmussen & Berntsen, 2009).

A possible critique of the present study is that we used a self-caught or self-classification method rather than a probe-caught method (e.g., Kane et al., 2007). It has been argued that self-monitoring may encourage participants to assign an artificially high priority to their awareness, thereby potentially overestimating the mental phenomenon of interest (e.g., Giambra, 1995). However, there is evidence to suggest that self-monitoring does not appreciably alter the phenomenological experience of mind wandering episodes (Smallwood & Schooler, 2006), for which reason it seems plausible that this should also hold for involuntary and voluntary recall. Furthermore, although involuntary memories clearly are more frequent in everyday life than previously assumed, they are probably considerably less frequent than mind wandering and related spontaneous thought processes in general. Most involuntary memories in daily life are transient and quickly dealt with. The chances of probes striking an involuntary recollection with regular signals during the day seem rather small, unless participants were probed every minute, given the average frequency of roughly 20 memories per day. The self-classification method therefore seems a more appropriate measure for involuntary as well as voluntary autobiographical memories in daily life.

Rubin and Berntsen (2009) asked a large sample of the general population to assess how often they had involuntarily as well as voluntarily thought about a self-chosen important event from the last week as well as an important childhood event selected by the experimenter. The participants estimated the involuntary remembering of the events to have taken place almost as frequently as the voluntary counterpart. In the present study, however, we found that involuntary remembering was

even more frequent than voluntary remembering. How should this discrepancy be resolved? First, by asking for important events, Rubin and Berntsen (2009) may have favored voluntary to involuntary remembering relative to what is the case in general in daily life, since voluntary autobiographical memories tend to be rated as more important and relevant to the life story than involuntary memories (Berntsen, 2009). Second, the high frequency of involuntary relative to voluntary remembering observed in the present study should be considered with some caution. Because involuntary memories are unexpected, involve more emotional impact and often occur during periods of diffuse attention, they may be more easily noticed in diary study as compared to their voluntary counterpart. Because voluntary memories often were retrieved as part of problem solving and social sharing, they may more often have been overlooked as compared to the involuntary memories.

In spite of these limitations, it is fair to conclude that involuntary autobiographical memories are at least as common (and presumably even more common) in daily life than are voluntarily retrieved autobiographical memories. These findings are counter to both cognitive and clinical theories, claiming that spontaneous remembering is the exception and strategic recall the rule. The findings show that involuntary recall is a typical way of accessing the personal past.

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Table 1

Percentage of Perceived Function for Involuntary and Voluntary Memories

Function Category	Involuntary Memories	Voluntary Memories	Significance (Fisher's Exact Test)
Problem Solving	12.5	52.2	p < .005
Decision Making	25.0	26.1	ns
Establish/Achieve Goal	12.5	4.3	ns
Emotional Regulation	12.5	13.0	ns
Identity	16.7	4.3	ns
Beliefs and Values	8.3	21.7	ns
Share with Person	25.0	69.6	p < .003
Think about Person	50.0	30.4	ns
Show Interest in Person	12.5	13.0	ns
Boredom	29.2	4.3	p < .05
Daydreaming	66.7	26.1	p < .008
Entertain Myself	16.7	4.3	ns
No Reason	29.2	0.0	p < .009
Other	25.0	8.7	ns