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## AUTOBIOGRAPHICAL MEMORY TASKS IN COGNITIVE RESEARCH

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In contrast to the topics considered in some of the other chapters in this volume, autobiographical memory is not defined by a single prototypical method or task, as is the Stroop task, nor is it a well-defined concept in a global theory as implicit memory can be. Exactly what is and is not an autobiographical memory depends on the definitions and goals of the particular researchers. For everyone it is memory about the self (Conway & Pleydell-Pearce, 2000); some add no further constraints (e.g., Butters & Cermak, 1986). The most common two additional restrictions are of theoretical importance. The first is that the memory is of a specific event (Crovitz & Schiffman, 1974); that is, the memory is an episodic memory rather than semantic knowledge about oneself (Tulving, 1972, 1983). The second is that the memory comes with a sense of recollection or reliving of the original event (Baddeley, 1992; Brewer, 1996; Greenberg & Rubin, 2003; Wheeler, Stuss, & Tulving, 1997). These two restrictions are what separate autobiographical memory from other forms of memory in most theories. The methods described in this

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chapter, however, vary regarding the extent to which these added restrictions are used: Most methods require a specific event whereas none require a sense of recollection. But even if the definition of autobiographical memory is restricted to be a store of specific recollected events, autobiographical memory cannot simply be viewed as a particular kind of abstract memory system. As will follow from some of the methods reviewed in this chapter and the experimental and clinical literature, having an autobiographical memory involves integration among at least emotion, narrative, language, and imagery in several sensory modalities (Rubin, 1998; Rubin, Schrauf, & Greenberg, 2003). Thus, the study of autobiographical memory involves much of cognition and its relation to emotion.

Six methods have been commonly used to study autobiographical memory. The first method is the *word-cue method*, in which participants are asked to think of autobiographical memories cued by words or other stimuli. The second method is the *life-narrative method*, in which participants are simply asked to tell the experimenter about their lives. The third is the *involuntary-memory-diary method*, in which the request for willful retrieval found in the first two methods is replaced by the request for participants to record involuntary, or unbidden, autobiographical memories as they occur; participants may return to them later if needed to provide additional information. These first three methods are intended to be as open-ended as possible and to provide as unconstrained a view of memory as possible, both of which qualities are at the same time their main strengths and weaknesses. All fit naturally into clinical studies.

The fourth method is the *Autobiographical Memory Interview*, which was devised for the study of neuropsychological patients, but is applicable in other situations. It is the only method that is capitalized because, unlike the others, it is a formal copyrighted test. In contrast to the others, it asks for specific kinds of memories from specific time periods that are determined by the experimenter and not the participant. The fifth method is the *diary recall method*, in which participants record events for themselves or others and are later tested on their memory of the events. The events are recorded either at the end of each day or when the participant is signaled by a beeper. In contrast to the first four methods, this method allows the comparison of the original record and later retrieved versions of the same episode and thus can provide some measure of the accuracy of the memories and of which aspects of the memories are forgotten under a variety of cuing conditions. Finally, the sixth method is the *questionnaire method*, in which participants are asked to report on a series of properties of autobiographical memories. We discuss it last because it usually is used in combination with the other methods reviewed. In this method, the definition of autobiographical memory can be kept open, and participants can report whether their autobiographical memories were of a single episode or a combination of them and whether they had a sense of recollection. How these aspects of autobiographical memory affect other prop-

erties or vary across participant population can then be viewed as empirical findings that test theoretical distinctions.

The six methods discussed do not allow for the direct investigation of the clinically relevant substantive issues of accuracy versus suggestibility of memory, memory under hypnosis, eyewitness testimony, and the ease of recalling of once-forgotten memories (except as measured in diary studies). These are questions of memory in general, as opposed to autobiographical memory in particular, and have tended to develop their own literatures. I have also excluded studies of the dating of autobiographical memories (for reviews, see Friedman, 1993; Thompson, Skowronski, Larsen, & Betz, 1996), an active area of research, because it seems less relevant to studies of psychopathology. The following sources offer a more general review of the literature: Schacter (1996) places autobiographical memory in the context of memory in general, Conway's (1990) text reviews the experimental work on autobiographical memory, and several edited books provide tutorial chapters (Conway, Rubin, Spinnler, & Wagenaar, 1992; Rubin, 1986, 1996; Thompson et al., 1998). An excellent summary of much of the data and theoretical arguments can be found in Brewer (1996). The role of narrative in autobiographical memory is reviewed from several different perspectives in Neisser and Fivush (1994) and Rubin and Greenberg (2003). Flashbulb memories are reviewed in Conway (1995) and Winograd and Neisser (1992).

#### THE WORD-CUE METHOD

The word-cue method (also known as the Crovitz method, the Galton method, and the Galton-Crovitz method) was invented by Galton (1879) and revived in modern times by Crovitz and Schiffman (1974) and Robinson (1976). It can be seen as a precursor to Freud's free association method (Robinson, 1986). It is probably the most widely used method in experimental and clinical work and so receives the most attention here. The technique is simple and intended to give a sample of autobiographical memories that come to mind most easily. Participants are presented with stimuli, usually common words, and then asked to produce an autobiographical memory for each. Unless detailed descriptions of the memories are collected for later analysis, in the interests of time and confidentiality participants are informed that their descriptions should be brief and need be intelligible to only themselves, and that descriptions of any potentially illegal or embarrassing events should be coded so only they will understand them. After all memories are obtained, participants are asked to return to each memory description and date it. The dating is usually done last because dating a memory often requires accessing more memories related to it. Dating thereby would change the search for later memories and could lead participants to dwell on one time period. However, when many questions are asked about each memory,

as in the questionnaire method, the date of the memory is obtained after each memory. In these cases, the distribution of memories is not usually of major theoretical interest and the other questions direct participants' attention in a number of directions.

The technique is flexible and has been used in varied ways. As few as one (Rubin, 1982) and as many as 900 (Rubin & Schulkind, 1997a) memories per person have been analyzed, the number depending on the goals of the experimenter and the time available. When a large number of memories are collected, it is typically to obtain a distribution of memories over the life span or to obtain enough memories from each participant to do within-individual analyses. Typical instructions have been as follows: "This is a study of autobiographical memory, that is, memory for events in your life that you can specify as occurring at one particular place and time. Shortly I will ask you to inspect each of the words on the following pages, one at a time, until a specific memory associated with that word comes to mind. As soon as you think of such a memory you should write it down in the space provided. One or two words should be sufficient, so you can later refer back to what you wrote" (Rubin, 1982, p. 24).

The three typical schemes for dating memories have been to ask the participant to record (a) their age at the time of the event (Berntsen & Rubin, 2002), (b) the exact date on which the event occurred (Rubin & Schulkind, 1997a, 1997b), and (c) how long ago the event occurred, using the standard time markers of English (e.g., 5 minutes ago, 2 months ago, 10 years ago; Crovitz & Schiffman, 1974; Rubin, 1982). Asking for the age of the participant at the event is simple and quick, but as about half of word-cued memories come from the most recent year, it is not precise for recent memories. When cuing is expected to produce fewer memories in the past year, it is an excellent technique. Asking for the exact date takes time and requires participants to estimate, which is difficult for some people, but for college students who are willing to spend the time, it is an excellent technique if the temporal distribution of memories is important. Asking how long ago events occurred is a good compromise, but produces a large number of memories at round numbers because the participants wish to communicate a lack of precision in their estimates. Thus, many more memories will be reported at 10 years ago than at 9 or 11 years ago.

The dates from all three methods can be used directly in most analyses, though it is often useful to convert the responses from the first two methods into time ago (i.e., time before the experimental session) to measure the retention interval. The procedure for plotting a distribution of memories over time is a bit more complex. For the first measure of asking the age of the participant at the time of the event, all that need be done is plot the number of memories at each age or, if a retention function is desired, the number of memories that occurred 0, 1, 2, 3, . . . years ago. As the average participant is six months from a birthday, the number of memories reported at the

participant's current age is an underestimate and as an approximation could be doubled. For the second method of asking for exact dates, the dates are rank-ordered, and bins of an odd number of reported memories are formed. The range time of each bin is used to determine the density of memories and the median date of each bin to determine the times ago. For example, once the memories are rank-ordered, if there are 11 memories in a bin and the last memory occurs 5 days later than the first, there would be  $\frac{5}{11}$  memories per day and that would be plotted at the time ago of the sixth memory in the bin (for details see Rubin, 1982). Finally, for the third method of asking how long ago the event occurred, Crovitz and Schiffman (1974) assumed that when a respondent reported that a memory occurred  $n$  time-units ago, the implied precision meant that the memory could be distributed evenly over  $\pm \frac{1}{2}$  of the time-unit. Thus, a memory that was reported as occurring 24 hours ago was assigned to a bin ranging from 23.5 to 24.5 hours ago, whereas a memory reported as occurring one day ago was assigned to a bin ranging from 12 to 36 hours ago. Crovitz and Schiffman plotted these densities at each time marker of English from 1 hour to 17 years ago using the time-units of hours, days, weeks, months, and years. Often the distributions as a whole are fit to a theoretical curve (Rubin, 1982, 1986) though occasionally those of individual participants are fit (Rubin, 1982). Statistical tests are usually done with analysis of variance comparing theoretically interesting differences in specific periods of life or comparing the mean age of the memories across conditions. In the latter comparison, a logarithmic transformation is often used because of the highly skewed nature of the distribution, but this transformation seems to make little practical difference.

The words used as cues have varied. The properties of cue words have been studied, and words with high imagery value produce fewer missing memories and faster reaction times (Rubin, 1980; Rubin & Schulkind, 1997c). In college students, but not in older adults, words higher in imagery and meaningfulness produce memories from earlier in life (Rubin & Schulkind, 1997c). Rubin and his colleagues have used 125 words or subsets of them. The words, which are rated on 51 properties (Rubin, 1980), are listed here rank ordered by the number of valid responses they produced in an autobiographical memory cue word tasks. When fewer than 125 words are needed, those that produced the greatest number of memories are a reasonable sample though some words may not be appropriate for all populations. The 125 words are fire, wine, death, hospital, kiss, mountain, ocean, sickness, candy, city, doctor, dress, horse, lake, love, mother, party, plant, poetry, ambulance, church, dirt, friend, health, money, river, tobacco, window, anger, anxiety, book, flower, paper, pencil, salad, warmth, water, baby, bird, history, home, orchestra, ship, tree, vision, agility, corpse, cottage, engine, errand, green, ink, star, violation, clothing, dream, hammer, hide, street, thief, trouble, trumpet, vehicle, boy, breast, door, excuse, frog, fur, salute, vanity, blossom, butter, comedy, girl, kindness, bowl, grief, humor, joy, time, village, chair, child, memory, table, truth, army,

opinion, pride, seat, hatred, jelly, month, priest, square, beggar, earth, theory, butterfly, comparison, justice, custom, hostage, industry, revolt, woman, person, shadow, kerosene, world, king, power, menace, rattle, patent, capacity, moment, contents, prairie, nectar, virtue, glacier, malice, and context.

In addition to words in one language, researchers have provided the words in two languages in order to examine the role of cuing in one language or another, testing in each language on different days (Schrauf & Rubin, 1998, 2000; see Schrauf, 2000, for clinical implications of retrieval in different languages). Odors and pictures (Chu & Downes, 2000; Herz & Cupchik, 1992; Rubin, Groth, & Goldsmith, 1984) and even no stimuli with a request for "50 events from your life . . . just let your mind wander until you happen on them" have also been used (Rubin, 1982, p. 27). To examine particular kinds of memories, instead of using word cues, researchers have asked participants for their most vivid (Fitzgerald, 1988), most important memories (Rubin & Schulkind, 1997c); memories to go into the book of their life (Fitzgerald, 1996); and their most happy, sad, or traumatic autobiographical memory (Berntsen & Rubin, 2002). Such cues are not intended to sample autobiographical memory in as neutral a way as are random words, pictures, or odors, but to sample cultural norms or the narrative structure of memory and emotion. The distribution of such memories over the life span has been the common question in these studies, with additional questions intended to address other issues. Variations such as these, but selected to probe a particular psychopathology, such as a specific phobia or clinical issue, would be easy extensions.

Here and in most autobiographical memory research outside the flashbulb memory and eyewitness literatures, the accuracy of the memory and even the existence of the event remembered are not verified. The dating of the memories in college students, however, has been checked and appears quite good. Rubin (1982) reported on nine undergraduates who were keeping and had kept diaries for an average of six years and who could find more than a quarter of their word-cued memories in their diaries. The median error was 0 days, indicating that the errors were not biased. The median of the absolute error was three days, with 74% of the dates within one month of the date found in the diary, which indicates that the errors were in general small.

In terms of the distribution of memories over the life span, the word-cue method, though it lacks much in the way of experimental control, has provided extremely regular results. There is a childhood amnesia component for the early years of life, a retention component for the most recent two decades, and, for participants over 40, a reminiscence bump in the form of an increase in memories from adolescence and early adulthood. The first two components are extremely regular. Results from different studies with the word-cued and other methods provide remarkably similar plots for childhood amnesia, in which there are few memories from the first years of life

(Rubin, 2000). The retention component is fit by a power function with  $r^2$  values above .95 (Crovit & Schiffman, 1974; Rubin, 1982). The bump varies in form a bit more, but appears in many methods (Rubin, 2002; Rubin, Rahhal, & Poon, 1998; Rubin & Schulkind, 1997a, 1997b), though it does not occur when participants are asked to produce their saddest or most traumatic memory (Berntsen & Rubin, 2002).

Reaction times have often been measured, but there are no clear effects as a function of the age of the memories, though as with other cognitive tasks older adults are slower (Rubin & Schulkind, 1997a). Other properties also do not vary with the age of the memory including vividness, pleasantness, emotionality significance, novelty of the event, and frequency of rehearsal (Conway & Haque, 1999; Jansari & Parkin, 1996; Rubin & Schulkind, 1997a). Whether participants have a recollective experience as opposed to just knowing about the event without any sense of reliving it also does not vary with the age of the memory in older adults (Rybash & Monaghan, 1999). Although decay in many properties would be expected, it seems that asking for any memory that pops into mind works against this. Memories that are easy to recall are rated equally on many properties regardless of their age. Thus, one advantage of the word-cued memories is that variability in such measures is not typically confounded with the age of the memory. In addition, there have been no reports of gender differences in the distribution of memories or in ratings, and explicit attempts to find them have failed (Rubin, Schulkind, & Rahhal, 1999).

## THE LIFE-NARRATIVE METHOD

Instead of being cued with words or other stimuli to provide autobiographical memories, people can simply be asked to relate their life in narrative form. This method has the advantage of using a natural request; people are often asked for a version of their life story, either directly or implicitly in a social situation (Linde, 1993). Moreover, being able to do this task is an important developmental landmark (Habermas & Bluck, 2000). The request for a life narrative is less likely to sample a wide range of memories because there is an implied request for important life events that form a coherent story and that tell the interviewer about important traits of the participant that are inherent parts of a narrative (Rubin & Greenberg, 2003). This difference is either an advantage or disadvantage depending on the goals of the study. Narratives that are generated by a structured interview, that are for time periods shorter than a lifetime, or that involve groups (e.g., Bruner & Feldman, 1996; Hirst & Manier, 1996) are less common than the open-ended method reviewed here. A variety of related methods exist in the literature on life review and reminiscence, which unfortunately is a separate literature

with few cross citations to the cognitive literature (for a review and discussion of this separation see Fitzgerald, 1996).

Fromholt and Larsen and their colleagues have used the life narrative method in autobiographical memory research with older participants (Fromholt & Larsen, 1991, 1992; Fromholt, Larsen, & Larsen, 1995; Fromholt et al., 2003). Participants in these studies are asked to "Tell about the events that have been important in your life." The participants are told about the 15-minute time limit in the instructions so that they can plan the length of their life stories. Narratives end naturally or when the allotted time is used. In contrast, Schrauf and Rubin (2001) provided less guidance with respect to time, letting social expectations provide them with 30- to 45-minute narratives. Interviews are tape-recorded and later transcribed for analyses. Questions (such as the dating of events and those discussed later in the questionnaire method) can be asked after the life narrative is obtained in the same session if the interviewer, or interviewers, make notes in order to isolate and provide a brief description of each event in the narrative. Researchers must take care not to influence the participants during the interview by showing special interest in certain issues or life periods, although interest and social encouragement are provided.

In the cue-word technique, the response to each cue is considered to be a memory. The life-narrative method produces a continuous stream of memories, and so the first step in analyzing the data is to divide the life narrative into distinct events. In practice, this can be accomplished fairly easily. Each memory is defined as "a thematically delimited set of information that referred to a past event, the content of which separated it from prior and succeeding information" (Fromholt & Larsen, 1991, p. 88). Thus, in this method a brief event, an extended episode such as a vacation, and a repisodic memory (Neisser, 1981) such as going fishing repeatedly over the course of several years are all considered as autobiographical memories, with dating of the longer periods at their midpoint. The following dependent variables have been considered once the life narrative was divided into events or memories, with many variables showing differences among groups (e.g., Fromholt et al., 2003): (a) the number of memories in the life narrative; (b) the amount of detail in each memory scored with a three-point scale, in which events expressed in a single sentence receive one point, events with up to three additional pieces of information receive two, and events with more elaborated contents receive three; (c) repetitions of memories, though this variable is considered mainly in demented patients (Fromholt & Larsen, 1991); (d) the number of transitional events, that is, events that signify a major change in life (e.g., starting school, getting married, or being widowed); (e) emotional valence scored on a three-point scale of positive, neutral, and negative (For such judgments, Fromholt, Larsen, and colleagues adopted a strict criterion to avoid false attributions of emotionality. All memories in which the participant did not specifically express emotional quality were scored as neu-



tral.); (f) the memories are dated, and either the age of the respondent during the reported event or how long ago the reported event occurred is analyzed, both to examine the distribution of memories over the life span and to note changes in the other measures over the life span; and finally (g) backward searches are a violation of a strict temporal order and thus can be seen as one measure of disorder in the telling of the life narrative. Once the memories are dated, those that do not fall in strict temporal order can be easily noted. A normalized measure can be obtained by dividing the number of memories occurring earlier in real time than the one that was before it in the narrative by the number of memories occurring later in real time than the one that occurred before it in the narrative (Schrauf & Rubin, 2001).

Another form of life narrative analysis is the *sequence and templates in narrative* method developed and standardized by Luborsky and colleagues (Luborsky, 1987, 1990, 1993, 1998). The first of two questions is "I'd like to know more about you and your life. Would you describe your life for me, whatever comes to mind about it? Start where you like; take as much time as you need." No framework is imposed by the interviewer. No suggestion is made that a chronological approach be taken. Phrases such as "important events of your life" are not used to avoid generating an account indexed to social norms. The interviewer listens without interruption until the person has finished. Luborsky's experience is that once they have begun, people will talk uninterruptedly for 20 to 30 minutes about their own lives. The first step in his analysis, as with the one developed by Fromholt and Larsen, is to divide the continuous narrative into individual events or memories.

In the second section of the interview, the researcher asks that the participant depict his or her whole life with a pair of contrasting images or structures: a sequence of book chapters and a mural with many scenes and themes. These frames are purposely provided in order to "probe a person's affinity for a particular image. The chapters provide a linear chronology of socially normative and bounded categories. The mural image provides for the simultaneous presentation of diverse experiences and events without attention to sequence, boundaries, and coherence" (Luborsky, 1998, pp. 321–322). Luborsky has found that how individuals impose narrative coherence on their life-stories sorts into general types. Some individuals organize their life-stories according to the dominant *cultural life-course* reflected in their ethnic socialization. The cultural life-course (Fry, 1990) includes expected transitions (e.g., graduate college at 23, marriage in the late 20s, children in the 30s, retirement at age 65). Other individuals, whose lives challenge the cultural patterns, adopt *personal themes* in organizing their narratives and use other metaphors for shaping their narratives (e.g., "life is sweet," "the bitter life," "the devoted, silent life," "life as a hurdle race"; Ruth & Oberg, 1996). Still others employ a *recursive* strategy and tell their stories by domain, beginning at some appropriate point and following the thread to the stop-point (or present moment) of that domain: life at home, life at school, work his-

tory, marriage and family (Luborsky, 1990, 1998). This choice of narrative framework on the part of the individual can change over time, of course, and may be indicative in any given moment of the individual's sense of adjustment to life's challenges.

### THE INVOLUNTARY MEMORY DIARY METHOD

Although Ebbinghaus considered them as one of the three main types of memory, modern cognitive psychologists have generally not studied involuntary memories. Nonetheless, involuntary memories are observed in clinical settings and are symptoms in a range of disturbances—especially post-traumatic stress disorder. Moreover, studies have indicated that most undergraduates have involuntary memories at least several times a week (Berntsen, 1996; Brewin, Christoulides, & Hutchinson, 1996). A survey study of a representative sample of the Danish population showed that most people knew about involuntary memories and rated them as being common (Berntsen & Rubin, 2002). Because many involuntary memories vanish quickly, recording them as they occur as opposed to retrospectively provides a description less biased toward those involuntary memories that are themselves especially memorable.

A diary method has recently been used to study such memories at the time that they occur (Berntsen, 1996, 1998, 2001). Two demands are in conflict in this method. The first is to make the recording of involuntary memories as quick and easy as possible so that the act of recording them as they occur will not put too much of a burden on participants. The second is to record as much information as possible about each memory. The compromise is to record at the time of the involuntary memory the information that is most important to the study and that is most likely to change or be forgotten with the passage of a few hours and to provide other information later that day. To accomplish this, the participant carries a small notebook with some questions. In Berntsen's studies, participants are able to provide a brief description of each involuntary memory and complete 10 rating-scale questions without difficulty. An additional set of questions is filled out at the participants' convenience later during the same day. In some studies a comparison word-cued memory task is added, in which the experimenter provides a cue word and the same set of questions answered about the involuntary memory.

At the start of the task, participants in Berntsen's studies were given individual detailed instructions. An involuntary memory was defined as a memory about a past event that is brought to consciousness with no preceding attempts at retrieving the memory. The participants were informed that an involuntary memory could be cued by their surroundings or aspects of current thought, but if an autobiographical memory were cued by current

thoughts, it was to be considered involuntary only if the cuing of the memory had occurred without voluntary attempts. It was stressed that involuntary memories could deal with all kinds of personal experiences, pleasant as well as unpleasant, recent as well as remote. Emotionally neutral examples were used as illustrations during the instruction. Participants were informed that it was legitimate to skip a record if it appeared too intimate and embarrassing. As there was no possible way of preventing the participant from excluding records, making such exclusions a possible part of the procedure allowed the experimenter to ask, subsequent to recording, whether or not the participant had censored responses. In Berntsen's (1996) study, only a few reported that they had skipped one or two records, because the record was too intimate or too difficult to describe in words. In Berntsen's studies, participants are limited to the first two involuntary memories that occur each day. Although the particular questions changed for each study, questions answered immediately have included the following rating scales: vividness of the memory, impact on mood, physical reactions, emotional valence, and relation to a previous trauma.

In most cases, the involuntary memories are found to have recognizable environmental cues. Recent and distinctive events are found to dominate, and the majority of the memories are rated emotionally positive or neutral. Nonetheless, undergraduates' most traumatic memories occur more frequently among involuntary memories than do memories of their most positive events. Compared with voluntary word-cued memories, involuntary memories refer more frequently to specific episodes and are less rehearsed (Berntsen, 1998). Although this method is new and has been used by only a few laboratories, it is included here because of its potential to examine how active concerns, as well as environmental stimuli, cue memories without conscious effort. Such a technique is especially relevant for clinical research in which involuntary memories (as either intrusive memories or rumination) can be an important symptom and can provide a window on ongoing thought processes that occasionally break into and interrupt conscious thought.

### THE AUTOBIOGRAPHICAL MEMORY INTERVIEW

In the word-cue, life-narrative, involuntary-memory-diary, and diary recall methods the participant generates the events. Participant generation is ideal if the researcher wants to know what memories come to mind under various situations or what events tend to occur or be distinct enough to be noted. However, it is often useful to document what people can remember rather than what they (consciously or unconsciously) select to remember, and it is often desirable to distinguish semantic memory from episodic memory. For this reason Kopelman, Wilson, and Baddeley (1989, 1990) developed the Autobiographical Memory Interview. It divides life into three periods—

childhood, early adult life, and recent events—and asks for three autobiographical memories for specific incidents from each period and three personal semantic memories from each period as well as for semantic background information. Thus, for early adulthood, participants would be asked for a memory of a specific incident concerning (a) their first job or their time at college, (b) their or someone else's wedding during their 20s, and (c) meeting someone during their 20s. For the same period they would be asked for personal semantic questions with similar cues. For example, for their first job, participants would be asked for the name of the firm, their colleagues, their supervisor, and so forth. Set prompts are used if participants fail to produce a memory. For instance, failure to remember an event from a first job would evoke questions about the first day on the job or an event with a friend.

Because the questions for autobiographical and semantic memory are similar, comparisons of loss in these kinds of memories can be more direct. Because specific time periods are queried, the failure to be able to recall from one time period cannot be attributed to a bias to avoid that time period. These advantages come at the expense of the more open-ended probing of autobiographical memory of the first three methods.

#### THE DIARY RECALL METHOD

In all of the methods discussed so far, no attempt is made to examine how the contents of a memory change over time; little experimental research has been done on which aspect of the memory provides good cues to the memory as a whole. However, by asking people to record events in a diary each day and not to examine them again until testing, researchers can note changes in the contents of memory over time. To the extent to which a record from the time of an event can be considered accurate, the diary method offers an approximation to a measure of accuracy. Similarly, through selection of particular aspects from the initial recording of a memory as cues for the later recall, the value of these aspects as memory cues can be measured and used to infer how memory is organized. Many diary recall studies, and all of the early ones, developed to study autobiographical memory were done on a single participant, the author of the study (Linton, 1975, 1982, 1986; Wagenaar, 1986; White, 1982). Later studies used undergraduates as diary keepers (see Thompson et al., 1996, for a review).

Linton called her heroic effort “the take-two-items-a-day-for-five-years study” (1975, p. 87). It focused more on dating accuracy than did later studies, but set the main parameters of the method. The basic procedure is to make diary entries each day and then later select randomly from among these entries either to query the participant about some recorded properties of an event given other recorded properties or to provide ratings of a memory of the event given its description. For instance, Wagenaar (1986) might cue himself with who was present at an event and then see if he could remember

all the other aspects of the memory; if this failed he could add another cue such as when the event occurred. For long-term studies such as Linton's or Wagenaar's the only person the experimenter could rely on to do the recording regularly and be available years later for testing was the experimenter. Thus, the study is very labor intensive, but this time is often well spent. The single-experimenter-as-participant approach has provided the experimenter with a rich sense of how memory works that is obtained from considering all the issues of how to record events and the intensive testing and data analysis that follow. The combination of first person, participant, knowledge of the processes involved in memory search and retrieval; and third person, experimenter, knowledge of the results has led to especially rich discussions of how memory functions (see especially Linton, 1982, 1986; Wagenaar, 1986). For instance, a major problem that Linton uncovered for herself was that in real life, events cannot be fully appreciated until well after they occur, so testing the accuracy or the meaning of an event recorded in a diary can be problematic (Robinson, 1996). Descriptions including "for the first time" are good ways to uniquely identify an event for later testing, but descriptions such as "I Xeroxed the final draft of the statistics book and mailed it" (Linton, 1982, p. 82) turned out to be a problem when Linton later mailed her third "final draft." Similarly, meeting a shy scholar is an event whose meaning and importance is changed significantly when they decide to marry (1986).

Wagenaar (1986), in his six-year study, recorded who, what, where, when, and a critical detail for each diary entry, which allowed him to cue himself first with one of the wh- questions first and then add a second, third, and fourth wh- question to measure their effectiveness as cues alone and in combination. Although it was expected that dates would be a good cue in a database as there was usually only one and at most two entries per day, dates were of little use to Wagenaar as cues (see Brewer, 1996, and Thompson et al., 1996, for an argument on why dates are not integral aspects of autobiographical memories). He also recorded salience, emotional involvement, and pleasantness, finding like Linton that pleasant events were better retained. Like all other diary studies, he found forgetting to be much slower than would be expected from laboratory work and to have a much more linear curve. He also noted that he had no evidence that any memory he recorded was ever completely forgotten. He found 10 memories that he failed to recall when he examined all the cues but that were likely to be recalled by the person recorded in the *who* slot. He then took each of those diary entries to that person and asked him or her to provide more details of the event. In all 10 cases, he reported that he eventually was able to recall the event.

An especially clever modification was introduced by Thompson (1982). In addition to recording events from their lives for a 14-week semester, undergraduates recorded events from their roommates' lives. At the end of the recording period, the roommates were asked whether the experimenters could look at the recordings of their lives and prepare questions for them to answer.

In this way, the objection that the diary keepers spent unusual effort trying to recall their lives or that the act of recording memories distorted normal processing could be overcome. Thompson found no difference between the diary keepers' and the roommates' memory performance even though the roommates were unaware that they would be tested until a week before the test.

The studies reviewed so far have one major limitation. The events participants enter in a diary are intended to be unique. Linton noted that a stranger examining her diary entries would not be aware of the repetitive events, such as lecturing, that made up much of her life. Thus, the autobiographical memories queried in the diary method are a small biased subset of all autobiographical memories, often just the most interesting or troublesome. If routine events are of interest or are the crux of a clinical problem, they will be greatly underrepresented or omitted completely. If one really wants to sample autobiographical memory, then one has to sample the events to be remembered. To do this, Brewer (1988) had undergraduates carry a beeper that went off at random intervals during their waking hours. When the beeper signaled, the participant recorded information about ongoing activity or thoughts including when, where, and what in the form of a summary sentence about thoughts and actions, and a host of ratings about the event. Thoughts as well as actions were specifically requested because, as a pilot subject, Brewer found that in many cases the event that was occurring at the time the beeper sounded was primarily a thought that was unrelated to his ongoing actions. Participants were asked to record enough information to distinguish the event from similar events that might occur that week, including the weather, what they were wearing, and other details.

One type of diary study is underrepresented in the cognitive literature. Many people keep diaries, especially in adolescence (Burt, 1994; Rubin, 1982; Thompson, 1982). These could be available for research. Rubin (1982) had undergraduate diary keepers check the dates of their memory descriptions in their own diaries. In this way, he never needed access to the diaries. Thompson reported that 12% of keepers of journals not required for a course "were interested in having their memory tested using their journal" (1982, p. 11). Thus, a rich source of material for testing may be existing diaries or diaries kept as part of therapy (Burt, 1994). Such diaries would not contain descriptions neatly formatted with specific information and in some cases may have been read at intervals after they were initially recorded, but they would not require the extra effort needed in the more controlled experimental diary studies and would focus on issues of importance to participants.

## THE QUESTIONNAIRE METHOD

In all of the previous methods, except the Autobiographical Memory Interview, questions are often asked about aspects of the memories in addi-

tion to when they occurred. Usually, only a few questions that are central to the research project are used, but for some studies, responses to a fixed set of questions are the main data of the study. The questions most often used have been fairly stable from the earliest studies of autobiographical and flashbulb memories because they probe theoretical issues that have endured. Sample collections of such questions can be found in Brewer (1988); Johnson, Foley, Suengas, and Raye (1988); Sheen, Kemp, and Rubin (2001); Rubin, Schrauf, and Greenberg (2003); and Talarico and Rubin (2003).

Often questions about only one memory of a given type can be asked of each person, such as "What was your most traumatic memory?" However, when multiple memories are obtained, such as to cue words or requests for 10 happy memories, the responses to questions can be averaged. If each memory is considered as a separate item on a test, reliability can be calculated and in general is high, with Cronbach's alphas of about .9 with 20 memories. Also, when answers to questions on many memories are obtained from each participant, it is possible to examine the relation among the responses to the question within individuals and summarize those relations (e.g., Rubin et al., 2003) In this way, the relations of variables can be investigated within individuals.

The exact wording of the questions has been fluid, and there has been little systematic work to ensure that the questions really measure the concept they ask about in the manner done in the development of a standardized clinical test. Questions are sometimes asked both for the present time and the times when the event reported in the memory occurred. When *now* and *then* questions both are asked, the two responses usually are highly correlated (e.g., Rubin et al., 1984). It is reasonable to assume that part of the correlation can be attributed to stability over time and another part to current attitudes affecting reports of past attitudes. Thus, any differences in *now* and *then* measures can be seen as an indication both of actual change and of how the participant now views that change.

### Questions About the Memories Themselves

The most commonly asked question is how old the memory is, a question discussed in detail earlier. In addition to this question's importance in assessing the distribution of memories over the life span, measuring the age of the memory ensures that differences in other measures are not due to differences in the retention interval. Another common question has been how often a memory has been thought or talked about in the past. For cognitive psychologists this is a measure of rehearsal, but it may also reflect the importance of the memory to the individual. The response is assumed to be monotonically related to the actual number of rehearsals. A measure that is often correlated with rehearsal is the importance of the event reported in the memory to the individual, or the significance to his or her life.

Perhaps the most important question for clinical research is whether the memory is of a specific event or is the merging of several memories that are from an extended time period or are merged because they are similar in content (Williams, 1996). Most of the discussion of this question is deferred until the next chapter. However, in terms of cognitive psychology, the question has important theoretical consequences for how one views autobiographical memory. Tulving's (1972) widely accepted distinction divides memory into semantic and episodic components. Semantic memory stores items such as language rules, word definitions, and general facts. Episodic memory contains the store of "personally experienced unique episodes" that are "distinctive and separate although part of a larger series"; they are "always stored in terms of its autobiographical reference to . . . already existing" memories (Tulving, 1972, pp. 385, 387). Thus, according to Tulving's definition, an autobiographical memory should be identified as a single, isolated event, not as a concatenation of several prior experiences, and so merged or extended memories are excluded from autobiographical memory. This more atomistic verbal-learning approach can be contrasted with schema-based approaches. Although Brewer (1986, 1996) preserves a once-versus-many-times distinction, he holds that both single and repeated events that form a schema can lead to a recollective memory. Similarly, Neisser (1981) coined the term *reepisodic memory* for the merging of memories of events into one representative event and argued that people may confuse such reepisodic memories with those caused by memories for single occurrences. Both kinds of memories can be observed, but merged memories, which are especially important in the study of depression and posttraumatic stress disorder, are considered outside the realm of autobiographical memory for some theoretical approaches.

#### Questions About the Phenomenological Properties of the Memories

There are two main issues: reliving or recollection of the memory and belief in the accuracy of the memory. A key distinction introduced in the beginning of the chapter and one used to define autobiographical memory for many philosophers is that of recollection, the idea that in a sense, a person relives the memory. An extreme version of reliving is the clinical phenomenon of flashbacks. Typical questions have asked for ratings of the extent that the event is being relived and, on the basis of Wheeler et al. (1997), asking whether the participant travels back in time to the event and feels as a participant rather than as an observer (see Sheen et al., 2001, and Talarico & Rubin, 2003, for examples). Belief in the accuracy of memories has been central to many debates and has been examined in the reality monitoring research of Johnson and colleagues (Johnson et al., 1988; Johnson, Hashtroudi, & Lindsay, 1993; Johnson & Raye, 1981) and in direct questions (Rubin et al., 2003; Sheen et al., 2001; Talarico & Rubin, 2003). In laboratory research, a *remember* versus *know* choice is often used to study recollection, but



in autobiographical memory studies this distinction seems more closely related to belief in the accuracy of the memory (Rubin et al., 2003).

### Questions About Components of the Memories

Autobiographical memory involves at least emotion, narrative, language, and imagery in several sensory modalities and questions have been asked about all of these components. As visual imagery is a central feature of autobiographical memory, many questions have centered on it. In addition to asking how vivid the visual image of the memory is, researchers have asked about the spatial layout and setting. In Brown and Kulik's (1977) paper introducing the term *flashbulb memory*, knowledge of the setting was stressed and so questions about it entered early into consideration of autobiographical memory. Although setting can be considered visual and correlates with questions about vividness of the image, the setting is also part of a multimodal spatial property of the memory. The separation of visual and spatial can be made on the basis of both behavioral and neuropsychological data for autobiographical memory (Greenberg & Rubin, 2003; Rubin et al., 2003) and is most clearly distinguished in autobiographical memory studies of the blind (Ogden & Barker, 2001).

One of the most interesting visual questions is whether the memory is seen from a field (i.e., out of one's own eyes) or an observer perspective (i.e., as an outsider would). This dimension, which was used by Freud (1899/1950) to argue for the constructive nature of autobiographical memory, has been studied by cognitive psychologists (Nigro & Neisser, 1983; Robinson & Swanson, 1993) and is important in clinical studies, as it may be a way of distancing oneself from the event and, in the extreme, be part of an out-of-body experience. In my own experience, a two-point dichotomous question is much less useful than a more continuous five-point scale (e.g., Berntsen, Willert, & Rubin, 2003; Talarico & Rubin, 2003).

In addition to visual imagery, questions have been asked about other modalities. The vividness of auditory images is usually lower than for visual images and those of smell and taste are often near the floor, except for some memories noted in the trauma literature. Questions on emotion have included three aspects: (a) the extent to which the original emotion is felt now, (b) emotional intensity, and (c) valence. Language, especially narrative, plays an important role in autobiographical memory. Questions about language have included the extent to which the memory comes in words and whether there is talking in the memory. Narrative can be considered separate from language in general on both behavioral and neural grounds (Rubin & Greenberg, 2003). Narrative questions have centered on whether the memory is coherent, but to determine clinical relevance one can also ask whether the memory is central to the life story (Berntsen et al., 2003). One

way to gain a better understanding of the role of language and narrative in autobiographical memory is to test participants who are bilingual and bicultural. Just as dreams can come to people in one language or another, so can autobiographical memories. Both the language being used in the testing session and the language in which the memory is felt to come can be examined (Schrauf & Rubin, 1998, 2000). The language used to relate the memory can be of importance in distancing oneself from the event recalled in experimental and clinical settings (Schrauf, 2000).

#### A FINAL NOTE

The methods used in the experimental literature to study autobiographical memory place relatively few constraints on the responses participants can make and thus may be especially suitable for uncovering changes in memory processes that occur in clinical populations. They are flexible in that few fixed parameters or stimuli are set. The results obtained are robust, in spite of this lack of experimental control. These virtues, however, require the experimenter to be especially thoughtful in choosing a method and in analyzing the data obtained. Few procedures exist that are applicable without modification in the way that the administration of a standardized test is; decisions must be made that will have effects on the success of the research. In writing this chapter, I kept wanting to be able to say “here are the stimuli to use” or “25 trials are ideal” but could not; the details depend on the goals of the research. It is a challenging and exciting time to be investigating autobiographical memory. Guidelines are not strict, and there is much to discover.

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# COGNITIVE METHODS

and Their Application  
to Clinical Research

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