



Misconceptions about Memory

A Symposium

What People Believe About Memory Despite the Research Evidence

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Large portions of our population have misconceptions about memory, a concept that people use everyday, whether remembering where they parked their car or important facts and events relevant to their personal or professional lives. Despite enormous scientific evidence, people have continue to embed these misconceptions about the understanding of memory through their attitudes and beliefs. This discussion will focus on the results of two separate studies collecting responses of 1400 people from the USA and 250 people from South American countries to the Beliefs and Attitudes About Memory Scale (BAAMS; Brown, Garry, Silver & Loftus, 1997). [The items are displayed here on page 6.] Additionally, majority selected items from the BAAMS will be presented with corresponding scientific evidence refuting these misconceptions. The results will be discussed in terms of the implications of these prevalent misconceptions.

Introduction

According to Loftus, Garry, Brown and Rader (1994), misconceptions about memory exist due to the lack of clear evidence to sustain memory conceptions and/or overwhelming evidence that supports a contrary belief. Using the Beliefs and Attitudes About Memory Scale (BAAMS; <http://www.education.uconn.edu/memorysurvey/>), Brown, Garry, Silver and Loftus (1997) found large percentages of people relying on misconceptions about what people can remember and how memory works when storing and recalling events. For instance, Brown, et al., (1997) found that 36% of their sample agreed with the item that memories recalled under hypnosis are more accurate than memories recalled without it. Expanding this area of research Alvarez and Brown (2001) translated and applied the BAAMS to a Spanish-speaking sample (BAAMS-S). The study found a consistent pattern of responses across the two cultures for the following factors: blending memories, pre- and birth memory, and memory permanence.

It is important to clarify misconceptions about memory because they affect other fields such as psychotherapy, witnessing of crimes and accidents, legal trials, education and oral history. Using scientific research evidence, the current paper discusses and clarifies misconceptions related to selected items of the BAAMS and the BAAMS-S. Research on memory related to hypnosis and

memory, blending memories, traumatic memories, memory storage and early memories as infants are presented.

Additionally, the response patterns for a sample of over 1400 for the BAAMS and 250 for the BAAMS-S will be discussed as evidence supporting the large amount of misconceptions about memory. The concern is: Why do so many people have beliefs and attitudes about memory that are unfounded in the scientific literature. And even more so, when there is clear evidence presented to the contrary, why do these beliefs and attitudes persist at such a high rate among the populous. Thus, we will focus on the research evidence to combat misconceptions about memory and how it works (see Table 1, next page, for a complete listing of the scale items and scientific evidence combating the misconceptions).

What Do People Believe Despite the Evidence?

Hypnosis and memory

Some misconceptions of memory are related to the accuracy of hypnotic memories. For instance, 30% of the USA sample and 35% of the Spanish-speaking sample agreed that memories recalled under hypnosis are more accurate than memories recalled without it (item #1). However, research related to hypnosis and memory, found evidence that does not support the belief that hypnosis

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enhances memory (Nogrody, McConkey & Perry, 1985; Wagstaff, 1999). The changes in reported memory have been attributed to encouraging the subjects and lax criterion for reporting the memories. Similarly research by Whitehouse, Dinges, Orne and Orne (1988) found evidence that hypnosis does not facilitate retrieval from memory. Furthermore, a study conducted by Burgess and Kirsch (1999) found that hypnosis increased the production of inaccurate memories; especially in highly suggestible participants that were given positive information about the effects of hypnosis on memory committed more errors during hypnosis. Therefore, as Wagstaff (1999) explained hypnosis only encourages participants to use a relaxed criterion when reporting their memories.

Another item of the BAAMS asked participants whether they believe that hypnotic memories can be faulty (item #14). In this case, it seems that lack of clear evidence

Table 1. Selected BAAMS items and scientific evidence combating misconceptions in memory

Item	Data	Data Source
<i>1. Memories that are recalled under hypnosis are more accurate than memories recalled without it.</i>	The author explained that empirical evidence suggests that hypnosis does not improve memory, but it makes the difference only to encourage subjects to adopt a more lax criterion for reporting.	Wagstaff, G. F. (1999).
	“Our data provide no rationale for the use of hypnosis to enhance memory retrieval in the first place. We found no evidence that hypnosis increases accurate recall” (p.29)	Burgess, C. & Kirsch, I. (1999).
	The authors’ findings suggest “hypnosis does not facilitate the retrieval from memory concerning meaningful material presented several days earlier” (p.294).	Whitehouse, W.G., Dinges, D.F., Orne, E.C, & Orne, M.T. (1988).
<i>3. Precise records of all our experiences are permanently stored in the brain.</i>	“The act of imagining may generate information whose source later becomes confused, resulting in a stronger belief that the imagined childhood event actually occurred” (p.209).	Garry, M., Manning, C. G. & Loftus, E. F. (1996).
<i>6. Memories for different events can blend with each other.</i>	“Confusion is increased by perceptual similarity between memories from external and internal sources or between two external sources (p. 6).	Johnson, M., Hashtroudi, S. & Lindsay (1993).
	Memory blends means that “subjects will often recall or recognize an item that is neither the original nor the interpolated item but a mixture of the two” (p. 116)	Chandler, C.C. (1991).
<i>7. Everything we learn is permanently stored in the mind, although sometimes certain information is not accessible.</i>	“The actual rate of forgetting and the critical period for entry into long-term storage depends upon the nature of retained information and the circumstances of original learning” (p. 49).	O’Connor, M. G. (2000).
<i>10. People can confuse events they merely imagined with events they truly experienced.</i>	“A source-confusion mechanism predicts greater imagination inflation for long-ago imagined events compared with more recent imagined events, whereas a familiarity mechanism predicts no difference in the amount of imagination inflation..... The subjects who imagined the long-ago childhood events showed the typical imagination-inflation effect, but those who were asked to imagine recent events showed no change in confidence” (p. 8)	Garry, M. & Polaschek, D. (2000)
	In the experiment performed the authors found that “subjects who initially reported that an event did not happen, but then imagined that it had, were more likely to increase their confidence that it had occurred when asked about it later than were subjects who did not imagine the event” (p. 211)	Garry, M., Manning, C. G. & Loftus, E. F. (1996).
<i>11. The mind accurately captures and preserves the details of traumatic events better than it does the details of non traumatic events.</i>	“False memories of traumatic events can be created, and details of genuinely experienced traumatic events can change over time” (p.11)	Garry, M., Frame, S. & Loftus, E. F. (1999).
	“Questionnaire studies of early childhood memories provide little or no information about the accuracy of adults’ memories of extreme trauma, or about the truth value of memories that are recovered after many years” (p.902)	Pillemer, D.B. (1998).

Item	Data	Data Source
13. <i>Some experiences can never be recovered by hypnosis, nor any other special techniques, because the information is simply no longer available.</i>	“It is highly suggestive that recovered memories may well have been false memories..... 3 of their patients were unable to obtain any corroboration in spite of active attempts to do so” (p. 159)	de Rivera, J. (1998).
	“the present study indicated that neither hypnosis nor imagination enhances memory beyond normal waking performance; that is, hypnotic and waking hypermnesia were equivalent” (p.200)	Nogrady, H., McConkey, K. & Perry, C. (1985).
14. <i>When people are hypnotized to help them remember their previous experiences, they often remember things that never happened.</i>	“It is highly suggestive that recovered memories may well have been false memories... 3 of their patients were unable to obtain any corroboration in spite of active attempts to do so” (p. 159)	de Rivera, J. (1998).
	“More than a third of the subjects (36.2%) incorrectly recalled that a person did not spill pencils. Furthermore, only about fifth of the subjects (19.15%) were “correct” in unequivocally reporting that a telephone did not ring and that a person in fact spilled pencils during the previous session. Thus, a sizable number of subjects exhibit faulty memory of events that are the target of age regression suggestion – even events that actually occurred” (p.324).	Lynn, S.J., Milano, M. & Weekes, J.R. (1991).
18. <i>Things we see on television can blend with our memories of truly experienced events.</i>	“the fictional events that we read or hear are incorporated, along with accurate accounts and our own direct experiences, into our general knowledge and beliefs. Movies, television, books, magazines, newspapers –all are sources of fictional information that may, under some circumstances, be treated as reliable information” (p.13)	Johnson, M., Hashtroudi, S. & Lindsay, S. (1993).
19. <i>Memory records and stores all of our experiences since birth.</i>	When Usher and Neisser asked college students to report childhood memories of a sibling birth, they rarely remembered anything if it happened before the second birthday.	Pillemer, D.B. (1998).
26. <i>Memory is usually not very good for traumatic or stressful situations.</i>	“Research on memory with children and adults, suggests that people are more likely to forget an isolated incidence of abuse than a series of repeated events although the repeated events may become blended in some typical script” (p. 1179)	Loftus, E., Garry, M. & Feldman, J. (1994).
28. <i>Things we read about can accidentally get confused with truly experienced events.</i>	“Presumably, reading about an event often gives rise to imagery related to the event, whereas viewing an event is less likely to give rise to imagined reading” (p. 7)	Johnson, M., Hashtroudi, S. & Lindsay (1993).
33. <i>It is not unusual for people to have accurate memories of events for the first few days after birth.</i>	The earliest memory frequently involves an event that occurred after the third birth. “Traumatic events that occurred before children were 3 years old rarely were accessible to verbal recall, but events that occurred when the victims were older than 3 usually were described in words” (p.899)	Pillemer, D.B. (1998).

lead the majority of the participants to be neutral towards this item (47.4% of USA and 50.2% of Spanish-speaking samples). Neutral response rates at this level raise serious concerns. In addition, 25% of the USA sample and 22% of the Spanish-speaking sample disagreed with this item. Similar to the previous item, scholars have not found evidence to sustain that hypnotic memories are not faulty.

Memory Permanence

When referring to memory permanence a 43% of the Spanish-speaking sample disagreed with the item stating that information in memory can decay and be permanently lost from memory (item #12). People's beliefs toward this item are not consistent with scientific research that has found evidence that information can be lost from memory. When studying short-term recall, Tolan and Tehan (1999) found interference effects in short term recall, in which verbal distracters produced more disruption than nonverbal distracters. In addition, long-term recall research can be traced to 1984 when Bahrick found a constant slope that indicates the number of responses lost per unit of time. Thus, the author suggested that much of the information in memory has a life span of several decades.

Additionally, 31% of the USA sample and 38% of the Spanish-speaking sample indicated their agreement with the item that precise records of all experiences are permanently stored in the brain (item #3). On the contrary, research by Simons (1996) found in the participants inability to notice changes to objects, proposing that we do not maintain visual representation of object properties across views.

Although people believe that memory records all experiences since birth (43% of USA and 35% of Spanish-speaking samples) (item #19), research has found that participants rarely remembered anything if happened prior to their second birthday (Usher and Neisser as cited in Pillemer, 1998). Pillemer (1998) stated that the earliest memories involve events occurred after the third year of age and that traumatic events that occurred before that age were rarely recalled.

Traumatic memories

With respect to items related to traumatic memories, 41% of USA and 42% of Spanish-speaking samples believed that the mind records better the details of traumatic events than the ones of non-traumatic ones (item #11). Likewise the research about the earliest memories by Pillemer (1998) found in his questionnaires no accuracy of adult's memories of extreme trauma when referring to early childhood memories. Furthermore, Garry, Frame and Loftus (1999) indicated that false memories of traumatic memories can be created and that the details of traumatic memories change over time. Garry, Loftus and Brown (1994) pointed out that they suspect that details of traumatic and non-traumatic memories can be wrong. As research done by Loftus (1993, as cited in Garry, Loftus & Brown, 1994) has found, entire episodes can be suggested and created in a person's memory. Moreover, according to Garry, et al., (1994) many people who recov-

ered abuse memories in therapy ultimately believed that these memories were the product of suggestions by therapists.

Related to traumatic memories is whether a significant event can be better remembered. Item 5, for which 45.5% of the USA sample agreed and 45.7% strongly agreed; similarly, 38.1% agreed and 51.8% of the Spanish-speaking sample strongly agreed that the more significant an event is, the more likely it is to be remembered. Pillemer (1998) stated that people can remember information critical to the central event, peripheral details and one's own circumstances during the event, and each of them can also be forgotten.

Blending Memories

As Chandler (1991) defined that blending memories refer to memories that are neither the original nor the interpolated one, but a mixture of the two. Therefore, we are referring to memories blending for different events, or memories confused with imagined events, dreamed events or events seen on television.

In the research of beliefs about memory, it was found that people do believe in blending memories. Seventy-two percent of the USA sample and 50% of the Spanish-speaking sample indicated their agreement with memories of different events blending with each other. In accordance to this belief, research has found that memories blend with each other. In explaining blending memories Johnson, Hashtroudi and Lindsay (1993) indicated that confusion is increased by perceptual similarity between memories from external and internal sources. The authors indicated that "source monitoring" refers to the processes involved in making attributions about the origins of memory, knowledge and beliefs. According to this framework, there are an external, an internal and an internal-external source monitoring types and in all of them there are multiple cues to source. The accuracy in identifying the source depends on the type and amount of the memory, the uniqueness of the characteristics for a given source and the efficacy of the judgment processes.

A similar explanation for blending memories comes from the attribution framework. According to Jacoby (1995 as cited in Gow, 1999), from an attribution point of view the general can be mistaken for the specific and the specific can be mistake for the general. Moreover, Jacoby, Kelley and Dywan (1989) concluded that subjects confuse memory of a particular event for general knowledge.

Similarly, 64% of the USA sample and 43% of the Spanish-speaking sample indicated their agreement with the item stating that people can confuse events they merely imagined with events they truly experienced. Research has shown that people can confused experienced with imagined events, as Garry and Polaschek (2000) indicated imagining can change memories. According to Johnson, Hashtroudi and Lindsay (1993) confusion between memories of perceived and imagined information increases when there is a decrease in the information about the cognitive operations of imagination. Furthermore, Garry and Polaschek (2000) described that time

and familiarity influences these blending memories; a greater imagination inflation occurs for events that are long-ago in time than for recent events, and familiarity predicts the difference in the amount of imagination inflation.

Other Memory Beliefs

Other memories beliefs are related to memories for painful or unpleasant experiences and whether they cause emotional damage and reside in the unconscious. With respect to whether memories for painful experiences are pushed to the unconscious, 62% of the USA sample and 60.6% of the Spanish-speaking sample agreed with that item. Nevertheless, researchers claim that in order to claim that those memories reside in the unconscious, they should show that the memory existed before (Loftus, Garry & Feldman, 1994). In addition, Loftus, Garry and Feldman (1994) remark that normal forgetting of events happens, thus it should not be claimed that a repression mechanism is playing a role.

Conclusions

Memory is a psychological term that everyone understands; but do they? It is clear that large percentages of the population in both the United States and South America have misconceptions about memory, what it is and how it works. Despite contrary evidence, many people seem to have beliefs and attitudes about memory that can have serious effects. These effects may be in the classrooms as our children are presented with information to remember and use, whether they are the beliefs and attitudes of the teachers or the students themselves. They may be in our police stations as people are questioned regarding the witnessing of a crime, and in our court rooms as jurors listen to testimony. What is believed and remembered will be affected by the observers' attitudes and beliefs about memory.

This is a crucial concern as we tell our students to "...remember this, because it is important", without corresponding strategies, and those strategies must have a scientific basis. We must educate our college students to better understand the workings of memory, as the majority of the two samples reported here are college students, or have a college degree. They must not leave our colleges and universities with misconceptions and beliefs about memory. If they do, they will not be able to be effective as citizens, using their memory to make decisions everyday, and they will continue to propagate the misconceptions outlined in this paper.

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Items from BAAMS Scale

1. Memories that are recalled under hypnosis are more accurate than memories recalled without it.
2. The battle experiences that war veterans remember are highly accurate and resistant to decay and /or distortion.
3. Precise records of all our experiences are permanently stored in the brain.
4. In general, memories tend to get worse over time
5. The more significant an event is, the more likely is to be remembered
6. Memories for different events can be blend with each other
7. Everything we learn is permanently stored in the mind, although sometimes certain information is not accessible.
8. It is possible for a person to remember things that happened before he/she was born.
9. Things we dream about can accidentally get confused with truly experienced events.
10. People can confuse events they merely imagined with events they truly experienced.
11. The mind accurately captures and preserves the details of traumatic events better than it does the details of non-traumatic events.
12. Information in memory can decay and be permanently lost from memory.
13. Some experiences can never be recovered by hypnosis, nor any other special technique, because the information is simply no longer available.
14. When people are hypnotized to help them remember their previous experiences, they often remember things that never happened.
15. Memories of physical trauma are sometimes "stored" in the muscles of the body.
16. "Forgetting" something just means you can't find the place where the information is permanently stored.
17. By Using special therapeutic techniques, some people can remember things that happened while they were in their mother's womb.
18. Things we see on television can blend with our memories of truly experienced events.
19. Memory record and stores all of our experience since birth.
20. A pretty good rule of thumb for determining accuracy of a person's memory for an event is the amount of detail he/she uses when reporting the memory.
21. Memories for painful experiences are sometimes pushed into the unconscious.
22. Nothing is ever truly forgotten.
23. We usually remember the basic gist of typical experiences.
24. The muscles and skin of the body can remember and store whatever experiences the mind chooses to forget.
25. A "spotty" or fragmented portion of childhood memories usually means something traumatic has occurred.
26. Memory is usually not very good for traumatic or stressful situations.
27. Some athletes are so highly skilled that their muscles remember what to do and how to move.
28. Things we read about can accidentally get confused with truly experienced events.
29. Very traumatic events can sometimes be recalled with the proper therapeutic techniques.
30. Newborn memories can sometimes be recalled with the proper therapeutic techniques.
31. Lost memories for unpleasant experiences reside in the unconscious, where they often cause a lot of emotional damage.
32. People often fill the gaps in their memories with events that "make sense" but never actually occurred.
33. It is not unusual for people to have accurate memories of events for the first few days after birth.
34. If we really focus our attention on remembering, it is possible to retrieve memories of especially important but frightening events, such as baptism or circumcision.
35. With the right techniques, certain people can produce accurate and vivid memories of a past life.
36. I believe that my present life is influenced by a previous life/lives I may have had.
37. It is easier to accurately remember something you have done than something you have said.

Effectiveness of Self-Modeling as an Intervention for Behavioral Change: Or is it Really the Alteration of Memory?

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This newsletter entry is a brief summary of a paper presented at the annual meeting of the American Psychological Association in August, 2001

A considerable body of research has indicated that memory can be altered (Loftus, 1997; Schacter, 1995). The question is what are the mechanisms by which the alteration occurs. Loftus has suggested that it is relatively easy to "create complex and elaborate false memories in the minds of research subjects, and that subjects are confident that these false memories are real." (p. 61). The procedures employed to change memory have involved external suggestion, encouragement both to remember more and imagine former false memories (Loftus).

This synopsis explores the treatment of videotape self-modeling and its relationship to the alteration of memory. Self-modeling is defined as "an intervention procedure using the observation of images of oneself engaged in adaptive behavior. Most commonly these images are captured on video, edited into 2 to 4 minute vignettes, and repeatedly viewed to learn skills or adjust to challenging environments as part of a training or therapy protocol" (Dowrick, 1999, p. 23). We propose that when individuals view a modification in their behavior on edited videotapes, their memories and self-beliefs change to be in agreement with that which was viewed. When individuals view their videotapes on six to eight occasions, over a period of several weeks, they may eventually alter their memories of past maladaptive behaviors, with a memory of engaging in exemplary behavior similar to that depicted on the edited videotapes. It is assumed that they eventually come to believe that they were always capable of performing such exemplary behavior. The following case-study is one of three that were included in an investigation published by Kehle, Madaus, Baratta, and Bray, in 1998. This example describes the procedure.

Megan was a third-grade child with selective mutism that was initially diagnosed in preschool. She was described as having an above average IQ; however, she evidenced poor academic performance in school. Her selective mutism and poor school-related performance were the primary mitigating factors that resulted in her being placed in a special education class for students with serious emotional disturbance. In addition to her selective mutism, Megan also exhibited enuresis, which has been shown to be an associated behavior.

The treatment involved the construction of an edited videotape that depicted Megan supposedly responding to approximately 10 of her teacher's questions. In reality,

Megan was responding to questions posed by her father. The edited intervention videotape was around 5 minutes long and was shown back to Megan once or twice a week over the course of 5 weeks. The tape was also viewed by her classmates in order to instill the expectation that she could indeed speak.

During the fifth week of intervention, Megan began conversing in an appropriate and expected manner that was indistinguishable from her classmates. In addition the associated feature of enuresis abated entirely. At a 9-month follow up, Megan's in-school speaking remained age-appropriate. Her placement was now in general education and her academic performance was judged as superior. At the follow-up interview, Megan stated that she could not remember why she did not speak in school, simply suggesting that she was shy.

The possibility that similar mechanisms are involved in the research on memory and the effectiveness of self-modeling is compelling. This is particularly evident in the research focusing on misattribution and suggestibility. The procedure employed to induce these images of events that never took place in order to create a false memory (Loftus, 1997), is strikingly similar to the above described self-modeling procedure in which the student viewed an edited self-modeling videotape of adaptive talking behavior that have never taken place before in the school setting. Both create a false memory that the person(s) either have previously experienced the event, or subsequently, can successfully replicate the visually depicted event.

Additional support for the impact of self-modeling comes from literature suggesting that information presented visually is more potent and enduring than information presented verbally with regard to altering memories (Braun & Loftus, 1998). Individuals who are exposed to visually presented information, come to "really believe in the veracity and strength of the newly created memories, and they report visually re-experiencing the information." (p. 577). Of particular importance, Braun and Loftus reported that altering memories can also result in a subsequent change in behavior. Their study of the effects of misinformation in advertising showed that "memory changes can be directly linked to consumer subjective judgments and choices when the misinformation is particularly salient." (p. 569). The use of edited videotapes depicting oneself engaged in exemplary behaviors should maximize identification with the model. The following, taken from Braun and Loftus, is relevant to our argument:

Advertising is far from unimportant or harmless; it is not a mere mirror image. Its power is real, and on the brink of a great increase. Not the power to brainwash overnight, but the power to create subtle and real change. The power to prevail. (Clark, 1985)

In summary, the positive effects of self-modeling, should dramatically exceed the effects realized as a result of visually conveyed advertising. This is perhaps due to the fact that self-modeling capitalizes on identification and similarity with the model. Finally, it was proposed that alternation of memory may be a plausible alternative explanation for the effects of self-modeling.

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Empirical Support for Memory Beliefs

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Our memories define us. They permit a sense of continuation from one occasion to the next, stringing together a series of moments that we come to call a lifetime, each embedded in the cultural context that comes to discern an era, a history. But how steady is the continence of this history? Is it a jagged peak that serves as a landmark, or the wavering face of a river that changes? Clearly we are aware that each of us is capable of recalling life events, but does the average person know the precision of this record keeping? When does it begin? How malleable are these recollections? And are these beliefs consistent across individuals, or does each person construct his or her own unique understanding of memory? This paper examines common constructs that form a core of beliefs about memory. Using a national sample of 1239 individual's responses to the Beliefs About Memory Survey (BAMS: Brown, Garry, Loftus, Silver, DuBois, & DuBreuil, 1996), our focus for this paper centers on three general beliefs about memory: memory storage; blending of memory; and the possibility of early and pre-life memory.

This research has relevance to many; among them is the juror, therapist, public relations officer, and teacher. Common assumptions about the role and capability of memory pervade our culture, yet as scientists we must ask, are these beliefs a mere reflection of the false consensus effect at work in our own thinking, or are they supported by empirical evidence? Have researchers done well to disseminate findings regarding the role of memory? This paper begins to address these questions.

Empirical Support for Memory Beliefs

Our recollection of events is important, as is how we believe we may remember material and how accurate we believe those memories may or may not be. Science has revealed that memories are fallible. Belli's (1989) research proposed that misinformation effects (i.e., repeated false statements and underhanded information that lead people to believe they have seen or experienced something that they have not) may distort recollection. This, coupled with confirmation bias (i.e., the tendency of people's beliefs to drive their behaviors) may cause people to search for and then ultimately remember inaccurately. The work of Loftus and colleagues has focused on this lack of precision in a person's memory, whether related to eye-witness testimony (Loftus & Ketcham, 1991) or repressed memory (Garry, Loftus, Brown, & DuBreuil, 1994). Her theory describes a mixing of current perceptions with schematic representations of memories to cause alterations to an earlier memory. These distorted memories then may appear to be real memories to the individual, but in fact have been influenced by questioning techniques, suggestion, or mere recall efforts. A person's belief that they can recover repressed or newborn memories through specific techniques, techniques for which there is no scientific evidence to support, can significantly impact the belief system about memory and the recollection of 'facts' and 'events.' The study of person's memory beliefs is very important in the field of memory research as it relates to the fidelity of memory for events during an observed situation, such as an argument between two people, a legal trial, or the evaluation of someone's performance (e.g., teacher observation). It also raises questions about the recall of repressed memories of abuse and violence during counseling.

Returning to our initial questions, then, we must examine the commonly held beliefs about memory that are assumed in our culture. Garry, Loftus, and Brown (1994) developed a measure of people's beliefs about memory and found a surprising level of agreement with beliefs that are unsupported by scientific research. Brown, Garry, Silver, and Loftus (1997) reported similar findings. For example, 33% of the sample used in the Brown et al. (1997) study believed memories of physical trauma are sometimes 'stored' in the muscles of the body; 25% believed their present life is influenced by a previous life/lives. The data indicated that large percentages of the sample were subject to misinformation and unfounded and unsubstantiated memory beliefs. These findings point toward the task of better educating the public regarding the nature of memory. An assessment evaluating these beliefs concerning memory can provide a baseline measure of the magnitude of misinformation about memory within our society, serving as a guide for scientists and educators, and has implications in a number of scientific fields of study.

Method

Participants

One thousand two hundred thirty-nine individuals from Connecticut, South Carolina, Maryland, Montana, Oklahoma, Texas, and Utah participated in this study. These

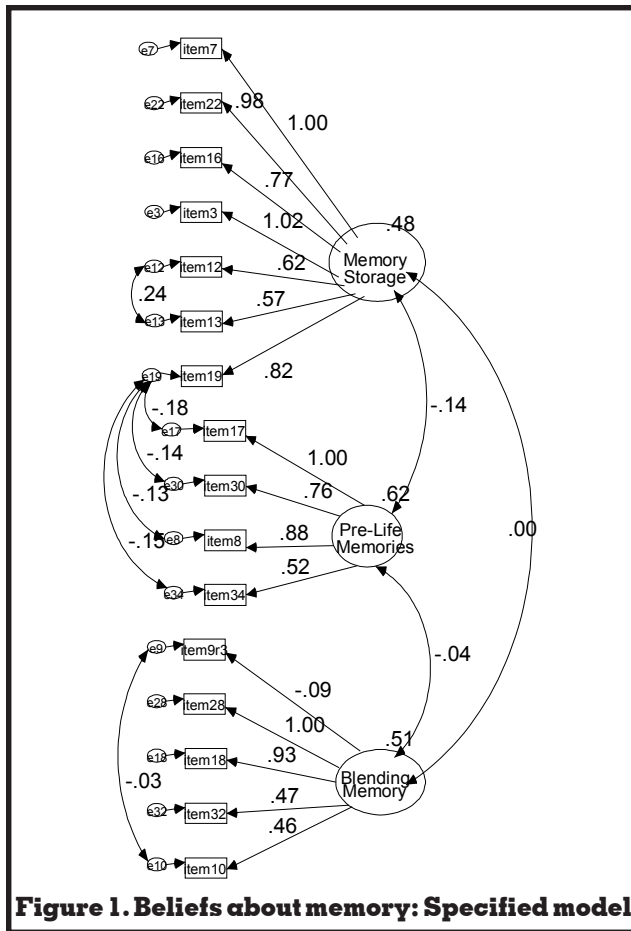


Figure 1. Beliefs about memory: Specified model

participants represent high school, community college, and university students, as well as those residing in senior housing. Some of the school-aged participants were provided extra points in their class for participation.

Instrumentation

The Beliefs About Memory Survey was initially developed by Garry et al. (1994), and further revised by Brown et al. (1996) and Brown et al. (1997). The most recent version of the BAMS contains 37 items on a self-report 5-point Likert scale with labels of 'Strongly Disagree', 'Disagree', 'Neutral', 'Agree', and 'Strongly Agree' (see <http://www.education.uconn.edu/memorysurvey/> for the complete survey, the questions of which are presented here on page 6). Principal component evidence provided by Brown et al. (1997) demonstrated a three-component solution. Components were labeled New born, womb, and previous lives memories (6 items),

Variable 1	Variable 2	Correlation
Pre-Life Memories	Blending Memories	-0.08
Pre-Life Memories	Memory Storage	-0.26
Blending Memories	Memory Storage	0
Error Item 10	Error Item 9	-0.23
Error Item 34	Error Item 19	-0.21
Error Item 17	Error Item 19	-0.42
Error Item 12	Error Item 13	0.34
Error Item 30	Error Item 19	-0.25
Error Item 8	Error Item 19	-0.19

Table 1. Correlations

Blending of memories (5 items), and Memory storage beliefs (7 items). The remaining 19 items did not covary with any of the items on the first three components. Rasch analyses (Smith et al., 1998) revealed strong empirical support for 16 of the 18 items identified as loading on the three constructs from the components analysis. This study examines those 16 items, addressing the constructs of *Memory Storage*, *Pre-Life Memories*, and *Blending Memories*, in a confirmatory factor analysis.

Items defining the *Memory Storage* construct relate to the durability of memory, such as item 7, "Everything we learn is permanently stored in the mind, although sometimes certain information is not accessible". The *Pre-Life Memories* construct is defined by questions relating to our ability to store memories prior to physiological birth, such as item 8, "It is possible for a person to remember things that happened before he/she was born". The third construct, *Blending Memories*, relates to the authenticity of recollection capabilities. Items that define this construct are similar to item 18, "Things we see on television can blend with our memories of truly experienced events".

Results

All data were subjected to confirmatory factor analysis (CFA). The initial measurement model was altered by the addition of six covariance terms among error terms as determined by the modification indices and theoretical justification and re-estimated. The final measurement model is depicted in figure 1. [For specific details on the procedures and the results contact Bethany Silver].

Correlations. Table 1 shows the correlations among the factors. Recall that the covariance between the Blending Memories and Memory Storage constructs was not significant. Significant correlation occurred between the remaining constructs in the model, with the strongest correlation found between Pre-Life Memories and Memory Storage

Discussion

There are a number of practical uses for the BAMS. It could be used as a screening tool for jurors, to ensure that they are critical consumers of testimony; a self-assessment for educational needs regarding research findings related to memory; and as an evaluation instrument to guide therapists against the encouragement of false memories in clients who believe in the possibility of special techniques, such as hypnosis, to uncover repressed memories. Data collected from this research may be useful to the public relations officer, who provides information to the media, so as to present information with embedded strategies that would facilitate recall. It is also useful to the teacher, who can help students create and modify memory strategies by defining the capabilities of memory, as well as means for increasing memory skills, so that memory is viewed as a self-regulated, as opposed to attributional, entity.

Conclusion

There are several important results that may be drawn from our analyses. From a clinical standpoint, these

findings have implications for therapists working with clients, lawyers questioning clients and eyewitnesses, teachers instructing students in a classroom, and for the average citizen. As therapists ask questions of clients, they must be aware that a client's beliefs about the functioning of their memory will directly impact the events that they recall and the accuracy with which they report those events. As lawyers question witnesses during a trial, they must consider the juries' beliefs about the memory of the event related to the testimony delivered, as well as the memory beliefs of the jury members listening to the testimony. If great detail is presented in the testimony, it appears that the jury may be more likely to believe that the person's memory of the event is more accurate than if there is impoverished detail. When teachers are instructing in their classrooms, they need to be aware that their students may have many misperceptions about memory and how it operates, and these beliefs may negatively impact the student's ability to recall instructional material. For members of our society, an increased awareness of memory facts and myths can greatly aid expectations about memory capability, and strategies for remembering that will facilitate accuracy.

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Discussion: Research Evidence to Combat Misconceptions About Human Memory

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In 1978, Ulrich Neisser gave the opening address at a conference focusing on the practical aspects of memory. During that speech he stated, and I am paraphrasing here, that if something were an interesting or socially relevant topic concerning the behavior of human beings, that psychologists would rarely study it. He of course was talking about the nearly century long tenure of memory research to date. He argued that findings from the highly controlled laboratory research that had been conducted in the past had little relevance or application in the real world. Neisser called for a more ecological approach to the study of human memory. In this approach, he challenged researchers to take into account the context of memory and the perspectives that the individual brings into the research equation.

Looking at the nearly 25 years of memory research that has passed since Neisser's speech in 1978 – what has changed? Well, psychologists are still conducting those controlled laboratory experiments, and probably always will. This occurs for several reasons, but for the sake of time and space – I offer only the two of the more major reasons. First, it is much easier to present a cogent, theoretically based explanation of human memory if we can parse out intervening variables like context and prior experience. Second, these experiments HAVE lead to some relevant insights into human memory and learning. Take, for example, the enormous body of research on the recall of information from text-based resources. From this research, we know better

how to present text-based information to students, how to organize it, how to heighten attention – what information not to include and how to help students read in order to facilitate better and more accurate recall. Even this body of research, is however feeling the need for a more ecological approach, turning to the use of naturally occurring texts instead of experimentally contrived ones, examining reading in the classroom context and even the impact of collaborative reading environments. So, in roads are being made—even if at a slow pace.

In the same vein, the research presented in this collection of papers takes a stride away from the laboratory. Rather than trying to define human memory, these researchers have attempted to understand how memories define humans. With respect to the Silver et al., and Alvarez and Brown papers, we see an attempt to document the beliefs that we all carry with us that shape the way we see, log, and recall events in our lives. While these beliefs are as unique as the individuals who hold them, this research highlights that there are shared representations of memory among us and across cultures. We know from recent research published by Winckelman and Swartz (2001) that what people believe about memory and how it works does shape the nature and quality of what can be recalled. In addition, research by O'Sullivan and colleagues (1996) illustrates that beliefs about memory change over time and suggests that memory beliefs maybe learned. As suggested in both of these papers, as practitioners in the field of psychology, we need to be mindful of the preconceived beliefs about memory that students bring to our classrooms and how these beliefs may effect how they think, acquire knowledge and apply meaning both in and out of educational settings.

Finally, I turn to the Kehle et al. paper. In this paper, we see a new, more ecological explanation of a traditionally behavioristic regime. Forward thinking, thinking that is open to a myriad of plausible hypotheses, like that underlying self-modeling, is the kind of proposal that will allow us as researchers to examine the full spectrum of human memory, rather than a single constrained path. We need to continue to examine such hypotheses, constantly changing the research lens so that we do not continue to explore with tunnel vision. I en-

courage these researchers to move forward with their postulate and try and document the alterations that might be occurring in participants' memories as a result of this powerful intervention.

Over the 100 plus years of memory research, it may be easy to think that as humans we are merely the compilation of our memories – the end product all that we have ever endeavored. However, the research presented here today illustrates that just the opposite is true. Our memories are the end product of all we have ever thought or done, and are filtered by our perceptions and opinions. As individuals, who we are is shaped by our memory of the past and our memory is continually reinvented by who we have become. This symposium has called upon us as researchers in the field to embrace these complexities and to realize their ramifications on how we study memory and apply research findings in our own work. I hope these lines of research will continue and look forward to how they continue to reinvent my understanding of human memory.

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Author's note: The discussion is based on three of the five papers presented in the symposia and presented here. For further information, please contact Dr. Kimberly A. Lawless at Klawless@uic.edu