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Semantic–episodic interactions in the neuropsychology of disbelief

Ricki Ladowsky-Brooks

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James E. Alcock

Department of Psychology, Glendon College, York University, Toronto, Ontario, Canada

Introduction. The purpose of this paper is to outline ways in which characteristics of memory functioning determine truth judgements regarding verbally transmitted information.
Method. Findings on belief formation from several areas of psychology were reviewed in order to identify general principles that appear to underlie the designation of information in memory as "true" or "false".
Results. Studies on belief formation have demonstrated that individuals have a tendency to encode information as "true" and that an additional encoding step is required to tag information as "false". This additional step can involve acquisition and later recall of semantic–episodic associations between message content and contextual cues that signal that information is "false". Semantic–episodic interactions also appear to prevent new information from being accepted as "true" through encoding bias or the assignment of a "false" tag to data that is incompatible with prior knowledge.
Conclusions. It is proposed that truth judgements are made through a combined weighting of the reliability of the information source and the compatibility of this information with already stored data. This requires interactions in memory. Failure to integrate different types of memories, such as semantic and episodic memories, can arise from mild hippocampal dysfunction and might result in delusions.

INTRODUCTION

Belief in the absence of memory is inconceivable. Over the past decade there have been significant advances in the understanding of memory and its neurobiological subsystems (Squire, 2004). The purpose of this paper is to outline ways in which the characteristics of memory functioning determine

Correspondence should be addressed to R. Ladowsky-Brooks, 7636 Yonge St., Thornhill, ON, Canada L4J 1V9. E-mail: ricki@rlbneuropsychology.com

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truth judgements regarding verbally transmitted information. Findings on belief formation from several areas of psychology are reviewed in order to identify general principles that appear to underlie these judgements. It is argued that there is a tendency to accept encoded information as "true", whereas the designation of encoded information as "false" requires additional interactions of memory, which, when disordered, lead to delusion formation.

It is worth stating that in the psychological literature as a whole, the term "belief" is very rarely defined despite wide usage. Belief has been variously used to describe the acceptance of a simple fact (Alcock & Moore, 1985; Begg, Armour, & Kerr, 1985), a complex schema (Young, 1990), or a point of view (Lord, Ross, & Lepper, 1979). In personality measurement, and in cognitive therapy and psychiatry, beliefs refer primarily to assertions that are consistently stated or endorsed about the self and others (Beck, Rush, Shaw, & Emery, 1979; Berrios, 1991; Brett-Jones, Garety, & Hemsley, 1987; Graham, 1993), while attitude theorists have defined beliefs as associations or linkages that people establish between an attitude object and various attributes that they ascribe to it (Ajzen & Fishbein, 2000; Eagly & Chaiken, 1998). The present paper will deal only with verbally transmitted information (in the form of words, propositions, opinions, or stories), and the mechanisms that lead to its classification within the memory system as "true" or "false". Within this context, the term "belief" will refer to information that has been accepted as "true", regardless of its external validity or the level of conviction with which it is endorsed.

MEMORY AND BELIEF

Semantic and episodic memory

Of particular importance in the understanding of many clinical disorders is the distinction between semantic and episodic memory, first conceptualised by Tulving (1972). Semantic memory has been defined as knowledge of words and their meanings, and of concepts and facts (Squire, 2004; Tulving, 1972; Tulving & Markowitsch, 1998). Episodic memory has been defined as the conscious recollection of personal past events that can be referenced with respect to time and place, although this information might not be accurately recalled (Squire, 2004; Tulving & Markowitsch, 1998). The hippocampus is a brain structure that is located in the medial temporal lobe of the cerebral cortex and is now recognised as playing a pivotal role in the encoding of episodic and semantic memory (Aggleton & Brown, 1999; Corkin, 1984; Milner, 1970; Zola-Morgan, Squire, & Amaral, 1986). Yet, independence of these memory systems has been suggested by case studies of memory disorders, which show relative impairment of one type of memory over the

other (Garrard, Perry, & Hodges, 1997; Mishkin, Vargha-Khadem, & Gadian, 1998; Yasuda, Watanabe, & Ono, 1997), and by neuroimaging studies that show overlapping but nonidentical patterns of brain activation in the two types of memory tasks (Dalla Barba, Parlato, Jobert, Samson, & Pappata, 1998). Furthermore, hippocampal damage impairs the retrieval of episodic but not semantic memory (Nadel, Samsonovich, Ryan, & Moscovitch, 2000). It therefore has been suggested that the hippocampus not only encodes new information, but plays an additional role in the reactivation of constituent features of memory representations that were bound together at encoding (Nadel et al., 2000; Schacter, Norman, & Koutstaal, 1998).

The strength of an episodic or semantic memory is usually judged by a number of variables that involve *explicit* recall or recognition of the information (Delis, Kramer, Kaplan, & Ober, 1987). However, some memories and skills can be formed or maintained unconsciously, in which case *implicit* retention of information could be demonstrated by practice effects and the unintentional production of learned material on tests such as verbal fluency and word completion (Haist, Musen, & Squire, 1991; Roediger, 1990).

Encoding and belief formation

Numerous experiments (Bacon, 1979; Begg, Anas, & Farinacci, 1992; Begg et al., 1985; Begg, Robertson, Gruppuso, Anas, & Needham, 1996; Hasher, Goldstein, & Toppino, 1977; Roggeveen & Johar, 2002) have demonstrated that there is a bias towards accepting information as "true" once it has been encoded in memory. With respect to semantic memory, the tendency to accept encoded information as "true" has been referred to as a *default bias* (Petty & Wegener, 1998) or as an *illusory truth effect* (Begg et al., 1992). Following from earlier work by Bacon (1979), and Hasher et al. (1977), Begg et al. (1985) presented people with made-up, but plausible statements, and then 2 weeks later asked them to rate these statements and other newly introduced statements as "true" or "false" on a 7-point rating scale, with "1" being "certainly true" and "7" being "certainly false". An example of such a statement was "The extended right arm of the Statue of Liberty is 42 feet long." There was a significant tendency to rate the previously seen statements as being truer than the newly introduced statements because, it was inferred, they were consistent with that information already stored in memory. Even statements that were initially preceded by an "uncertainty" clause, such as "few people believe that", were rated upon second exposure as truer than entirely new sentences, but as less true than the certain sentences. Thus, it appeared that some kind of truth-value weighting had occurred at the time of initial encoding based on whether these statements

had initially been viewed in an affirmative or negative context, yet truth ratings did not appear to be directly related to any superiority in the learning or retention of the certain sentences (Begg et al., 1985).

These findings have been replicated in a series of studies (Begg et al., 1992) that demonstrated that the familiarity of verbal information significantly affected truth ratings, even when it was known that the "true" information was merely acquired within the framework of the experiment itself (Bacon, 1979; Begg et al., 1992). This finding lead Begg et al. (1992) to conclude that the effect of familiarity on rated truth is an automatic and unintentional consequence of exposure. In fact, the tendency to accept verbally encoded information as "true" is so strong that even a false experience, repeatedly communicated to a child in the form of a verbal narrative (for example, getting one's hand caught in a mousetrap), will often later be identified by the child as a true experience (Ceci, Huffman, Smith, & Loftus, 1996). When preschoolers were asked to categorise as "true" or "false" a list of four events, two which had actually occurred, as reported by their parents, and two which had been contrived by the experimenters, a small percentage of children rated the false events as true by the seventh experimental session and were able to provide their own account of these fictitious events in great detail (Ceci et al., 1996). This phenomenon has been referred to in the literature as the misinformation effect (Johnson, 1988; Johnson & Raye, 2000; Loftus, 2005).

MEMORY AND DISBELIEF

Tagging of semantic information

The aforementioned studies demonstrate that when information that cannot be evaluated according to prior knowledge is presented to people, there is a bias towards acceptance of this information as "true". This is most easily demonstrated with information that was invented for the purpose of such an experiment, like the made-up but plausible statements in the Begg et al. (1985) study. If this type of information is accompanied by cues that signal it is false, then belief formation appears to be a two-stage process, with false information first being accepted as "true", and subsequently tagged as "false" (Gilbert, Krull, & Malone, 1990; Gilbert, Tafarodi, & Malone, 1993). Gilbert et al. (1990) presented study participants with statements whose veracity could not be determined, such as "A monishna is a star." Each assertion was presented on a computer screen for 8 s, followed by a blank screen for 2 s, and another blank screen that contained the signal word "true" or "false" for another 3 s. On some trials participants were interrupted by a brief, 350 ms tone-detection task that occurred 750 ms after participants had been informed of the assertion's veracity. It was shown

that newly presented information, marked as false at the time of presentation, would later be remembered as "true" if processing of the auxiliary false cue were to be interrupted. In contrast, interruption of the auxiliary truth cues did not result in "false" judgements. It was argued that people initially accept as "true" every proposition they comprehend and then decide whether to "unbelieve" it or not (Gilbert et al., 1990, 1993; Wilson, Gilbert, & Wheatley, 1998).

Independent processing of semantic information and veracity information has also been posited in a phenomenon known as the "sleeper effect" in which there is a delay in the impact of a message that was associated with a discounting cue, such as a message disclaimer (Kumkale & Albarracin, 2004; Pratkanis, Greenwald, Leippe, & Baumgardner, 1988). Pratkanis et al. (1988) hypothesised that the effect is mediated by decay of the discounting cue over time, and this claim has been supported by a recent meta-analytic review (Kumkale & Albarracin, 2004) that found more rapid forgetting of the discounting cue relative to the message. The discounting cue might also be viewed as a form of "false" tag, which suppresses the immediate impact of the message, so that, as it decays, the message is remembered as "true".

Further evidence of a two-stage process in belief formation comes from a functional imaging study that used fMRI to measure the activity of the brain during different types of truth judgements (Mitchell, Dodson, & Schacter, 2005). Trivia statements were presented on a computer screen for 5500 ms below one of the cue words "True", "False", or "Neutral"; the statements were later presented along with novel statements and participants were asked to rate their veracity. The "truth effect" emerged, and it was shown that encoding of statements that were cued as "false" and subsequently judged correctly as "false" was accompanied by increased activity in the left hippocampus and in the inferior frontal gyri bilaterally. There was no increased activity of these areas during encoding of statements that were "true", or statements that were "false" and were later judged to be "true". This suggests that additional encoding was taking place during learning of the "false" statements that were correctly identified. During the judgement phase of the task, activation during items that were judged either correctly or incorrectly to be "false" was greater in these same regions and in another cortical region (the left parietal cortex) than during "true" judgements. It was concluded that labelling of information as "false" involved a form of recollection that was not being utilised during "true" judgements.

Source memory and associative tags

If some kind of tag is being used to denote semantic information as "false", it is possible that this tag is derived from episodic events accompanying the

transmission of information, as these events might help to determine the credibility of the information source. Persuasion studies have shown that semantic information is accepted or rejected on the basis of a variety of variables, many of which relate to characteristics of the message source, such as the power and attractiveness of the speaker, the perceived credibility of the speaker, the forcefulness of the argument, and the context in which the message is presented (McGuire, 1985; Petty & Wegener, 1998). That the veracity of semantic information should depend on such cues is understandable, in light of the fact that individuals rarely have the opportunity to objectively test or evaluate the truth value of all conveyed information.

Source memory is defined as memory for the situation or context in which information was received or experienced (Schacter, Harbluk, & McLachlan, 1984; Shimamura & Squire, 1987) and as such, it can be viewed as a component of episodic memory (Troyer, Winocur, Craik, & Moscovitch, 1999). For example, if an individual is asked to recall a list of words, not only should they be able to recall many of the list words within a reasonable time frame, but they should also be able to recall the situation in which the information was learned. Source amnesia has been reported to be dissociable from impaired recall/recognition of message content (Shimamura & Squire, 1987), and a role of the frontal lobes in mediating source memory has been hypothesised (Davidson, Cook, Glisky, Verfaellie, & Rapcsak, 2005; Janowsky, Shimamura, & Squire, 1989).

The role of source memory in providing a false tag for semantic information is supported by the finding that the truth effect—the tendency for mere repetition of information to induce or increase belief—is enhanced by the decline of source memory in ageing (Law, Hawkins, & Craik, 1998). Furthermore, manipulation of encoding variables which increased source memory in the older population also led to a reduced truth effect (Law et al., 1998). As well, it has been shown that the brain regions which show additional activation on fMRI during false judgements are the same areas that are activated during successful source memory recognition (Mitchell et al., 2005).

It should be pointed out that the tagging process need not be explicit, as Lieberman, Ochsner, Gilbert, and Schacter (2001) have demonstrated: Participants with amnesia, like control participants, changed their subjective ratings of pictorial preferences based on a cognitive dissonance manipulation that they could not remember. It might be that uncertainty about truth is signalled by implicit memory cues, whereas "false" judgements are made on the basis of explicit memory cues. The contribution of explicit and implicit source recall to belief formation needs to be clarified with future research.

Source memory problems have also been linked to the misinformation effect (Loftus, 2005). When imaginary episodic events are repeated, the

original source cues can become eroded, and this, in conjunction with the increasing vividness of the vignette, could contribute to the acceptance of a false memory (Ceci et al., 1996; Johnson & Raye, 2000; Lindsay, 1990; Roediger, McDermott, & Goff, 1997; Thomas, Bulevich, & Loftus, 2003). It might be that the multimodal nature of episodic encoding provides an implicit source cue in that vivid memories will later be judged to emanate from one's own experience. Less vivid memories, such as the details of a story told by one person to another, are judged as having been acquired through a secondary source, but could be mistaken for one's own experience if the memory becomes more vivid as a result of repetition (Johnson, 1988; Johnson & Raye, 2000).

BELIEF STABILITY

Just as source cues can signal that information is false, cues emanating from disagreement between new and previously learned information can also result in the assignment of a "false" tag. This was clearly demonstrated in the early studies on the nature of the truth effect (Bacon, 1979), which found that information that contradicted statements that had just been presented in the test session was labelled as "false". This type of tagging can also be mediated by implicit source cues, insofar as the source of previously encoded material is assumed to be more trustworthy than the transmission source of the new message. However, if the source of the new information is unusually powerful or convincing, this information might be judged to emanate from a more trustworthy source than the previously encoded information, and belief change might ensue. It is thus proposed that truth judgements are made through a combined weighting of the reliability of the information source and the compatibility of this information with data that has already been stored.

Many categories of information require updating, as is the case with autobiographical information, which is subject to constant revision on the basis of new experience (for a discussion of autobiographical memory, see Conway & Pleydell-Pearce, 2000). The challenge of belief maintenance is to preserve internal stability of belief and minimise confusion, while at the same time allowing for necessary revisions and changes.

Associative tagging

One way in which the brain can encode data that are incompatible, while reducing consequent confusion, is by isolating different beliefs from one another. Budd (1973) observed that religious beliefs are usually isolated from secular beliefs, so that changes in secular beliefs brought about by experience

can have no effect on religious beliefs. Frank (1977) argued that people are taught in childhood to accept two opposing belief systems with radically different perspectives on how one learns about reality. If this is so, then source or "contextual" cues might not only serve to mark information as false in semantic memory, but might also act as cues that differentiate belief systems. The source tag might signal that the information is to be taken as true in only one circumstance, thereby reducing confusion by tagging incompatible information in meaningful ways. For example, facts that are accepted as true in religious situations can have a specific source tag, so that an individual might pray for well-being in a religious institution, but visit the doctor and not their religious leader when illness strikes.

Conflicting beliefs can also be effectively isolated from one another and differentially accessed, depending on whether task demands are explicit or implicit. In one study (Banaji & Dasgupta, 1998), judgements made by study participants concerning the possible fame or criminality of individuals in photographs often suggested implicit assertions that differed from their explicit assertions. In this regard, Devine (1989) has suggested that automatically activated semantic associations acquired early in life, such as those regarding gender (Fagot, 1985; Golombeck & Fivush, 1994), race (Averhart & Bigler, 1997), and nationhood (Piaget, 1951) can be inhibited by more controlled processes that are acquired later in life. Such processes can involve associative tags or linkages that necessitate longer activation times, thus failing to inhibit automatic representations elicited by tasks that require rapid, nonconscious judgements. In situations where the cue is accessed, the postpersuasion belief might be expressed; when this cue is inaccessible, the prepersuasion belief might be expressed. Disagreement between new and previously learned information can therefore result in the addition or alteration of a false tag (persuasion effect), and/or in the simultaneous acceptance of conflicting beliefs that are differentially accessed.

Encoding bias

Another way in which the stability of stored information can be maintained is through encoding bias. Encoding of information that is incompatible with stored data can be prevented through filtering of both semantic and episodic information, a process that has been termed "selective memory" (Eagly & Chaiken, 1998) or "selective attention" (Downing, 2000). It has been demonstrated in a variety of situations and is purported to depend on relatively enduring patterns of thinking that arise from our limited processing capacities (Downing, 2000; Gazzaniga, 1998; Howard & Hollander, 1997). For example, it seems well established that narrative elements consistent with stored information will be better recalled than those that diverge from

common memory associations (Averhart & Bigler, 1997; Lenton, Blair, & Hastie, 2001; Lepore & Brown, 1997). Also, memory bias for negative events has been demonstrated in depression (Bentall, Kaney, & Bowen-Jones, 1995; Watkins, Vache, Verney, & Matthews, 1996). Although encoding bias might help to preserve the internal consistency of stored information, it might lead to the maintenance of erroneous beliefs (Beck et al., 1979; Young, 1990).

DELUSIONS

The paper, thus far, has dealt with verbal information that is communicated to the individual (Alcock, 1981), yet stored information could also be derived from private deductions or associations of the individual (Alcock, 1981; Tulving & Markowitsch, 1998) as well as from anomalous perceptual or feeling states that later find expression in words (Jaspers, 1963; Young, 2000). Strange or unusual ideas that are not supported by cultural norms and that are held with unusually strong conviction are classified as delusions in DSM-IV (American Psychiatric Association, 1994). Delusions can be characterised by a number of measurable variables, such as conviction, preoccupation, and life interference (Brett-Jones et al., 1987). They are often classified according to their content, based on either the predominant theme, the degree to which they might be considered bizarre, or their compatibility with mood state (Junginger, Barker, & Coe, 1992; Nakaya, Kusumoto, Okada, & Ohmori, 2002). A distinction has been made between primary delusions, which appear to involve a radical transformation in the meaning of an experience, and secondary delusions, which are considered to be understandable in the context of a person's life history and mood state (for discussion see Walker, 1991).

Much research has focused on factors that lead to delusion formation, such as perceptual abnormalities (Cutting, 1987; Lewis-Lehr, Slaughter, Rupright, & Singh, 2000; Ruff & Volpe, 1981; Young, 2000) or differences in decision-making styles (Garety & Hemsley, 1997). However, a second contributing factor to delusion formation could be that semantic–episodic interactions are disrupted, both with respect to source tagging of information (Moritz & Woodward, 2002) and with regard to semantic monitoring of experience. Frith (1992), Garety and Hemsley (1997), and McKenna (1991) have all postulated that schizophrenia involves a breakdown in the control of information processing by "stored regularities". This implies a subtle semantic memory deficit that can be characterised by an inability to use semantic knowledge to reject incongruous experience under certain conditions (Rossell, Shapleske, & David, 1998).

The absence of a semantic influence in the interpretation of experience becomes particularly problematic when one's senses provide aberrant

information, as in the hallucinations of schizophrenia (Berner, 1991; Shea, 1998) or the visual-perceptual distortions of certain organic conditions (Cutting, 1987; Lewis-Lehr et al., 2000; Ruff & Volpe, 1981; Young, 2000), as well as in conditions of memory disorder that provide erroneous information about past events. For example, in the condition of confabulation that results from certain types of brain damage (Dalla Barba, Cappelletti, Signorini, & Denes, 1997), false autobiographical memories are produced by either defective memory retrieval mechanisms (Burgess & Shallice, 1996; Moscovitch, 1989) or poor monitoring of information source (Ptak & Schneider, 1999). Dalla Barba (1993) has suggested that the content of confabulation varies along a continuum, from minor distortion to bizarre and semantically anomalous tales, according to the level of semantic memory impairment. Yet, as long as experience is interpreted and encoded in a way that is compatible with semantic information, delusions might fail to develop even in the presence of sensory disorders. For example, in Charles Bonnet syndrome, central or peripheral pathology of the visual system creates illusions of little men and other strange scenes, but individuals with this condition, who presumably have intact semantic filtering of information, do not believe that these hallucinations are real (Teunisse, Cruysberg, Hoefnagels, Verbeek, & Zitman, 1996). Semantic tagging of anomalous perceptions could be one mechanism that contributes to the recognition and rejection of internally generated experiences.

While failures in either associative tagging or encoding bias can result in acceptance or maintenance of false information at the conscious level, previously acquired semantic knowledge might continue to govern behaviour at the unconscious level. Discrepancies between stated delusional beliefs and behaviour can be demonstrated in the clinical setting (Brett-Jones et al., 1987); consequently, delusions have been described as "islands of irrationality" (Davies & Coltheart, 2000) and "empty speech acts" (Berrios, 1991). For example, some individuals with the Capgras delusion might believe that their spouse is really an impostor, yet not take the actions that would ordinarily be taken under such circumstances, such as calling the police (Davies & Coltheart, 2000; Young, 2000). This dissociation between stated beliefs and behaviour, which can also be demonstrated in normal individuals under conditions of rapid judgements regarding fame or criminality (Banaji & Dasgupta, 1998), suggests that delusions might represent a subtle kind of memory failure in which there is deficient integration or "binding" of the constituent features of memory representations. This can limit semantic–episodic interactions that lead to associative tagging and encoding biases, resulting in a failure to discriminate truth.

Eichenbaum and Bodkin (2000) have hypothesised that the "flexibility of memory", meaning the ability to use or alter memories beyond the constraints of the original learning situation, is mediated by the hippocampus. The

hippocampus might play an important role in the revision of stored information, so that failure of the hippocampus to fully integrate newly encoded experience with previously acquired semantic information could lead to delusions. This would be consistent with the abnormalities of the left medial temporal lobe that have been found in schizophrenia (DeLisi et al., 1991; Law & Deakin, 2001; Suddath et al., 1989) and in other conditions that entail delusional thinking (Cummings, 1985). Thus, while disturbances in cognitive, perceptual, and emotional variables can all contribute to the formation of delusions (McKay, Langdon, & Coltheart, 2005), disrupted memory interactions might account for the failure to reject them.

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REFERENCES

Aggleton, J. P., & Brown, M. W. (1999). Episodic memory, amnesia, and the hippocampal–anterior thalamic axis. *Behavioural and Brain Sciences*, *22*, 425–489.

Ajzen, I., & Fishbein, M. (2000). Attitudes and the attitude–behaviour relation: Reasoned and automatic processes. In W. Stroebe & M. Hewstone (Eds.), *European review of social psychology* (Vol. 11, pp. 1–33). Chichester, UK: John Wiley.

Alcock, J. E. (1981). *Parapsychology: Science or magic? A psychological perspective*. Toronto, Canada: Pergamon Press.

Alcock, J. E., & Moore, T. E. (1985). The vulnerability of belief in the conservation of area. *Canadian Journal of Behavioural Science*, *17*(3), 276–283.

American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (4th edn). Washington, DC: Author.

Averhart, C. J., & Bigler, R. S. (1997). Shades of meaning: Skin tone, racial attitudes, and constructive memory in African American children. *Journal of Experimental Child Psychology*, *67*(3), 363–388.

Bacon, F. T. (1979). Credibility of repeated statements: Memory for trivia. *Journal of Experimental Psychology: Human Learning and Memory*, *5*, 241–252.

Banaji, M. R., & Dasgupta, N. (1998). The consciousness of social beliefs: A program of research of stereotyping and prejudice. In V. Y. Yzerbyt, G. Lories, & B. Dardenne (Eds.), *Metacognition: Cognitive and social dimensions* (pp. 157–170). London: Sage.

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression*. New York: Guilford Press.

Begg, I. M., Anas, A., & Farinacci, S. (1992). Dissociation of process in belief: Source recollection, statement familiarity, and the illusion of truth. *Journal of Experimental Psychology: General*, *121*(4), 446–458.

Begg, I., Armour, V., & Kerr, T. (1985). On believing what we remember. *Canadian Journal of Behavioural Science*, *17*, 199–214.

Begg, I. M., Robertson, R. K., Gruppuso, V., Anas, A., & Needham, D. R. (1996). The illusory-knowledge effect. *Journal of Memory and Language*, *35*, 410–433.

Bentall, R. P., Kaney, S., & Bowen-Jones, K. (1995). Persecutory delusion and recall of threat-related, depression-related, and neutral words. *Cognitive Therapy and Research*, *19*(4), 445–457.

Berner, P. (1991). Delusional atmosphere. *British Journal of Psychiatry*, *159*(Suppl. 14), 88–93.

Berrios, G. E. (1991). Delusions as "wrong beliefs": A conceptual history. *British Journal of Psychiatry*, *159*(Suppl. 14), 6–13.

Brett-Jones, J., Garety, P. A., & Hemsley, D. (1987). Measuring delusional experiences: A method and its application. *British Journal of Clinical Psychology*, *26*, 257–265.

Budd, S. (1973). *Sociologists and religion*. London: Collier-MacMillan.

Burgess, P. W., & Shallice, T. (1996). Confabulation and the control of recollection. *Memory*, *4*, 359–411.

Ceci, S. J., Huffman, M. L. C., Smith, E., & Loftus, E. F. (1996). Repeatedly thinking about a non-event: Source misattributions among preschoolers. In K. Pezdek & W. P. Banks (Eds.), *The recovered memory/false memory debate* (pp. 225–244). San Diego, CA: Academic Press.

Conway, M. A., & Pleydell-Pearce, C. W. (2000). The construction of autobiographical memories in the self-memory system. *Psychological Review*, *107*(2), 261–288.

Corkin, S. (1984). Lasting consequences of bilateral medial temporal lobectomy: Clinical course and experimental findings in HM. *Seminars in Neurology*, *4*, 249–259.

Cummings, J. (1985). Organic delusions: Phenomenology, anatomical correlations, and review. *British Journal of Psychiatry*, *151*, 324–332.

Cutting, J. (1987). The phenomenology of acute organic psychosis: Comparison with acute schizophrenia. *British Journal of Psychiatry*, *151*, 324–332.

Dalla Barba, G. (1993). Confabulation: Knowledge and recollective experience. *Cognitive Neuropsychology*, *10*, 1–20.

Dalla Barba, G., Cappelletti, J. Y., Signorini, M., & Denes, G. (1997). Confabulation: Remembering "another" past, planning "another" future. *Neurocase*, *3*, 425–436.

Dalla Barba, G., Parlato, V., Jobert, A., Samson, Y., & Pappata, S. (1998). Cortical networks implicated in semantic and episodic memory: Common or unique? *Cortex*, *34*, 547–561.

Davidson, P., Cook, S., Glisky, E., Verfaellie, M., & Rapcsak, S. (2005). Source memory in the real world: A neuropsychological study of flashbulb memory. *Journal of Clinical and Experimental Neuropsychology*, *27*(7), 915–929.

Davies, M., & Coltheart, M. (2000). Introduction: Pathologies of belief. In M. Coltheart & M. Davies (Eds.), *Pathologies of belief* (pp. 1–46). Oxford, UK: Blackwell Publishers.

Delis, D. C., Kramer, J. H., Kaplan, E., & Ober, B. A. (1987). *The California Verbal Learning Test*. New York: Psychological Corporation.

DeLisi, L. E., Hoff, A. L., Schwartz, J. E., Shields, G. W., Halthore, S. N., Gupta, S. M., et al. (1991). Brain morphology in first-episode schizophrenic-like psychotic patients: A quantitative magnetic resonance imaging study. *Biological Psychiatry*, *29*, 159–175.

Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology*, *56*(1), 5–18.

Downing, P. E. (2000). Interactions between visual working memory and selective attention. *Psychological Science*, *11*(6), 467–473.

Eagly, A. H., & Chaiken, S. (1998). Attitude structure and function. In D. T. Gilbert, S. T. Fiske, et al. (Eds.), *The handbook of social psychology* (Vol. 1, pp. 269–322). Boston: McGraw-Hill.

Eichenbaum, H., & Bodkin, J. A. (2000). Belief and knowledge as distinct forms of memory. In D. L. Schacter & E. Scarry (Eds.), *Memory, brain, and belief* (pp. 176–207). Cambridge, MA: Harvard University Press.

Fagot, B. I. (1985). Changes in thinking about early sex role development. *Developmental Review*, *5*, 83–98.

Frank, J. T. (1977). Nature and function of belief systems. *The American Psychologist*, *32*(7), 555–559.

Frith, C. D. (1992). *The cognitive neuropsychology of schizophrenia*. Hove, UK: Lawrence Erlbaum Associates Ltd.

Garety, P. A., & Hemsley, D. R. (1997). *Delusions: Investigations into the psychology of delusional reasoning* (Maudsley Monographs No. 36). Hove, UK: Psychology Press.

Garrard, P., Perry, R., & Hodges, J. R. (1997). Disorders of semantic memory. *Journal of Neurology, Neurosurgery and Psychiatry*, *62*, 431–435.

Gazzaniga, M. S. (1998). The split brain re-visited. *Scientific American*, *279*, 50–55.

Gilbert, D. T., Krull, D. S., & Malone, P. S. (1990). Unbelieving the unbelievable: Some problems in the rejection of false information. *Journal of Personality and Social Psychology*, *59*(4), 601–613.

Gilbert, D. T., Tafarodi, R. W., & Malone, P. S. (1993). You can't not believe everything you read. *Journal of Personality and Social Psychology*, *65*(2), 221–233.

Golombeck, S., & Fivush, R. (1994). *Gender development*. New York: Cambridge University Press.

Graham, J. R. (1993). *MMPI-2: Assessing personality and psychopathology*. New York: Oxford University Press.

Haist, F., Musen, G., & Squire, L. (1991). Intact priming of words and nonwords in amnesia. *Psychobiology*, *19*, 275–285.

Hasher, L., Goldstein, D., & Toppino, T. (1977). Frequency and the conference of referential validity. *Journal of Verbal Learning and Verbal Behaviour*, *20*, 86–96.

Howard, J. A., & Hollander, J. A. (1997). *Gendered situations, gendered selves: A gender lens on social psychology*. Thousand Oaks, CA: Sage.

Janowsky, J. S., Shimamura, A. P., & Squire, L. R. (1989). Source memory impairment in patients with frontal lobe lesions. *Neuropsychologia*, *27*(8), 1043–1056.

Jaspers, K. (1963). *General psychopathology* (J. Hoenig & M.W. Hamilton, Trans, pp. 34–65). Manchester, UK: Manchester University Press.

Johnson, M. K. (1988). Discriminating the origin of information. In T. F. Oltmanns & B. A. Maher (Eds.), *Delusional beliefs*. New York: John Wiley.

Johnson, M. K., & Raye, C. L. (2000). Cognitive and brain mechanisms of false memories and beliefs. In D. L. Schacter & E. Scarry (Eds.), *Memory, brain, and belief* (pp. 176–207). Cambridge, MA: Harvard University Press.

Junginger, J., Barker, S., & Coe, D. (1992). Mood theme and bizarreness of delusions in schizophrenia and mood psychosis. *Journal of Abnormal Psychology*, *101*(2), 287–292.

Kumkale, G. T., & Albarracin, D. (2004). The sleeper effect in persuasion: A meta-analytic review. *Psychological Bulletin*, *130*(1), 143–172.

Law, A. J., & Deakin, J. F. W. (2001). Asymmetrical reductions of hippocampal NMDAR1 glutamate receptor mRNA in the psychoses. *Neuroreport*, *12*(13), 2971–2974.

Law, S., Hawkins, S. A., & Craik, F. I. M. (1998). Repetition-induced belief in the elderly: Rehabilitating age-related memory deficits. *Journal of Consumer Research*, *25*(2), 91–107.

Lenton, A. P., Blair, I. V., & Hastie, R. (2001). Illusions of gender: Stereotypes evoke false memories. *Journal of Experimental Social Psychology*, *37*(1), 3–14.

Lepore, L., & Brown, R. (1997). Category and stereotype activation: Is prejudice inevitable? *Journal of Personality and Social Psychology*, *72*, 275–287.

Lewis-Lehr, M. M., Slaughter, J. R., Rupright, J., & Singh, A. (2000). The man who called himself "hockey stick": A case report including misidentification delusions. *Brain Injury*, *14*(5), 473–478.

Lieberman, M. D., Ochsner, K. N., Gilbert, D. T., & Schacter, D. L. (2001). Do amnesics exhibit cognitive dissonance reduction? The role of explicit memory and attention in attitude change. *Psychological Science*, *12*(2), 135–140.

Lindsay, S. D. (1990). Misleading suggestions can impair eyewitnesses' ability to remember event details. *Journal of Experimental Psychology: Learning, Memory and Cognition*, *16*(6), 1077–1083.

Loftus, E. F. (2005). Searching for the neurobiology of the misinformation effect. *Learning and Memory*, *12*, 1–2.

Lord, C., Ross, L., & Lepper, M. R. (1979). Biased assimilation and attitude polarisation: The effects of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology*, *37*, 2098–2110.

McGuire, W. J. (1985). Attitudes and attitude change. In G. Lindzey & E. Aronson (Eds.), *The handbook of social psychology* (Vol. 2, pp. 233–246). New York: Random House.

McKay, R., Langdon, R., & Coltheart, M. (2005). "Sleights of mind": Delusions, defences, and self-deception. *Cognitive Neuropsychiatry*, *10*(4), 305–326.

McKenna, P. J. (1991). Memory, knowledge, and delusions. *British Journal of Psychiatry*, *159*(Suppl. 14), 36–41.

Milner, B. (1970). Memory and the medial temporal regions of the brain. In K. H. Pribram & D. E. Broadbent (Eds.), *Biology of memory* (pp. 29–50). New York: Academic Press.

Mishkin, M., Vargha-Khadem, F., & Gadian, D. G. (1998). Amnesia and the organization of the hippocampal system. *Hippocampus*, *8*, 212–216.

Mitchell, J. P., Dodson, C. S., & Schacter, D. L. (2005). fMRI evidence for the role of recollection in suppressing misattribution errors: The illusory truth effect. *Journal of Cognitive Neuroscience*, *17*(5), 800–810.

Moritz, S. M., & Woodward, T. S. (2002). Memory confidence and false memories is schizophrenia. *Journal of Nervous and Mental Disease*, *190*(9), 641–643.

Moscovitch, M. (1989). Confabulations and the frontal system: Strategic versus associative retrieval in neuropsychological theories of memory. In H. L. Roediger III & F. I. M. Craik (Eds.), *Varieties of memory and consciousness: Essays in honour of Endel Tulving* (pp. 133–160). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Nadel, I., Samsonovich, A., Ryan, L., & Moscovitch, M. (2000). Multiple trace theory of human memory: Computational, neuroimaging, and neuropsychological results. *Hippocampus*, *10*, 352–368.

Nakaya, M., Kusumoto, K., Okada, T., & Ohmori, K. (2002). Bizarre delusions and DSM-IV schizophrenia. *Psychiatry and Clinical Neurosciences*, *56*, 391–395.

Petty, E. R., & Wegener, D. T. (1998). Attitude change: Multiple roles for persuasion variables. In D. T. Gilbert, S. T. Fiske, et al. (Eds.), *The handbook of social psychology* (Vol. 1, pp. 323–371). Boston: McGraw-Hill.

Piaget, J. (1951). The development in children of the idea of the homeland and of relations with other countries. *International Social Science Bulletin*, *3*, 561–578.

Pratkanis, A. R., Greenwald, A. G., Leippe, M. R., & Baumgardner, M. H. (1988). In search of reliable persuasion effects: III. The sleeper effect is dead: Long live the sleeper effect. *Journal of Personality and Social Psychology*, *54*(2), 203–218.

Ptak, R., & Schnider, A. (1999). Spontaneous confabulations after orbitofrontal damage: The role of temporal context confusion and self-monitoring. *Neurocase*, *5*, 243–250.

Roediger, H. L. (1990). Implicit memory: Retention without remembering. *The American Psychologist*, *45*, 1043–1056.

Roediger, H. L., McDermott, K. B., & Goff, L. M. (1997). Recovery of true and false memories: Paradoxical effects of repeated testing. In M. A. Conway (Ed.), *Recovered memories and false memories* (pp. 118–149). New York: Oxford University Press.

Roggeveen, A. L., & Johar, G. V. (2002). Perceived source variability versus familiarity: Testing competing explanations for the truth effect. *Journal of Consumer Psychology*, *12*(2), 81–91.

Rossell, S. L., Shapleske, J., & David, A. S. (1998). Sentence verification and delusions: A content specific deficit. *Psychological Medicine*, *28*, 1189–1198.

Ruff, R. L., & Volpe, B. T. (1981). Environmental reduplication associated with right frontal and parietal lobe injury. *Journal of Neurology Neurosurgery and Psychiatry*, *44*, 382–386.

Schacter, D. L., Harbluk, J. L., & McLachlan, D. R. (1984). Retrieval without recollection: An experimental analysis of source amnesia. *Journal of Verbal Learning and Verbal Behaviour*, *23*, 593–611.

Schacter, D. L., Norman, K. A., & Koutstaal, W. (1998). The cognitive neuroscience of constructive memory. *Annual Review of Psychology*, *49*, 289–318.

Shea, S. C. (1998). *Psychiatric interviewing: The art of understanding*. Philadelphia: W. B. Saunders.

Shimamura, A. P., & Squire, L. R. (1987). A neuropsychological study of fact memory and source amnesia. *Journal of Experimental Psychology: Learning, Memory and Cognition*, *13*(3), 464–473.

Squire, L. R. (2004). Memory systems of the brain: A brief history and current perspective. *Neurobiology of Learning and Memory*, *82*, 171–177.

Suddath, R. L., Casanova, M. F., Goldberg, T., Daniel, D. G., Kelsoe, J. R., & Weinberger, D. R. (1989). Temporal lobe pathology in schizophrenia: A quantitative magnetic resonance imaging study. *American Journal of Psychiatry*, *146*, 464–472.

Teunisse, R. J., Cruysberg, J. R., Hoefnagels, W. H., Verbeek, A. L., & Zitman, F. G. (1996). Visual hallucinations in psychologically normal people: Charles Bonnet's syndrome. *Lancet*, *347*, 794–707.

Thomas, A. K., Bulevich, J. B., & Loftus, E. F. (2003). Exploring the role of repetition and sensory elaboration in the imagination inflation effect. *Memory and Cognition*, *31*(4), 630–640.

Troyer, A. K., Winocur, G., Craik, F. I. M., & Moscovitch, M. (1999). Source memory and divided attention: Reciprocal costs to primary and secondary tasks. *Neuropsychology*, *13*(4), 467–474.

Tulving, E. (1972). Episodic and semantic memory. In E. Tulving & W. Donaldson (Eds.), *Organization of memory* (pp. 382–403). New York: Academic Press.

Tulving, E., & Markowitsch, H. J. (1998). Episodic and declarative memory: Role of the hippocampus. *Hippocampus*, *8*, 198–204.

Walker, C. (1991). Delusion: What did Jaspers really say? *British Journal of Psychiatry*, *159*(Suppl. 14), 94–103.

Watkins, P. C., Vache, K., Verney, S. P., & Matthews, A. (1996). Unconscious mood-congruent memory bias in depression. *Journal of Abnormal Psychology*, *105*(1), 34–41.

Wilson, T. D., Gilbert, D. T., & Wheatley, T. P. (1998). Protecting our minds: The role of lay beliefs. In V. Y. Yzerbyt, G. Lories, & B. Dardenne (Eds.), *Metacognition: Cognitive and social dimensions* (pp. 107–125). London: Sage.

Yasuda, K., Watanabe, O., & Ono, Y. (1997). Dissociation between semantic and autobiographic memory: A case report. *Cortex*, *33*(4), 623–638.

Young, A. W. (2000). Wondrous strange: The neuropsychology of abnormal beliefs. In M. Coltheart & M. Davies (Eds.), *Pathologies of belief* (pp. 47–73). Oxford, UK: Blackwell Publishers.

Young, J. E. (1990). *Cognitive therapy for personality disorders: A schema-focused approach*. Sarasota, FL: Professional Resource Exchange.

Zola-Morgan, S., Squire, L. R., & Amaral, D. G. (1986). Human amnesia and the medial temporal region: Enduring memory impairment following a bilateral lesion limited to field CA1 of the hippocampus. *Journal of Neuroscience*, *6*, 2950–2967.