The episodic/semantic distinction: Something worth arguing about

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Tulving (1983) has produced a serious extension of his original idea. He faces the fact that the memory we use from day to day has to bear *some* relation to the memory used in the laboratory, even in the old verbal-learning experiments, and he creates a framework in which this range of phenomena can be encompassed. It is still a modest scheme, with only nine elements relating to internal processes and states, and it is a sad commentary on his (probably accurate) assessment of his audience that he fears lest "anyone despairs of the complexity inherent in [this] scheme . . ." (p. 138). Why should we expect psychological models to be simpler to understand than, say, biochemical cycles?

Tulving's achievements include a very clear differentiation between two kinds of knowledge. Our first challenge is whether or not such a differentiation justifies a separation into two *systems*. If the two kinds of knowledge were in a single system their very nature would strongly influence their properties, the conditions under which they are stored, the ways in which they can (or must) be retrieved or used. The advantages of having a single memory system instead would include, first, that the properties of different kinds of knowledge would not have to be ascribed to the systems in the rather apologetic way the data require. Thus, many of the initially distinctive attributes of the two systems become qualified with "more" and "less." We discuss this below in relation to affect. The second advantage of a single system is that the distinctions are allowed to be blurred. Thus, to take one of Tulving's examples (p. 42), suppose a student is told that Freud was born in 1856 and a week later learns that Pavlov was born in 1849, examples of "propositions entailing temporal relations in semantic memory." We might discover that the memory for this information behaves either like episodic or like semantic memory. This is alright because episodes can contain "semantic content," which can be treated, for instance, for inferential purposes," on the same basis that applies to semantic memory" (p. 43). It doesn't worry us that one wouldn't, by a single task, be able to determine which system some information was in, but with a single system one might be able to do without equivalent qualifications.

However, although we support a single memory system, with one retrieval method (using different kinds of retrieval cues for different kinds of information), we suspect that we are more in agreement with the spirit of Tulving's proposals than most single-memory theorists, particularly when they treat all knowledge as equivalent. More serious disagreement occurs when it comes to the specified properties of the memory systems, and it is to some examples of these that we now turn.

The modification of memories. "Mutability is one of the distinctive characteristics of engrams of events" (p. 164). Tulving is careful here; he is talking about "functional properties." The recoding process he envisages "that bring[s] about changes in the engram" (p. 164) implies that "utilisation of certain information originally contained in [the engram] should not be possible after encoding has taken place" (p. 168). He conjectures that attempts to test the hypothesis "will undoubtedly be forthcoming." In fact, they have forthcome.

Tulving cites as experimental support for his thesis the work by Loftus and her colleagues (e.g., Loftus, Miller & Burns 1978). Loftus's major finding is that subjects who are given inconsistent postevent information about details of a previously seen slide sequence or film will be misled and will erroneously remember the inconsistent details as having been in the original sequence.

However, the fact that subjects can be misled by subsequently presented inconsistent information does not require the assumption that memories are modified, or "recoded," as Tulving puts it. Our view, based on the assumptions of a recently formulated model (Morton, Hammersley & Bekerian 1980), would be that memories cannot be modified. Difficulties in recalling the original information are due to difficulties at re-

trieval. We claim that when subjects are given postevent information, a new memory record is formed which contains the inconsistent information. This record coexists with the memory record for the original event. At the time of retrieval, subjects will form a "description" (see Norman & Bobrow 1979) that searches memory for the information to be retrieved. Under most circumstances, as in Loftus's studies, we assume that the description will be biased to retrieve the most recent, relevant Headed-Record. However, it should be possible to override this tendency. What will be retrieved, then, will ultimately depend on the conditions existing at the time of recall (in line with Tulving's own position on many other issues).

A study by Bekerian and Bowers (1983) shows that we are right. Bekerian and Bowers noted that in all of Loftus's studies, subjects were presented with test items in a random order with respect to the original sequence. They argued that randomizing test items might prevent the formation of a description that would match the record containing the original information. In order to test this possibility, Bekerian and Bowers manipulated the order of test items: One group received the test items in a random order; the other group received the test items in a fixed sequence (i.e., an order that matched that seen during the original presentation). When subjects were given items in a random order, the misleading effects of inconsistent postevent information were found, as in the Loftus studies. However, when given test items in a fixed sequence, a vast majority of subjects responded with the accurate information and did not show the misleading effect of postevent information. These findings, as well as others (Bowers & Bekerian 1984), are predicted by our Headed-Records model and support the notion that, once encoded, memories cannot be modified.

The absence of affect in semantic memory. In his discussion of affect, Tulving states that "it makes sense to assume that only episodic memory has affective components, or at least that affect plays a more important role in the episodic than in the semantic system" (p. 42). The heavy qualification in the second clause of the strong claim in the first is symptomatic of the attempt at strict separation of the systems when faced with contrary data. Reviewing some of the evidence will help to clarify the issue. For example, Teasdale and Russell (1983) have shown that mood can affect the recall of words varying in their affective connotations. Subjects learned a list of positive and negative words while in a "normal" state. If subjects were then induced to be in a happy mood at recall, they retrieved more pleasant items from the stimulus list; if subjects were induced to be in a sad mood at recall, they remembered more unpleasant items. A similar point is raised by the findings of Bower and Gilligan (1979). Positive trait adjectives were remembered better if they were judged in reference to the self rather than for meaning or for sound. The "self-referent" condition and its influence on the memory for affectively loaded traits clearly cannot be viewed as operations solely within the episodic system. Tulving could argue that such findings are the result of an interaction between semantic and episodic memory systems and leave the semantic system (or, more precisely, semantic *knowledge*) totally free from affect. In this way, his account would approach our own single system account.

Memory in young children. "The absence of episodic memory in young children" (p. 50) involves a curious assertion. It seems to depend on a strict requirement for including in episodic memory the maintenance of temporal organisation in memories. Yet memories, in the sense of stored, usable information concerning events, can be found in young children. Thus, Barrett (1983) has found that the use of words in a child of twenty months is tied closely to complex, repeated events. Thus "duck" was initially restricted to when the child was knocking a yellow toy duck off the side of the bath at bath time. To use some of the criteria in Tulving's Table 1, the source of this seems to be sensation rather than comprehension; it concerns an event, it has self-reference, it is context-dependent and vulnerable (a month later the use of the word had generalised). Maybe we need a third, early, system to deal with such phenomena.

Coda. The points we have raised are not crucial. They merely chip away at some peripheral aspects of Tulving's framework. His book sets standards for the serious critic who will have to provide an alternative view with the same scope and more utility. We hope one is forthcoming.