THE BEHAVIORAL AND BRAIN SCIENCES (1984) 7, 223-268
Printed in the United States of America

Does current evidence from dissociation experiments favor the episodic/semantic distinction?

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In Part I of *Elements*, Tulving presents the case for two separate types of memory, episodic and semantic, that are differentially engaged depending on the memory query directed at the cognitive system. Queries that require retrieval of the time and place in which the information was learned are said to involve episodic memory, whereas those that can be answered without recourse to retrieving specific events are said to depend on semantic memory.

What is the best evidence to be put forward for such a proposition? If we ignore the speculative remarks in chapter 3 and direct our attention to the empirical research, the logic of which is considered in chapter 4 and the results of which are presented in chapter 5, we see that the most convincing evidence involves experimental dissociations.

> Experiments following the logic of experimental dissociation involve the manipulation of a single variable and comparison of the effects of the manipulation in two different tasks, one episodic, the other semantic. Dissociation is said to have occurred if it is found that the manipulated variable affects subjects' performance in one of the two tasks, but not in the other, or affects the performance in different directions in the two tasks. (p. 73)

The finding of dissociation is taken as support for the two systems, whereas the finding of similar effects of independent variables in the two tasks fails to support the distinction.

Several findings, reviewed on pages 84–91, do show experimental dissociations between tasks reasonably classified as episodic and semantic by Tulving's criteria. To date almost all of these take the following form: An independent variable is shown to have some effect on an episodic-memory task, such as recognition, but no effect on some semantic-memory task, such as perceptual identification (e.g., Jacoby & Dallas 1981). Evidence showing that some variable could affect a semantic-memory task and leave an episodic-memory task unaffected, or even have opposing effects on the two tasks, would be a convincing complement to the dissociations already reported. (Jacoby, 1983b, does in fact report a case in which manipulation of a variable has opposing effects on the two types of task.)

Neely and Payne (1983) have criticized research comparing performance in episodic- and semantic-memory tasks as typically involving numerous confounded variables besides the critical one of interest, namely, the nature of the retrieval query directed at the system. Their criticism is well founded, but for purposes of this commentary I will assume that the data from the functional dissociation experiments can be taken at face value and will direct my remarks at the logic of the enterprise.

Several difficulties exist with the logic of functional dissociation that vitiate its plausibility as a rationale for separating memory systems. In fact, Tulving has himself previously argued against this logic in attacking other proposals for separate memory stores or processing modes (Tulving 1976; 1979b; Tulving & Bower 1974). For example, Fisher and Craik (1977) reported an experiment in which they found a strong interaction (dissocia-

between the type of processing subjects engaged in when studying word pairs and the processing task required at retrieval of the target member of the pair. The dissociation took the form of a greater advantage in recall when semantic processing occurred on the occasions of both study and test than when phonemic processing occurred at both times. Since there was also a main effect of type of processing at the study stage, with semantic processing producing better performance than phonemic, Fisher and Craik (1977) concluded that both the notions of level of processing during study and congruity of processing between study and test (embodied in the encoding specificity hypothesis) were needed to explain the results. Tulving (1979b) criticized the conclusion that the data revealed evidence for different levels of processing, convincingly in my opinion, on the grounds that one could equally well describe the main effect in the data in terms of an effect of processing "level" of the cue at the test stage rather than the processing of the study episode (see Tulving 1979b, pp. 417–22 for the details of this reasoning). Tulving (1979b, p. 421) suggested that "Fisher and Craik's findings are logically consistent" with the notion that "probability of recall is always determined only by the compatibility between the trace information and the retrieval information. If one accepts this conclusion, any insistence on the importance of encoding or retrieval conditions outside the relation between the two makes little sense." Thus, despite the dissociation revealed by Fisher and Craik (1977), Tulving argued against their evidence as indicating separate processing levels. But if experimental dissociations can be accounted for in this way in the Fisher and Craik study, then why not in the other cases that Tulving uses as evidence for the episodic/semantic distinction? I will return to this point shortly.

A second difficulty with the logic of experimental dissociation as it has been applied in all studies to date is that only a single episodic and semantic task have been employed. At the least, the logic would seem to demand that experimenters should use two tasks allegedly relying on each system to ensure that an independent variable has different effects on tasks supposed to engage different systems, but similar effects within the same system. A natural question is how to interpret the finding of dissociations *within* the semantic- and episodic-memory systems. Would such findings implicate subsystems? Suppose, for example, that an investigator were to provide four groups of subjects with high-frequency and low-frequency words mixed within a list and then test them later with either episodic-memory tasks (recall and recognition) or semantic-memory tasks (completing word fragments and answering general-knowledge questions). Although no one to date has reported such an experiment (one is currently being conducted by T. A. Blaxton at Purdue University), we can predict on the basis of past results that the two episodic tasks will not show one common pattern of results with the two semantic-memory tasks showing a different pattern. The reason is that even in the comparison of the episodic-memory tasks a strong interaction will be evident. Recall of high-frequency words will be better than that for low-frequency words, but recognition of low-frequency words will be superior to that of high-frequency words (e.g., Balota & Neely 1980; Gregg 1976). Are we to interpret this finding as indicating different subsystems within episodic memory, perhaps a recall system and a separate recognition system?

Tulving (1976) considered such approaches to interactions between recognition and recall as reflecting basically different processes in the two tasks and rejected them in favor of interpretations based on an "episodic ecphory" view, a predecessor of GAPS (General Abstract Processing System) in the current volume. The general approach is to argue that interactions between recognition and recall can be explained in terms of information from two sources, that in the trace and that in the retrieval environment, as in the explanation of Fisher and Craik's (1977) results. The cues in recognition and recall are said

to overlap differently with information in the memory traces, thus producing differing patterns of performance. Once again, strong dissociations are explained in some way besides postulating separate systems. Finding interactions within two tasks that are both supposed to engage the semantic-memory system would complicate matters further, but at the moment I know of no such data, because researchers have typically not included comparison of semantic-memory tasks in their experiments.

The functional dissociation logic has also been used to support the notion that separate short-term and long-term memory stores exist in human memory (e.g., Glanzer 1972), but once again Tulving has sharply criticized this logic. Tulving and Bower (1974, pp. 282–84) criticize the "two component analysis," which involves dissociations induced by independent variables in the serial position curve in single-trial free recall. For example, many variables affect the prerecency part of the serial position curve but leave the recency part unchanged, thus implicating (according to some) separate memory stores. Tulving and Bower (1974, p. 283) argued against the assumption that dissociations necessarily reflect differences in the way information is stored: "The data are equally consistent with the possibility that retrieval information is differentially effective for the two components of recall, whereas the traces are indistinguishable."

Another problem with the functional dissociation logic, one alluded to previously, is how to interpret dissociations that occur within the two systems, or (more generally) how to account for other embarrassing interactions. What has happened in other domains is that memory systems have proliferated in order to explain new results. For example, in reviewing evidence from variations in materials that is taken to indicate different memory systems, Tulving and Bower (1974, p. 273) remarked that "The question is whether we should postulate a distinct memory system for every discriminable stimulus variable and for every variation of events along values of that variable that produces differences in memory for those events. If we did, we would soon have more memory systems or stores than we could name." However, the same trend seems to occur in Tulving's own work using the dissociation logic. When Tulving, Schacter, and Stark (1982) reported a puzzling pattern of results that did not fit well with the episodic/ semantic distinction, they suggested that the results might "reflect the operation of some other, as yet little understood, memory system" (p. 341). To quote Tulving and Bower (1974, p. 273) again, "it has not yet been made clear by anyone how the task of explaining memory phenomena is materially aided by the hypothesized existence of different memory stores and systems," a remark which still rings true.

Here I have taken Tulving's frequent arguments against functional dissociation as a logic for separating memory stores, levels, or systems and turned them to examine the episodic/semantic distinction. Unfortunately, the logic here does not seem any more forceful than it has in other cases. In fact, there is probably a much stronger case to be made for separate short- and long-term stores, although Tulving and Patterson (1968, p. 247) argued that "In the long run, nothing much can be gained by postulating a homunculus searching through one or more types of memory store for desired mnemonic information." Perhaps the case is different for memory systems, and perhaps people really do have separate episodic and semantic systems as Tulving proposes, but certainly there is no compelling evidence for the case now.

In fact, the remainder of Tulving's book suggests a more parsimonious way of interpreting all these dissociations taken as evidence for the episodic/semantic distinction. The same general arguments for interpreting interactions between study and test conditions in "episodic"-memory experiments can apply. Information can be coded in many different ways, and we might consider the memory trace (with Flexser & Tulving 1978, and

others) as a bundle of features encoded about an experience. Various types of test may cause people to encode features from retrieval cues that overlap to a greater or lesser extent with those in the memory trace for the event, thus effecting different patterns of remembering. Interactions between study and test situations are thus normal occurrences, rather than exceptions to be explained by postulating various memory systems. Such features as time and place of occurrence of a memory should be given no special status, but will be emphasized in some testing situations and not in others. Thus, interactions from experiments using very different testing procedures can be described in terms of encoding specificity (Tulving 1983b, chaps. 10 and 11) or transfer appropriate processing (where stored information is said to transfer to greater or lesser extents depending on the nature of the test; Morris, Bransford & Franks 1977). In accounting for results from his experiments Jacoby (1983a; 1983b) has taken the general tack that Tulving uses as evidence for the episodic/semantic distinction. Kolers and Roediger (in press) argue somewhat similarly, except that they suppose that performance is determined by a matching of mental operations or procedures at the occasions of study and test rather than a matching of informational contents from traces and cues.

In sum, I believe that Tulving (1976; 1979b; Tulving & Bower 1974) was on target in criticizing the logic of functional dissociation as typically used to establish separate memory stores or systems. Unfortunately, the criticisms apply with equal force to his own methods to separate episodic and semantic memory. Happily, however, his own ideas detailed in the remainder of the book provide a general framework for interpreting the results of the dissociation experiments reviewed in chapter 5. As a side benefit of accepting this other framework for discussing the results, other problems dissolve. For example, if we abandon the episodic/semantic distinction, the whole problem of "free radicals" falls away.

This research was funded by Grant HD15054 from the U.S. National Institute of Child Health and Human Development.