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AUTHOR Gavin, Eileen A.
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ABSTRACT

Albert Michotte, known primarily for his research in perception, also carried out several experiments in logical memory (conceptual or intellectual memory). He was strongly influenced by Kulpe, feeling that the thought processes were autonomous, in contradiction to more traditional and elementary conceptions of mental activity. His experiments, using paired-associate techniques to study the place of thought in logical memory, made note of time to complete each word pair; interval between presentation and test; and the subjects' introspections about the experience, perceptions of the word pair, and trains of thought engendered by the presentation of a single word. Significant findings were the different patterns of conscious phenomena each subject used in recalling the second word of the pairs, regardless of almost identical recall accuracy, and the large number of intermediary phenomena (relational and non-relational thought, visual imagery, and false words) that made up the recall process. Michotte concluded that relational thought was necessary to logical memory, but that it could not stand alone. Michotte's emphasis on memory as a contributor to action (one experiment was carried on in everyday situations instead of the laboratory) and his discovery of the multiplicity of means by which different individuals arrive at the same outcome are still of significance to current memory research. (MR)

# ALBERT MICHOTTE AND MEMORY

Eileen A. Gavin

The College of St. Catherine

When psychologists hear the name, Albert Michotte, they are likely to recall experiments on perception, especially phenomenal causality. It may come as a surprise to link his name with "memory." However, Michotte's early experiments showed his deep, attentive concern with memory, especially logical memory, that is, the human being's power to retain, recognize, and recall formerly-understood relationships. Michotte's fondness for experimenting, his thinking that there are altogether too many theories in psychology but too few solid facts, (1952, p. 216) and his own early educational background led him to publish three experiments on memory. (Michotte & Ransy, 1912; Michotte & Fransen, 1914; Michotte & Portych, 1914) This paper will focus mostly upon two of these that concern logical memory, or conceptual or intellectual memory as it is sometimes called. Both investigations fit Michotte's experimental bent and his dominant professional aim, to contribute to an understanding of action and of whatever leads to it. (1952, p. 235) Because of his lifelong preoccupation with action, "memory" colored even Michotte's later work. If it is so that "What memory is to the individual, tradition is to the community...." (O'Donoghue, 1971, p. 284) remembering Michotte's own twentieth century contributions to logical memory may invite the psychological community to link this part of the past to the present, and perhaps even to a possible future for the psychology of memory.

## I. Michotte's Background as It Relates to His Experiments on Logical Memory

How Michotte became interested in memory needs clarification. As was usual for psychologists-in-the-making in the early 1900's, Michotte spent part of two

years (1905-1906) at Wundt's Leipzig laboratory. His experiences just before that time help to show why Michotte had mixed feelings about what he found there. For one thing, he had read and found impressive some of Binet's work on "higher processes." (1952, p. 214) He had done laboratory experimentation on the structure of the nerve cell (1952, p. 214) that helped to lay the groundwork for his later focus upon "...the principles of the structural organization (Gestalt) of action itself, a veritable 'cell' of behavior, and of the events which action encompasses...." (1952, p. 235) No wonder Michotte at twenty-five showed real enthusiasm when in 1906 he met Wundt's former student, Külpe, who was investigating higher mental processes at Würzburg. Of meeting Külpe, Michotte said many years later, "At once I was aware that I would find in him precisely what I felt to be missing at Leipzig." (1952, p. 214) Külpe's iconoclasm, his less-entrenched and more-inclusive than Wundt's views on psychology confirmed Michotte's convictions about "...the autonomy of thought processes and the shortcomings of traditional associationism and of the elementaristic conception of mental life." (1952, p. 218) For the affable young psychologist, the established scholar's interest in him and in his ideas (together with his own recent educational experiences) helped to make Michotte ready for what he later called "...a true revelation...." (1952, p. 214) that came to light when he went to Würzburg in 1907 and 1908.

II. Michotte's Experiments on Logical Memory

Michotte's experiments on logical memory, published in 1912 and 1914, took root in this ground. By questioning whether new elements account for higher mental processes, he concluded that such processes instead reveal "...a fertilization of sensory experience through the participation of special <u>functions</u> that allow the use of symbols and the formation of more comprehensive syntheses and permit relational thinking and reasoning." (1952, p. 218) Michotte applied his thoughtful, empiricistic outlook to logical memory since:

...differences in reaction-times led us to recognize the role of the integrating function of thought in memory, an integration by which the items to be memorized become embedded in a complex relational unit (a Gestalt!) such that the reactivation of one of its aspects could bring about the reproduction of the others or make possible the intentional search for these others, and thus eventuate in a reinstatement of configurational unity." (1952, p. 218)

A. Procedure for Michotte's and His Collaborators' Experiments on Logical Memory. Michotte and his collaborators used the familiar paired-associates technique to determine through the simplest, least-equivocal procedure applicable to the problem, the place of thought in logical memory. (Michotte & Ransy, 1912, p. 6) The experimenters not only recorded the words people gave to complete each pair and the time taken before answering, but also the subjects' introspections about the experience, their perception of word-pair, their trains of thought evoked by a single word presented alone. Both experiments used word-pairs chosen for obvious apparent relations, such as belonging, whole-part, similarity, opposition and causality. Additional recall measures for nonsense syllables and two-digit figures made possible their comparison with responses to related words. The participants, four for the first experiment and five for the second, included the chief investigator, his collaborators, colleagues, and graduate students from the Louvain psychological laboratory.

The two investigations differed mainly in instructions and in focus of the second experiment upon the relation of various time intervals to recall, instead of upon immediate recall only, as was the case for the first. Participants in the first experiment were asked to look for a relation that seemed to unite the objects each pair of words designated. Five minutes after presentation of the entire series, the person reexperienced just one member of each pair and tried to

recall the other. Afterwards he dictated a report of what occurred during preparatory and recall periods.

The second experiment used related word-pairs, too. Unlike the earlier one, though, this experiment attempted to simulate everyday life situations through its instructions to attend to the word-pairs with a view to recalling them at an unspecified later time (without asking the person to look for relations this time.) Recall took place either immediately, or at times extended variously upon to a week.

B. Results.

1. General quantitative findings. Correct recall of missing words in the immediate condition occurred 84% of the time in the first experiment (Michotte & Ransy, 1912, p. 49) and 88% of the time in the second. (Michotte & Portych, 1914, p. 248) Under these circumstances, subjects showed almost equal success in recall, as a range in the first experiment of just 10.5% and a mean variation of 3.5% showed. (Michotte & Ransy, 1912, p. 48) As time intervals lengthened, accuracy of recall generally lessened and time needed to find the missing words increased. Michotte and Ransy found that accuracy declined in the accessory studies of immediate recall, with 47.8% correct recall for two-digit figures and 50% for nonsense syllables, while the range sharply increased. Since the nonsense syllables and figures came from shorter series presented three times, not just once, the relatively high accuracy and minimal range for related words suggest that they involve processes that do not come into play with figures and nonsense syllables.

2. Personal differences in responses. An initially baffling dissimilarity, that of marked individual differences in numbers and patterns of reported conscious phenomena, balanced off the main similarity, that of almost equal accuracy in recall of related words. Highly individual patterns of conscious phenomena were especially interesting and became most conspicuous when relational thought was not very evident. For instance, one subject reported much more visual imagery than

anyone else; another reported a lot of nonrelational thought. These "favorite" conscious phenomena appeared from the immediate recall test through the final interval of tested recall after a week. Whether or how most of these "typical" patterns of consciousness contribute to logical memory, and what their origins are, remain uncertain. Different styles of approaching word-pairs, though, certainly found expression in varied patterns of response that may eventually implicate physiological bases, early experiences, or other yet-to-be-identified kinds of influence. Whatever the origins of the different response styles, Michotte insisted that none of his evidence supported the view that people deliberately chose to bring a particular intermediary into play; these phenomena seemed totally unwitting.

The dynamics of differences in patterns of nonreactions and errors, however, seemed quite another matter. Some people tended quickly to give up looking for a missing term while others kept trying. Intense acts of will, though, appeared to affect recall adversely. (Michotte & Portych, 1914, pp. 324-325) Michotte and Portych think such individual differences involve both the psychology of will and of values, (1914, p. 253) a view that opens many new possibilities for investigation.

3. Intermediaries as phenomena of consciousness. Michotte and his collaborators counted and classified all reports of intermediaries, that is, of phenomena that intervened some time between first experiencing a pair of related words and finally recalling the correct missing term. These conscious phenomena fell into four different categories: (1) relational thought (which found expression in at least 21 subcategories, such as similarity, causality, subordination, part-whole, belongingness, and opposition;) (2) visual imagery; (3) nonrelational thought (for instance, reporting something unessential about the words;) and (4) false words. Although the data of Michotte and his collaborators support the view that some intermediaries help to evoke the missing word while others are simply accessory, no one knows which is which in a particular case. Further, some

intermediaries tended to occur early while others tended to occur late, as if they were a last resort. Reactions that involved intermediaries showed that: (1) the various conscious phenomena ranged from very clear to extremely vague; (2) reactions rich in intermediaries tended to be successful more often than reactions poor in them; (3) instructions affected both absolute and relative occurrence of intermediaries; and (4) under unfavorable circumstances, such as trying to recall after a week, several intermediaries occurred before the absent word came to mind.

Perhaps the main thing Michotte and his co-workers discovered about intermediaries was that relational thought, by and large, occurred more often than any other kind. Whenever anyone reported just one intermediary, that one was most likely to be relational thought.

C. Conclusions Concerning Logical Memory. Analysis of his results on intermediaries led Michotte to conclude that relational thought and a relational mode of thinking are usual for logical memory expressed in experimental situations such as his. For one thing, relational thought occurred about as often whether the recall test came immediately or after a week. Since other intermediaries increased primarily when relational thought did not lead to recall, Michotte concluded that these other phenomena must compensate for, substitute for, or add to inefficacious relational thought. (Michotte & Portych, 1914, pp. 345-346)

A strange paradox, though, invites explanation: no matter which or how many intermediaries Michotte's subjects reported, accuracy in recall stayed at the same level. Michotte and Portych concluded from these findings that, at least for experiments analogous to theirs, intermediaries must not be as important as they had supposed. (1914, pp. 357-358) How reconcile this paradox with Michotte's emphasis upon relational thought?

In answer, let us turn to some results. Sometimes when a subject tried to remember a missing term, he referred to it as "what must come," or "that which I await." (Michotte & Ransy, 1912, p. 16) While such comments do not immediately show relational thought, they do reveal an experience of expectation, a sense of incompleteness, a belief that not just any word will bridge the gap to complete the relationship. Michotte speaks of the stimulus word in the recall test as actually present while he sees the awaited word, though physically absent, as intentionally present in the sense that it is needed to complete an otherwise meaningless relationship. (Michotte & Ransy, 1912, p. 16) Intention in this sense refers to a person's awareness that the single stimulus term, as part of the basis for seeing a relationship, is incomplete without the other term. An understood common ground for the two terms, that helped to define and establish the relationship in the first place, must be reinstated to fulfill it. More concretely, a relation of opposition, as a person understands it, might be somewhat analogous to having a bridge unite mountainous terrain with very different land, for instance, with plains. A bridge of opposition would not be a bridge at all if it ended up in the air, any more than a relationship of opposition would be complete without opposing terms.

A rather puzzling finding, that a person occasionally discards an actually correct completer word that he himself thought of, saying it is not the right one, may be quite helpful for discovering what goes on in logical memory. (Michotte & Ransy, 1912, p. 24) The rejected word must in some sense have been retained; otherwise, why does it (rather than any of thousands of possible others) occur? The person's rejection of an actually correct term suggests that his understanding how the second term belonged to the stimulus term may well have been partial in the first place, just as in everyday life understanding may be partial, may develop gradually. Although such data raise more questions than they answer, they show quite surely that the expression of logical memory is not an all-or-none matter.

Besides, unlike the cheese, logical memory does not stand alone. It needs understanding (as cognitional,) and the search for the missing word involves wanting (as motivational.)

A final brief report lends further support to the view that relational thought profoundly affects recall. Michotte and Portych (1914, p. 359) wanted to see what would happen if they placed mismatched, unrelated word-pairs (as stimuli-to-be-remembered-together) in the same series as logically-related words. For instance, an ill-matched word-pair, "Dog-Green," might appear in the same series as another mismatched pair, "Furniture-Animal." Under these conditions people tended to recall a related word, such as "Animal," when the word "Dog" appeared. Although such results do not definitively answer the assumption contiguity theorists would probably make, that the associative affinity of "Dog" and "Animal" comes from their occurring together in the past, Michotte and Portych suggest another hypothesis: that the logical relatedness of the objects the words signify must be basic to the associative affinity of words. In saying this, they emphasize stimulus words as probably the main influence upon bringing about the enormous superiority of logical over mechanical memory. (1914, p. 358) Obviously, though, extrinsic features of words are not much help as, for instance, the presentation of word-pairs in Greek if the subject cannot read that language. When the meaning of one word, as the subject understands it, coincides in part with that of another, an important kind of similarity, that of partial identity in the signification of words, comes into play. For Michotte and Portych it is here that "...probably lies the secret of the associative affinity of words." (1914, p. 360)

While emphasis upon "similarity" is at least as old as Aristotle, considering it under the aspect of a person's discovering common ground in the signification of terms may help to clarify the integrating role of thought in memory. Looking at similarity in this way, as a basis for logical connectedness, reaches far

beyond Michotte's own work, as he himself realized. It implicates uncharted vistas in the psychology of thought.

Michotte's later work used illusions to explore what goes on in the world as the person knows it. According to Michotte, since the person acts adaptively, his phenomenal world must mesh in important ways with things as they are. His much earlier work on memory leads one also to wonder how understanding words, seeing them as logically related, may mesh with events and objects in the world Out There. Perhaps we who class things together on the basis of what we know of objects and events thereby spare ourselves from living out an otherwise chaotic existence.

III. Should We Remember Michotte's Contributions to Logical Memory?

Not during the century or so of experimental psychology, nor even in more than a score of centuries of the philosophy best known to the Western world has anyone come up with a "last word," a complete and definitive analysis of memory. No matter how helpful some explorations may be, it seems unlikely that anyone will fully exhaust, bring fully to light, the many mysteries of memory. Even though so much remains to be known about memory, trying to remember all we ever knew about it seems about as senseless as committing to memory last December's or this July's prices in a grocery store. So one may ask: is Michotte's work on logical memory worth remembering? I think it richly merits retention, recognition, and retrieval, especially since Michotte's approach to action, which includes memory, seems sound; it also supports and encourages thinking beyond the currently known.

A. Michotte's emphasis on memory, as it contributes to action, seems sound. First, let us look at his emphasis on action, as it provides an appropriate context for exploring memory. Since memory so often contributes to what we do and to how we do it, no wonder Michotte saw it as critical to action. In his emphasis upon action and all that prepares for it, Michotte viewed memory not as a "weak" form

of behavior, but as a function which, when it finds expression in the activity of remembering, will affect present action by bringing the past to bear upon it. For Michotte, remembering is a genuine psychological activity, not a mental fiction to be eliminated as more becomes known about stimulus events or about conditions in the organism that are also needed for its occurrence. In fact, the psychologist's acquiring new knowledge about stimulus events implies his own remembering, in the sense of his relating new information to what he already knew.

Michotte's action emphasis kept him open to whatever techniques and improvements in techniques that could help its exploration. His own thinking, attention to criticism, and awareness of the limits of any person's knowledge prompted him to look for ways to improve his own procedures, (Crabbe, 1967) particularly in gathering verbal information. His emphasis upon action kept him open to the significance of introspection, properly applied, which he considered "...indispensable in all psychological experiments" (1952, p. 220) for the light it casts upon a man's understanding of the situation in which he finds himself. (1952, p. 220)

B. It raises some significant questions. In a variety of ways Michotte's emphasis provides both focus and scope for gaining new knowledge about memory. His finding that people may arrive at the same outcome (recall of a missing word) through nonidentical means raises a host of questions about personal differences as they contribute to logical memory and about how crucial the differences are. One wonders, too: how may physiological individuality in its origins and expression contribute to different styles of remembering? How do cognitional activities, such as understanding, and motivational activities, such as willing, precisely contribute to remembering, whether by helping or hindering it? What are the origins of individual differences in such activities? Since Michotte found that changed

environmental conditions affect the incidence of various intermediaries, how may these conditions be further specified?

Michotte's ~~experiments~~ investigations also make one wonder what would occur in similar experiments if subjects were drawn from decidedly different educational or cultural backgrounds. Such information would be particularly valuable for clarifying the extent to which findings on logical memory may be generalized.

Finally, following up Michotte's belief that a person's discovering relations of partial identity or similarity in the signification of words may be a fruitful source of new knowledge. Although Michotte was not unique after Aristotle in his focus upon similarity, this fact in no way affects the potential significance of this principle.

Michotte's contributions to logical memory show that, although he later went on to study perception, which provides the work for which he is best known, he evidently never forgot "memory" and its yet-to-be-charted contributions to action. Besides, his own logical memory found apt expression in the memory experiments he designed, which are themselves so much at one with his own later work.

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