SELF AND MEMORY

Anthony G. Greenwald

OHIO STATE UNIVERSITY
COLUMBUS, OHIO

Theories that propose an important role for self (or ego) in memory have been in the wings and background of psychology since the beginning of the twentieth century. It has only been quite recently, however, that experimental studies of memory have produced data that demand a center-stage role for the concept of self in the study of memory. This chapter reviews highlights of the theoretical history of the relation of self and memory and draws together the diverse lines of recent research that provide a basis for further theoretical development. In synthesizing this

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work, I suggest that ordinary, voluntary recall is a property peculiarly characteristic of the *self system*. Indeed, the major function of the self system may be to provide the organization that preserves access to information from the varyingly distant past.

I. 1901–1935: Four Positions[1]

Seeds of present interest in the role of self in memory can be found in the works of four psychologists who had little in common—working in four different intellectual traditions, in four different countries, and in three different languages, and basing their conclusions on widely diverse types of data.

A. Freud

Clinical observations of dramatic pathologies of memory provided the basis for some of the earliest speculations about the role of self in memory. It is well known that Freud interpreted ordinary forgetting in terms of motivational conflicts, and that he extended this type of analysis to his account of repression—an occasionally massive forgetting assumed to be symptomatic of conflicts involving sexual motivation. Freud's theories of repression, its basis in psychosexual conflict, and the role of ego as the agency of repression are too well known to require review here. Also, these theories are readily accessible both in the original (Freud, 1915/1957; 1923/1961) and in many secondary sources (e.g., C. Brenner, 1957; Erdelyi & Goldberg, 1979). Instead, we consider some of Freud's earliest speculations on the role of self in memory—which came from his self-observations of everyday lapses of memory.

> I was unable to find a patient's name which had a certain reference to my early life. The analysis had to be followed over a long devious road before the desired name was discovered. The patient expressed his apprehension lest he should lose his eyesight; this recalled a young man who became blind from a gunshot, and this again led to a picture of another youth who shot himself, and the latter bore the same name as my first patient, though not at all related to him. The name became known to me, however, only after the anxious apprehension from these two juvenile cases was transferred to a person of my own family.
>
> *Thus an incessant stream of "self-reference" flows through my thoughts* concerning which I usually have no inkling, but which betrays itself through such name-forgetting. It seems as if I were forced to compare with my own person all that I hear about strangers, as if my personal complexes became stirred up at every information from others. It seems impossible that this should be an individual peculiarity of my own person; it must, on the contrary, point to the way we grasp outside matters in general. (Freud, 1901/1917, pp. 41–42, italics added)

[1]This historical survey presents four positions through prominent spokesmen whose works have survived. It is certainly not a comprehensive survey, and may not properly credit the origin of various ideas to their true originators. The reason for mentioning this fact is to note that the problem of retrieving the theoretical past of a discipline is similar to that of retrieving a personal past. The effort of tracing through libraries to locate publications that have not been retained by the current citation network resembles that of searching for personal memories that have fallen out of the current retrieval network—which, in this chapter, is identified as the self.

From a present-day perspective, Freud's observations on everyday lapses of memory may be more interesting for their suggestions about the route by which forgotten information can eventually be retrieved, than for his theory of the motivational conflict that presumably caused the forgetting. In the quoted example, the retrieval route involved self-related associations. Freud's hunch about the "incessant stream of 'self-reference'" will be seen to fit very well with recent research findings.

B. Claparède

The dramatic pathology of the Korsakoff syndrome suggested an important role of self in memory to the medically trained Swiss psychologist Edouard Claparède (1911/1951). His case observations and conclusions are given here at some length.

> The patient was a woman hospitalized at Asile de Bel-Air. She was 47 at the time of the first experiment, 1906. Her illness had started around 1900. Her old memories remained intact: she could correctly name the capitals of Europe, make mental calculations, and so on. But she did not know where she was, though she had been at the asylum five years. She did not recognize the doctors whom she saw every day, nor her nurse who had been with her for six months. When the latter asked the patient whether she knew her, the patient said: "No Madame, with whom have I the honor of speaking?" She forgot from one minute to the next what she was told, or the events that took place. She did not know what year, month, and day it was, though she was being told constantly. She did not know her age, but could figure it out if told the date. I was able to show, by means of learning experiments done by the saving method, that not all ability of mnemonic registration was lost in this person. What is worthy of our attention here was her inability to evoke recent memories voluntarily, while they did arise automatically, by chance, as recognitions. (pp. 68–69)
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> If one examines the behavior of such a patient, one finds that everything happens as though the various events of life, however well associated with each *other* in the mind, were incapable of integration with the *me* [ego] itself. The patient is alive and conscious. But the images which he [or she] perceives in the course of that life, which penetrate and become more or less fixated in his organic memory, lodge there like strange bodies; and if by chance they cross the threshold of consciousness, they do not evoke the feeling of "me-ness" which alone can turn them into "memories."

> We can distinguish between two sorts of mental connections: those established *mutually between representations,* and those established between *representations* and *the me*, the personality. In the case of purely passive associations or idea-reflexes, solely the first kind of connection operates; in the case of voluntary recall and recognition, where the *me* plays a role, the second kind of connection enters.
>
> In relation to the *me* as center, the connections of the second kind may be called *egocentric functions,* those of the first *marginal.* (p. 71)

With some change of language, Claparède's observations might have a very contemporary ring. Try, for example, substituting "episodic" and "semantic" (Tulving, 1972) for "egocentric" and "marginal" in the last sentence quoted. (This relationship will be returned to in Section V, B.) Claparède's use of the "saving method" to demonstrate that his Korsakoff patient was capable of "mnemonic registration," but with "inability to evoke recent memories voluntarily," provides a methodological parallel to some of the most recent work on amnesia (e.g., Cohen & Squire, 1980).

C. Bartlett

In his *Remembering: A Study in Experimental and Social Psychology,* Bartlett (1932) introduced the concept of *schema* to the study of human memory (see Hastie, 1980, for a useful survey of the schema concept). Also in that book, Bartlett rejected a role of the self in memory, as will be seen. A review of his position is important to the study of self in memory, to understand both his concept of schema and his reasons for deciding to do without the self.

Bartlett's concept of schema was based importantly on the neurological studies of Head (1920), who sought to explain the organism's sense of its location in space. Head (1920) postulated and defined the schema as "a postural model of ourselves which constantly changes" (p. 605; also quoted in Bartlett, 1932, p. 199). Thus, for example, if while walking I turn my head to the right, the postulated schema registers this change, which in turn allows me to judge that an object popping up in front of my nose is to the right of my line of travel rather than straight ahead. Bartlett (1932), with this inspiration, defined the memory schema as

> an active organization of past experiences, which must always be supposed to be operating in any well-adapted organic response. (p. 201)

> In its schematic form the past operates *en masse,* or, strictly, not quite *en masse,* because the latest incoming constituents which go to build up a 'schema' have a predominant influence. (p. 202)

Bartlett's thus crediting the latest incoming stimulus with a privileged place in memory shows the influence of Head's concept, in which the most important aspect of the schema is its use of information about the latest action to modify itself.

It is generally appreciated that Bartlett used the concept of schema to explain a constructive character of memory. He took the fact that experiences are often simplified (or otherwise systematically modified) in memory to mean that a person often infers the past with the aid of a schema, rather than being able to consult an exact record of events. However, Bartlett's theory of the schema's operation is not generally known. This rather complex (and unsatisfying) theory is quoted here.

> What, precisely, does the 'schema' do? Together with the immediately preceding incoming impulse it renders a specific adaptive reaction possible. It is, therefore, producing an orientation of the organism towards whatever it is directed to at the moment. But that orientation must be dominated by the immediately preceding reaction or experiences. To break away from this the 'schema' must become not merely something that works the organism, but something with which the organism can work. . . . So the organism discovers how to turn round upon its own 'schemata', or, in other words, it becomes conscious. It may be that what then emerges is an *attitude* towards the massed effects of a series of past reactions. Remembering is a constructive justification of this attitude; and, because all that goes to the building of a 'schema' has a chronological, as well as a qualitative, significance, what is remembered has its temporal mark; while the fact that it is operating with a diverse organised mass, and not with single undiversified events or units, gives to remembering its inevitable associative character. (Bartlett, 1932, pp. 207–208)

The above passage shows Bartlett struggling a bit to escape the domination "by the immediately preceding reaction or experiences" that was transported into his theory from Head's. In this passage there is considerable vagueness associated with the terms "turn round on its own 'schemata'," "attitude," "diverse organised mass," and with the appeal to consciousness. Nevertheless, Bartlett's calling attention to constructive aspects of memory has been of great significance. Because of this significance, it is useful to give as clear a statement as possible of Bartlett's theory. Interestingly, and with homage to Bartlett, it may be that the following statement of his theory is in part a reconstruction, based on a schema that combines his original statement along with more recent statements by others into a "diverse organised mass."

In contrast to Head's use of *schema* to designate the current status of an ever-changing entity, Bartlett used schema to characterize the common core of a series of similar past experiences. Bartlett's "schema" therefore operated at a higher level of abstraction than Head's. We can compare the two by thinking of repetitions of a complex movement such as a difficult dive involving twists and somersaults. Head's schema is the diver's

rapidly changing sense of position and location, whereas Bartlett's schema is the changing pattern of the entire dive on successive repetitions. Head's schema enables the diver, in the middle of the dive, to judge when to straighten out for entry into the water, whereas Bartlett's schema allows the diver, between dives, to judge that it is necessary to straighten out earlier on the next dive than on the last one in order to achieve proper entry.

In Bartlett's theory of the use of schemata in recall, some current stimulus (such as an instruction to recall a particular story) acts on the schema to elicit an *attitude*—a conscious feeling that guides use of the schema to infer the experience that originally gave rise to the schema. Because the schema is a "diverse organised mass," rather than an exact record of prior events, recall is often "schematic" rather than literal. The theory relies implicitly on associative processes—which allow current stimuli to evoke the schema and also serve to piece together the components of the schema—but assumes that the organizational aspects of the schema are not reducible to principles of rote association.

Bartlett (1932) was willing to assume that the person's memory shows organizational properties at a very high level, but chose to argue against labeling this high-level organization as a "self":

> The materials dealt with by different 'schemata' overlap, and both the 'schemata' and the appetites, instinctive tendencies, attitudes, interests and ideals which build them up display an order of predominance among themselves. Moreover, this order remains relatively persistent for a given organism. This is equivalent to saying that recall is inevitably determined by temperament and character. *All these considerations, however, give us no justification for speaking of some intangible and hypothetical Self which receives and maintains innumerable traces and re-stimulates them whenever the need arises.* All that we can say for certain is that the mechanism of adult human remembering demands an organisation of 'schemata' which depends upon an interplay of appetites, instincts, interests and ideals peculiar to any given subject.
>
> Equally, of course, we have so far no ground for denying the existence of a substantial, unitary Self, lurking behind all experience, and expressing itself in all reactions. We know only that the evidence of the experiments which have been considered does not necessitate such a hypothesis. (pp. 308–309, italics added)

It is apparent from this and other remarks that Bartlett (1932, pp. 308–311) intended to reject the *transcendental* self, or "pure ego," just as William James (1890) had earlier done. His observation of a high level of organization among appetites, interests, and attitudes is nonetheless comparable to the sort of evidence on which others have based an *empirical* conception of self.[2]

[2]The transcendental/empirical distinction is approximately the same as knower/known or subject/object. In philosophy, the transcendental self is often identified with Kant's idea of self as the agent of perception, and the empirical self with Hume's view of the self as a bundle of perceptions. The concept of a transcendental self is also often associated with the idea of a soul (for which the Greek is *psyche*). William James (1890, Chap. 10) provides a lucid introduction to the transcendental/empirical distinction.

D. Koffka

In his major work, *Principles of Gestalt Psychology,* Koffka (1935) devoted over 60 pages to the hypothesized role of ego in memory (esp. pp. 319–342, 514–528, 591–614). Koffka distinguished between self and ego, the former being defined as a central subsystem of ego, but his analysis of memory was given in terms of the broader system, ego. The following passages give some of the central statements of Koffka's theory of the role of ego in memory.

> In our theory the total field of excitation is divided into two major sub-systems, each containing numerous sub-systems of its own: the Ego and the environment. And the trace field which is created by the excitation field contains the same dichotomous organization. (Koffka, 1935, pp. 520–521)

> If an environmental trace is in close connection with the Ego system it will not only be in communication with the particular time structure of that system with which it communicated at the time of its formation; but because of the coherence of the whole temporal Ego system it will be in communication with later strata also. (p. 522)

Although Koffka (1935) provided no graphic representation of the ego and environment systems, his words directly suggest the representation given in Fig. 1. Figure 1 also incorporates information from Koffka's descriptions of temporal and motivational aspects of the ego-environment structure, and of the centrality of ego in the psychological field. In these passages a *trace* is a memory representation or record, which is left as a residue of the activity of a perceptual *process*.

> The temporal stratification of traces is one of the factors which determine their availability. A trace within its stratum is connected with the Ego of the same stratum, but may be far removed from the Ego of a later stratum. (p. 525)

> Mere temporal sequence, however, is but one factor in this complex dynamic connection. Availability of the trace . . . depends upon proper connection between the trace system and the Ego. . . . If a trace is derived from a process which was directly connected with a person's interests, then it will have its place in a field formed by processes of high intensity and will be in particularly close connection with the Ego system. (p. 526)

> Inasmuch as the Ego is, as a rule, more or less in the centre of its environment, we can picture the Ego part of the trace column as its core and the environmental part as a shaft, keeping in mind that core and shaft support each other. (p. 609)

As it did for Bartlett, the concept of attitude played an important role in Koffka's theory of memory. "The effect of attitude [is] to put a process in

communication with traces which, without such an attitude, they could not 'find'" (Koffka, 1935, p. 607). Figure 1 includes a portrayal of Koffka's proposed role of attitude in memory, illustrated in terms of an experiment in which figures seen in a laboratory session yesterday are to be recognized in a second session today. The attitude created by the task of today's experiment "has the character of a quasi-need, it corresponds to a tension in the Ego part at the tip of the column [the part presently being formed]. This tension can be relieved only through that part of the trace column which contains yesterday's figures (Koffka, 1935, p. 609)." The attitude thus enables connection of today's excitation field with the trace field created by yesterday's experiment, despite intervening trace strata, such as one associated with a concert attended last night.

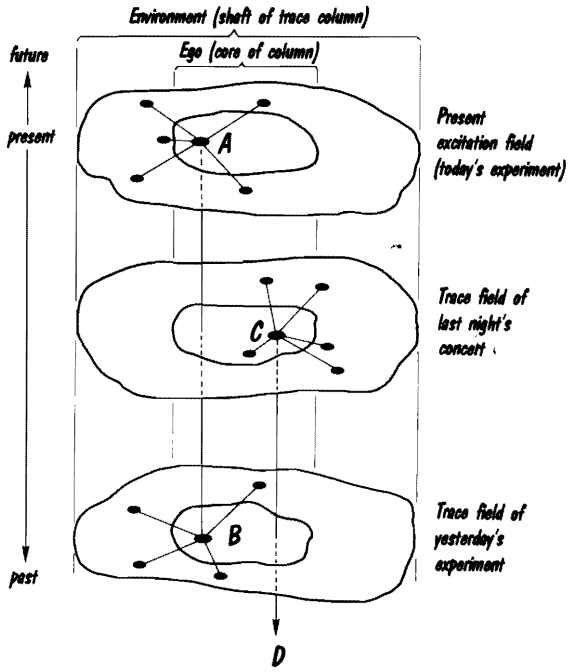

Fig. 1. Simplified representation of Koffka's conception of an ego-centered memory structure. *Ego* is at the center, and *environment* at the periphery, of the *excitation field*. Residues of past excitation fields form *trace fields* that are arrayed in temporal strata. The cumulation of trace fields (the trace *column*) defines ego as a memory structure that forms a *core* within the *shaft* defined by the traces of environmental excitation. The three strata shown illustrate Koffka's example relating today's experiment, a concert attended last night, and yesterday's experiment (see text). The present excitation field (A) is assumed to be in more direct contact with an attitudinally similar past trace field (B) than with a temporally closer (but attitudinally dissimilar) one (C), which may have direct communication (D) with other ones dynamically similar to it.

Accurate recognition of a figure presented today requires that both the trace of yesterday's figure and the process of the corresponding one presented today be in contact with the ego fields of their respective strata.

Koffka's memory theory was designed to encompass Bartlett's findings, and therefore the two theories contain no mutually incompatible assumptions. Koffka's much more detailed account filled important gaps in Bartlett's formulation as represented by the latter's unelaborated appeal to the "diverse organised mass" of a schema, to attitudes, and to the role of consciousness in enabling the organism to "turn round" on its schemata. Interestingly, Koffka concluded that he could not account for (among other things) the effect of attitude on recall *except* by providing a central role for ego in memory—in contrast with Bartlett's rejection of self. Again, this is not a mutual incompatibility. As previously noted, the self that Bartlett rejected was a transcendental knower (see Allport, 1965, p. 129), whereas the self (ego) that Koffka required was an organization of knowledge (see Greenwald, 1980). Koffka's formulation of the ego can be regarded, therefore, as a translation and elaboration of Bartlett's (1932) speculation about the dependence of human remembering on "an organisation of 'schemata' which depends on an interplay of appetites, instincts, interests and ideals peculiar to any given subject" (p. 309).

E. Summary of the Early Views of Self and Memory

Freud, Claparède, Bartlett, and Koffka agreed in asserting that ordinary, voluntary memory depended on a very high level of organization among residues (traces or memories) of past experience. Three of the four (all except Bartlett) believed that this organization was at least in large part the same as that which we call "self." Freud and Koffka had the most detailed theories of the role of the self in memory. Freud's theory of repression (which has not been described in any detail here) spawned many laboratory investigations, which, however, proved frustratingly inconclusive and often nonsupportive (see review in Holmes, 1974). Koffka's theory of ego as a memory structure received much less empirical attention than Freud's. Perhaps partly as a consequence of not having received much test, Koffka's theory remains consistent with much of the existing evidence.

It is clear that the early theorists were concerned with a level of organization that is hierarchically superordinate to that with which more recent work on organization in memory has been concerned (e.g., Tulving & Donaldson, 1972). However, in the last few years, memory research has begun to address phenomena at the highest levels of organization. It is to some of this work that we now give attention.

II. 1977 Onward: Discovery of the Self-Reference Effect

Theoretical developments concerning the role of self in memory were scarce in the four decades following Koffka's major theoretical effort. That hiatus has ended now, as is evident in a set of related contributions that appeared starting in the late 1970s. These studies, to be reviewed in this section, are outgrowths of cognitive psychologists' recent efforts to develop detailed working models of human memory. The theorists' backgrounds are in personality, social psychology, and experimental psychology. This convergence from several directions on the relationship between self and memory suggests that new theoretical developments in this area will be widely useful.

A. Rogers and Kuiper

Starting from an interest in determining how respondents to personality inventories accessed the information needed to generate self-report judgments, Rogers (1974) turned his attention to a task in which subjects judged whether or not trait-word stimuli were self-descriptive. Subsequent experiments by Rogers, Kuiper, and Kirker (1977) and Kuiper and Rogers (1979) examined both latencies of such judgments and subsequent performance on unexpected tests for recall of the judged stimuli. Compared to a variety of other judgments on similar stimuli, the self-referent judgments were made more rapidly and also led to greater (incidental) recall of the trait stimuli. The authors' initial interpretations of these results employed the depth-of-processing or degree-of-elaboration explanation that had been proposed for other results using the judgment/incidental recall procedure (Craik & Lockhart, 1972; Craik & Tulving, 1975). The results were taken to suggest that self-reference provided the basis for even deeper or more elaborated processing than did the semantic judgment task with which it was compared.

> The self [is] an abstract structure that contains both general trait-like entries and some specific behavioral exemplars or instances. This memory structure is active during the input and interpretation of self-related information and provides a degree of "meaning" or embellishment to the incoming information. (Kuiper & Rogers, 1979, p. 511)

Most recently, Rogers (1981) has added the conclusion that an evaluative, or affective, component of self-referent judgments is implicated by the latency and memory effects associated with such judgments.

> Affect exerts its major effects during the encoding of personal information. . . . The person can be thought of as "maintaining a watching brief" for indicators of self-relevant events. When such an indicator is encountered, the person's attention is directed toward it. . . . The encoding of a unit of personal information will be a combination of the actual cognition plus an affective signal or tag. . . . The strength of the [affective] signal will vary directly as the degree of self-relevance—and will effect [sic] the strength of the memory trace left by the encoding operation.
>
> The superiority of self-referent memory performance for evaluative tasks . . . results from the rich and strong two-factor [i.e., cognitive and affective] trace left by a self-referent judgment. (pp. 207–209)

B. Markus

Like Rogers and Kuiper, Markus (1977, 1980) has experimentally studied latencies for self-report judgments. Her focus has been on the way in which a person's idiosyncratic knowledge structures (self-schemas[3]) influence judgment and recall of information. Markus's use of "schema" is in the tradition of Bartlett (1932), although she takes her exact definition from Neisser's (1976) recent description of the schema as a structure that "accepts information as it becomes available at sensory surfaces and is changed by that information; it directs movement and exploratory activities that make more information available, by which it is further modified" (p. 54). A finding that Markus has replicated in several contexts is that persons who are "schematic" for a trait (they judge both that the trait is self-descriptive and that it designates an important characteristic) make self-relevant judgments bearing on that trait more rapidly than they do for other traits, and also more rapidly than do people who are not schematic for the trait. Markus (1980) has summarized her views on the role of self-schemas in judgment and memory as follows:

> Thinking about the self, like thinking about any object, involves providing meaning to an incoming stimulus so that it can be represented in memory. Meaning is produced by fitting or assimilating various components of the stimulus to the knowledge structures contained in memory, and then adjusting or accommodating these structures so that they can adequately represent the relevant data. . . . Because even the most other-directed among us spend so much time thinking about the self, self-structures are frequently used and available for future use in information processing. Thus, we are likely to pay more attention to information about the self and to expend more effort reflecting on it. Often we may even change data so that it fits with our self-concept or ignore or selectively forget information if it does not match our ideas about ourselves. (p. 130)

C. Keenan and Baillet

A number of researchers reacted to the original report by Rogers *et al.* (1977) of an effect of self-reference on memory by asking whether simi-

[3]The only plural of *schema* given in standard dictionaries is *schemata*. Nevertheless many contemporary psychologists, including Markus, use *schemas* as the plural form. The two forms are used interchangeably in this chapter.

larly high levels of recall would not be found also for traits judged in terms of their applicability to other people (rather than to self). Of these several studies (Bower & Gilligan, 1979; Kuiper & Rogers, 1979; Lord, 1980), the two experiments by Keenan and Baillet (1980) may have the greatest impact in suggesting further theoretical development. Their first experiment showed that both speed of judgments of trait applicability and subsequent incidental recall for the judged traits increased directly with the degree of familiarity of the person judged, over seven levels of familiarity (Jimmy Carter, teacher or boss, favorite character, friend, parent, best friend, self). Their second experiment showed that the effect of familiarity on recall occurred for judgments on evaluative dimensions (e.g., Does "rude" describe: you, [your parent, your favorite character, Jimmy Carter]?) but not for judgments on factual dimensions (e.g., Do you [your parent, etc.] have gills?)

These findings by Keenan and Baillet actually provided a major basis for Rogers' (1981) having concluded that there was an affective component of self-referent judgments. Keenan and Baillet, however, although noting the possibility of an affect-based account, preferred a cognitive interpretation. The essence of their cognitive interpretation was that evaluative judgments, but not factual ones, employ a "rich" conceptual structure.

> We suggest that the richness of the conceptual structure to which an event is encoded may provide a more general definition of encoding elaboration than has been offered to date . . . because it applies across a wide range of semantic encoding tasks and it can be determined ahead of time rather than post hoc. (Keenan & Baillet, 1980, p. 667)

> As research into memory for personally and socially significant events proceeds, . . . it may be that the data will call for models [that] incorporate the constructs of motivational psychology into the mechanistic process models of cognition. For now, however, the data can be adequately explained using only cognitive constructs; they may raise the possibility of a motivational account, but they do not compel one. (p. 668)

D. Bower and Gilligan

In their investigation, Bower and Gilligan (1979) sought to show that the heightened recall of trait stimuli originally found by Rogers *et al.* (1977) did not depend on judging the applicability of traits to *self*. They succeeded in finding two other tasks that produced comparably high incidental recall of trait stimuli: (*a*) judging relevance of traits to remembered personal experiences, and (*b*) judging relevance of traits to remembered experiences involving one's mother. Their interpretation was offered in terms of a semantic network model (HAM—Anderson & Bower, 1973) of encoding and memory, and they concluded that the self-concept behaved in memory in the fashion expected by this model.

> There is nothing special about the self schema as a mnemonic peg; any well-differentiated person will do. (Bower & Gilligan, 1979, p. 429)

Bower and Gilligan (1979) thus subsumed the role of self in memory under the generalization that "good memory depends on relating the inputs to a well-differentiated memory structure" (p. 420). Note that their conclusion can be used either to suggest that the study of memory needs no special treatment of the self or, alternatively, to suggest that the self should be accorded a special role because it may be the best-differentiated cognitive structure available.

E. Comment on Interpretations of Self-Reference Effects

The researchers whose works have just been reviewed have no disagreement about the major self-reference findings, which can be summarized briefly as follows: Information judged for self-relevance is better recalled than information judged on other dimensions; judgment of relevance of information to persons other than oneself facilitates memory as a function of familiarity with the person being judged; and the beneficial effect on memory of self-reference or familiarity disappears when the judgment has no evaluative content. These same researchers, however, differ in their conclusions about the status of self as a psychological construct. Rogers and Kuiper and Markus have interpreted the self-reference findings as manifestations of an organization (self or self-schema) that has unique psychological properties, whereas Keenan and Baillet and Bower and Gilligan have preferred not to attribute special properties to the self as a psychological construct.

These differences of opinion about the status of self are reminiscent of Bartlett's and Koffka's differing conclusions about the existence of self as a special entity. As noted earlier, Bartlett and Koffka apparently agreed in finding evidence for high-level organizational processes in memory, but differed on the appropriateness of using the designation "self" for this organization. The present differences of interpretation about the self-reference effect also represent, in part, differing preferences for theoretical labels. Despite their apparent conceptual differences, Keenan and Baillet and Bower and Gilligan can agree with Rogers and Kuiper and Markus that the self-reference findings demonstrate the operation of a high level of cognitive organization. However, there is another aspect of disagreement that cannot be set aside so easily—namely, that concerning the possible involvement of affective processes in the self-reference effect. Rogers (1981) has suggested that affect plays an important role in processing self-relevant information, whereas Keenan and Baillet

(1980)—whose research provided some of the most important evidence on which Rogers' conclusion was based—felt that it was premature to conclude that affective processes are involved in the self-reference effect. Perhaps relevant to this issue are the recent suggestions by Bower (1980) and by Clark and Isen (1981) that affects or emotions can be treated as conceptual nodes in a memory structure, such that analyses of their effects in memory may be given in terms of standard cognitive principles. It will be interesting to follow the future development of this issue, which promises to touch on important theoretical matters.

III. Memory When Self Is Involved

In addition to the self-reference effect, which has inspired the theoretical efforts just reviewed, several other well-established findings suggest a special role of self in memory. These findings are here grouped into categories of *self-generation, egocentric perspective,* and *ego-involvement* effects. In order to maintain a broad scope in this review, the coverage of these topics is representative rather than thorough. The common theme that can be found in the results to be reviewed is that memory is superior when self is involved in information processing than when self is not involved. The aim of the review in this section is to provide a basis for later translating the assertion "self is involved" from empirical operations into psychological conceptualization.

A. Self-Generation of Study Material Facilitates Recall

1. *The Self-Generation Artifact in Law-of-Effect Experiments*

As is the case with many interesting phenomena, the first empirical appearance of the effect of self-generation in facilitating recall was an unwanted experimental artifact, not initially identified as interesting in its own right. Thorndike (e.g., 1932) conducted many experiments that used the general procedure of presenting a stimulus item (e.g., a word in a foreign language) together with several alternative (e.g., translation) responses in a multiple-choice format. On retests, subjects repeated rewarded responses (ones that had been called "correct") at a rate well above chance. This finding was interpreted as supporting the *law of effect*—an automatic strengthening effect of reward on stimulus–response connections. Unfortunately it was also true that unreinforced responses

were repeated at a substantially above-chance rate, which suggested to Thorndike that a *law of excercise* (strengthening as a consequence of unrewarded practice) was needed in addition to the law of effect. As a result of subsequent investigations (see reviews in Nuttin & Greenwald, 1968, pp. 145–154; Postman, 1947, 1962), it became apparent that the assumed chance-repetition rate (i.e., repetition probability of $1/n$, where n is the number of choice alternatives on each trial) was not appropriate as a baseline against which to compare reward effects. That is, subjects did not select randomly among alternative responses, and a response that was especially likely to be chosen on an acquisition study trial was likely also to be selected at an above-chance rate on a subsequent test trial. Even instructions that the multiple-choice experimental items constituted an extrasensory perception task (e.g., Wallach & Henle, 1941) were insufficient to induce chance selections among response alternatives. A method of eliminating this self-generation artifact was eventually achieved by providing the subject the illusion of choosing responses, the verbal content of which was actually under the experimenter's control (Greenwald, 1970; Nuttin & Greenwald, 1968, pp. 153–155). As is now clear, the purity of method achieved with this innovation was purchased by eliminating from the trial-and-error learning experiment an interesting process (self-generation) that should not have been considered just a troublesome artifact. Before attempting to characterize this process further, let us consider some not-obviously related phenomena of more recent discovery.

2. *Cognitive Response Learning in Persuasion*

In the two decades after World War II, researchers at Yale University, under the leadership of Carl Hovland, conducted an intensive program of laboratory studies of communication and persuasion (e.g., Hovland, Janis, & Kelley, 1953). Those studies followed up on the researchers' earlier wartime efforts to develop and test indoctrination programs, and were guided by learning principles developed in the work of Clark Hull. A major frustration of the Yale communication research program was recurring evidence that the persuasion produced by effective communications did not conform to a simple learning model. According to that learning model, the persuaded audience members should have been those who best learned the arguments that had been presented by the communicator; instead, persuaded and nonpersuaded subjects typically showed *equal* levels of learning and subsequent memory for communicated arguments. The conceptual puzzle posed by such results appears now to have been resolved by the proposition that, during a persuasion

episode, the audience generates covert evaluative responses that do not necessarily agree with the communication. If these *cognitive responses*—whether they be counterarguments or supporting thoughts—are later more easily retrieved than are the communicator's arguments, then persuasion can have an orderly learning/memory interpretation in terms of cognitive responses (Greenwald, 1968). Greenwald and Albert (1968) gave an intial demonstration that subjects are much better able to recall their own generated thoughts on a controversial topic than to remember comparable statements that were produced by other subjects. This preferred status in memory of cognitive responses, relative to communicated arguments, has subsequently been demonstrated many times (see Petty, Ostrom, & Brock, 1981).

3. *Self-Generation in Verbal Learning*

At about the same time that persuasion researchers were investigating memory for audience cognitive responses, verbal learning researchers began to investigate the memorial consequences of an active role of the subject in generating to-be-remembered material. The first such study (Bobrow & Bower, 1969) was inspired by developments in psycholinguistics. Bobrow and Bower found that, when subjects actively generated a sentence linking two concrete nouns (e.g., the nouns DOG and ROPE might be linked by "The DOG bit the ROPE"), they were subsequently better able to produce the second noun when cued by the first than were subjects for whom the experimenter had provided the linking sentence. Bobrow and Bower concluded that the actively generating subjects remembered better because they comprehended better; in more recent terminology, this explanation corresponds to the idea of deeper or more elaborated processing (Craik & Tulving, 1975). Interestingly, Bobrow and Bower (1969) rejected as "simply too vague" (p. 458) the competing hypothesis that "the act of successfully searching for a sensible connective to link [the two nouns] parallels or is equivalent to the process of constructing a scheme for retrieving [the second noun] from memory when given [the first]" (pp. 455–456). Results that are presently to be reviewed suggest that this search-parallels-retrieval interpretation may be the more accurate.

The most direct evidence for the facilitating effect of self-generation on recall has come from some recent experimental studies by Slamecka and Graf (1978). Their general procedure involved presentation of a stimulus word and a rule by which this stimulus was related to a response word—for example, the stimulus word *rapid* and the rule *synonym*. The main experimental variable was variation of whether the subject's response word was *read* or *generated*. In the generate condition, the stimulus was

followed by the first letter of the desired response—e.g., *rapid-f;* in the read condition the subjects were instead presented with the full pair—e.g., *rapid-fast*. In five experiments, the generate condition was consistently superior to the read condition in recognition, cued recall, and free recall of the response words (not in free recall of the stimulus words).[4]

The comprehension or depth-of-processing interpretation suggested by Bobrow and Bower (and again, later, by Erdelyi, Buschke, & Finkelstein, 1977) was considered problematic by Slamecka and Graf. The latter authors observed that a depth-of-processing interpretation predicts that (*a*) the beneficial effect of generation should extend to the stimuli of their paired associates, and (*b*) the generation effect should be greater for a semantic (e.g., synonym) rule than for a phonetic rule (rhyme), which presumably requires shallower processing. Neither of these expectations was supported by the data of Slamecka and Graf's experiments.

4. *Reward-Based Education and the Self-Generation Effect*

We can now spell out the relation between the self-generation effect and the role of reward in learning. The frequently observed asymmetry of reward and punishment effects—that is, the fact that rewards increase performance probabilities and punishments do not equivalently decrease them—has been used widely as a basis for advocating reward-only training procedures (especially by Skinner, e.g., 1953). Thorndike (e.g., 1932) had explained the reward–punishment asymmetry by means of the law of effect—the assumption of a special connection-strengthening property of rewards. In contrast, the interpretation suggested by the self-generation effect looks less to the effects of the reward than to the (covert) events that precede it. When a response is rewarded, the learner's task requires subsequent reuse of the structures that generated the (rewarded) response. It may therefore be hypothesized that *the virtue of reward rests on the fact that the educator who wishes to rely on reward is obliged to design training situations so as to invoke response-production mechanisms that will later be used in reproducing the desired response*.

Not all training situations that result in the learner's producing a correct response will capitalize on the value of self-generation. Jacoby (1978), for example, found that problem solutions are better retained when the

[4]The task of proofreading these pages suggested that authors' proneness to miss errors in their own text can provide another illustration of the self-generation effect. In this case the originally generated text is so easily retrieved that it appears to be there—on the page being proofread—even when it is not. The common suggestions to the author/proofreader of reading the pages in reverse order or reading the text aloud may be effective in part because such techniques disrupt the use, during proofreading, of the mechanisms involved in originally generating the text.

learner produces the correct response by working through to the solution rather than retrieving it from memory. Also consistent with the value of self-generation in education are findings that show self-generation of incorrect responses to interfere with acquisition of correct responses. This has been shown particularly clearly in studies that yoke an observational learner with a task performer. After an error, the performer (who generated the error) has more difficulty performing correctly on a subsequent trial than does the observer (e.g., d'Ydewalle, 1979; Marx & Witter, 1972).

5. *Toward Interpretation*

The essence of the self-generation effect, in the several results that have been reviewed, is that material actively produced by the subject has a privileged place in retrieval, when compared with material passively received. The hypothesis that the self-generation procedure serves to guarantee the availability of a mechanism that must be used in eventual retrieval is compelling. In agreement with Bobrow and Bower (1969), however, this explanation must be judged unsatisfyingly vague as long as the mechanism shared by acquisition and retrieval is left unspecified. *Hypothesis:* The shared mechanism that produces the self-generation effect is the self system. *Critique:* This hypothesis, too, is vague—as long as the self system is not well defined. *Reply:* Let us proceed to work toward a more precise conception of the self system.

B. Egocentric Perspective Facilitates Recall

We remember the past egocentrically or autobiographically, recalling events in terms of our relation to them. However intuitively plausible this egocentricity of memory may appear, it is not a necessary truth. It is possible, for example, to conceive of an organization of past experience that is more like that of some reference work, such as a history text or the index of a thesaurus. [Tulving (1972) characterized semantic memory as "a mental thesaurus."] The importance of the egocentric character of memory has become apparent particularly with the recent conduct of several imaginatively devised experiments that have compared memories for material acquired with and without an egocentric perspective.

1. *Enhanced Recall of Own Contributions to Group Performance*

In an experiment by M. W. Brenner (1973), a group of subjects sat around a large table and, in turn, read aloud words that had been prepared on index cards that they turned over just before reading them. Subjects expected to be tested for memory of all words read by those around the table. A powerful effect found by Brenner was that subjects remembered best the words they themselves read to the group; a lesser effect was subjects' reduced recall of words read by just-preceding and just-following persons (relative to the average of all words read by others). In studies using both natural and experimental groups, Ross and Sicoly (1979) found that people recall their own contributions to a group effort more readily than they recall the contributions of other group members. For example, married subjects recalled more instances of their own performance of household chores than of their spouses', and subjects in two-person laboratory groups remembered more of their own statements than of their partner's from the previous day's group discussion.

Ross and Sicoly suggested that their subjects might have attended more to their own efforts than to their partner's—a plausible observation that, it should be noted, might apply equally to Brenner's finding. But we should not dismiss the effect of egocentric perspective on recall as reflecting no more than routine variations in attention. Consider the related self-reference effect that was found by Rogers *et al.* (1977) and others. In the absence of evidence to the contrary, one might guess that subjects *attend more* to self-referent judgments than to other judgments. But there *is* evidence to the contrary. Self-referent judgments take *less* time, on the average, than do other types of judgments (Keenan & Baillet, 1980; Kuiper & Rogers, 1979). We should therefore be reluctant to interpret Brenner's and Ross and Sicoly's findings in terms of variations in quantity of attention, until there is evidence that supports this hypothesized mediator.

2. *Empathy and Memory—Extension of the Egocentric Perspective to Others*

In an interesting variant of his 1973 study, M. W. Brenner (1976) had subjects arrive for the experiment in dating pairs and seated members of each pair at opposite positions around the table. His results indicated that the two effects of egocentric perspective—enhanced reall of own-read words and reduced recall of words read just before and just after one's performance—occurred also (albeit in reduced magnitude) for memory of words read by the dating partner and the persons just preceding and following the partner (cf. Keenan & Lindauer, 1981). In the studies following up on the original Rogers *et al.* (1977) report of the facilitating effect of a self-reference orienting task on recall, similar facilitation was found to occur for orienting tasks that involved encoding in relation to familiar others (Bower & Gilligan, 1979; Keenan & Baillet, 1980; Kuiper

& Rogers, 1979; Lord, 1980). Keenan and Baillet's finding of a graded reduction in the recall-facilitation effect as the referent person was decreasingly familiar is particularly consistent with the suggestion that memory is facilitated by empathic extension of the egocentric perspective.

Perhaps the fullest demonstration of the consequences for memory of extending the egocentric perspective to others is in a story-recall experiment by Owens, Dafoe, and Bower (1977). By varying the content of a 300-word introduction to a 1200-word story involving two men and a woman, Owens *et al.* succeeded in inducing their subjects to empathize with one or the other of the two men. The effect of this empathy was apparent in imagined physical perspective (subjects tended to imagine the scenes of the story from the position of the character with whom they identified), in interpretation of ambiguous events of the story (subjects saw "their" character as less responsible than the other male for various mishaps that occurred), and in recognition memory for story content (subjects tended to give false positive recognition responses to statements that agreed with their induced perspective).

C. Ego-Involvement: Persisting Tasks Facilitate Recall

1. *Definition of Ego-Involvement*

In a recent paper (Greenwald, 1981a) I have tried to establish a consistent definition of ego-involvement as the person's *engagement in a persisting task*. (As I noted in developing this definition, any discussion of the consequences of ego-involvement must first deal with the existence of several mutually contradictory usages of ego-involvement.) A *persisting* task can be distinguished from a *recurring* task. This is the distinction, for example, between working toward a bachelor's degree (a task that persists for several years) and going to class (which recurs daily for several years). Persisting tasks can be located at a higher hierarchical level in a task structure than related recurring tasks, as in the example just given. Similarly, for example, the persisting task of building a house hierarchically subsumes the recurring task of hammering a nail. Persistence occurs in degrees, such that (for example) the task of getting a good grade in a specific course is intermediate in persistence between obtaining an undergraduate degree and going to class. As can be seen from the examples just given, persisting tasks can often be described as more *important* than the tasks that they subsume—that is, more important than the less persisting tasks that occur at lower hierarchical levels in a task structure. Thus, tasks are ego-involving (by definition) to the extent that they are persisting, and this will often mean also that they are both highly placed in a hierarchical task structure and important.[5]

2. *Irrelevance of Certain Procedures to Assessing the Effect of Ego-Involvement on Memory*

Some important previous reviews (esp. Osgood, 1953, pp. 571–587; Rapaport, 1942/1971) have based evaluations of the effects of ego-involvement on memory on studies using procedures that are excluded by the present definition of ego-involvement. For example, on the assumption that a task that is *temporarily* important to the subject is ego-involving, Osgood included in his review a study (Biel & Force, 1943) that compared memory for intentionally learned material with that for material incidentally learned to the same criterion. An unanticipated retention test after a 19-day delay showed no difference in memory, suggesting no effect of "ego-involvement" on memory. However, although the intentional learning instructions enhanced the importance of the material at the time of initial acquisition, there was no persisting task in regard to this material during the retention interval; therefore Biel and Force's intentional learning condition doesn't meet the present conceptual criterion for ego-involvement. Also included in Osgood's review was Levine and Murphy's (1943) study of learning and memory as a function of attitudinal agreement or disagreement with the material to be learned. Levine and Murphy found that procommunist and anticommunist material was learned faster and forgotten more slowly by subjects for whom the material was politically agreeable than by ones for whom it was disagreeable. Again, the procedure does not meet the present conceptual criterion of ego-involvement, because the subjects were given no persisting task to which the agreeable material was more relevant than was the disagreeable material.[6] Both Osgood and Rapaport also included in their reviews studies on relative memory for pleasant and unpleasant experiences, with

[5]The persisting-task definition of ego-involvement fits well with Koffka's analysis (see Fig. 1), in which ego functions in memory by means of motivational links between temporally separated strata in the trace column. Koffka's analysis straightforwardly produces the expectation that ego-involvement (task persistence) should facilitate long-term retrieval.

[6]It is conceivable that some aspects of Levine and Murphy's materials did make the agreeable information more useful in regard to some (unspecified) persisting task. However, there is no empirical indication that, *in general,* attitudinally agreeable information is more relevant to persisting tasks than is disagreeable information. There are many results showing, to the contrary, that subjects often find disagreeable information as useful as, and sometimes more useful than, agreeable information [see Wicklund and Brehm's (1976) discussion of the lack of support for cognitive dissonance theory's hypothesis of selective self-exposure to agreeable information].

the former assumed to be more ego-involving. Again, this is an empirical variation that doesn't fit with the persisting-task conception of ego-involvement. If one assumes (as seems plausible) that all affective experiences are generally more relevant to persisting tasks than are nonaffective ones, then the findings of many of this last group of studies (that both pleasant and unpleasant experiences tend to be retained better than neutral ones) can be taken in support of a role of ego-involvement in facilitating memory.

3. *Evidence That Does Bear on the Persisting-Task Definition of Ego-Involvement*

The question to which we seek an answer is: Is information better retained when it has future usefulness (relevance to a persisting task) than when it does not? Remarkably, and despite the obvious importance of this question, few texts on human memory report any evidence relevant to it. Aall (1913) was apparently the first to demonstrate that students remembered more studied material, several weeks after an exam, if they had been led to believe that the material would continue to be useful after the exam. Parallel results have been obtained, in recent experiments involving much shorter retention intervals, by Jacoby, Bartz, and Evans (1978, Experiment 2) and by d'Ydewalle, Degryse, and DeCorte (1981), the latter of whom also provided a review of research relevant to this phenomenon.

The well-known results of Zeigarnik (1927, 1938) also bear on the question of task persistence and memory. Zeigarnik assumed that, when a task in which the subject was absorbed was interrupted prior to its completion, the task thereby acquired a persisting character. The "Zeigarnik effect" of better recall for such interrupted tasks than for corresponding completed ones is, with this assumption, consistent with the proposition that material associated with persisting tasks is better remembered.

Nuttin (1953; available in translation in Nuttin & Greenwald, 1968) introduced the distinction between *open* and *closed* tasks (see also Nuttin, 1976). In closed tasks, subjects believe that the initial encounter with task stimuli is also the last; open tasks are ones for which the subject expects that the same (or related) stimuli will later be reencountered. An example of a closed task is a series of (say, psychophysical) judgments of once-presented stimuli. The same procedures can become part of an open task if the subject expects the judgment stimuli to be presented once again.[7] Nuttin's conception of the open task has been perhaps the most

[7]It may be helpful to point out the difference between an open task and an intentional learning task. In the interval between study and test, an intentional learning task *is* an open task, but it becomes a closed task as soon as the last test trial is completed—that is, when the subject expects to have no further use for the studied information. Also, as Nuttin pointed out, an intentional learning task is often a mixture of open and closed tasks. The subject usually has an open task in regard to correct or rewarded responses, and a closed task in regard to incorrect responses.

influential force in suggesting the persisting-task definition of ego-involvement. Nuttin regarded the effect of persisting tasks on learning as

> the essential mechansim of human learning.
>
> The persisting task tension explanation allows substantial reconciliation among seemingly disparate results obtained by the Lewinian school and stimulus–response theorists. The fact that interrupted or unsuccessful responses are frequently found to be better recalled than completed or rewarded ones (in the former case [viz., Zeigarnik]) can be reconciled with the fact that completed or rewarded responses are found more likely to be repeated (in the latter) when the typical experiments of each school are analyzed in terms of the persisting task orientation of the learner. In experiments of the Lewinian school, it is the interrupted or failed task that is generally of greatest future significance while, in those of the S–R school, it is generally the rewarded response that guides the learner to future successful performance. (Nuttin & Greenwald, 1968, p. 102)

Nuttin's repeated findings of superior retention of information acquired in the context of open tasks (Nuttin & Greenwald, 1968, Chap. 6) have received further corroboration in subsequent investigations of "directed forgetting" (reviewed in Bjork, 1972; Epstein, 1972). In the directed-forgetting experiments, items (words or paired associates) are designated as to-be-remembered or as to-be-forgotten, usually by means of a cue that is presented together with or after the item. This procedure directly maps onto Nuttin's open–closed distinction, in that an open task is created for the to-be-remembered items, and a closed task for the to-be-forgotten ones. Among the findings from the directed-forgetting procedure is a clear superiority of memory for the to-be-remembered items in comparison with the to-be-forgotten ones (as can be determined when the experimenter gives an unexpected recall test for the latter). In summary, the proposition that persisting tasks facilitate retention has received a wide variety of empirical support (see additional discussion in Nuttin, 1976).

IV. Theoretical Synthesis

A. Three Self/Memory Effects

The following generalizations summarize the results just reviewed.

1. Material that is actively generated by the learner is more easily recalled than is material passively received (the *self-generation* effect).
2. Material that is encoded with reference to self is more easily recalled

than is material otherwise encoded (the *egocentric perspective* or *self-reference* effect).

3. Material associated with a persisting task is more easily recalled than is material associated with a completed task (the *ego-involvement* effect).

The aim of the remainder of this report is to use these findings to build on the body of existing theory (already reviewed in Sections I and II) concerning the role of self in memory. The major conclusions of this effort will be that (*a*) the three self/memory effects have a common underlying explanation, and (*b*) this explanation has broad implications for the study of organization in memory.

B. Properties of the Self System

Let us first review the interpretive principles that have been most frequently suggested in existing accounts of the three self/memory effects. The principle most often appealed to has been *depth* (or *elaboration) of processing,* which has been used in several discussions of both the self-generation and egocentric perspective effects; a principle of enhanced or *selective attention* has also been used to interpret some egocentric perspective effects; and the gestalt psychological principle of *task tension* has been used to explain the ego-involvement effect. Although these explanations possess some intuitive appeal, they leave important questions unanswered. For example: What cognitive operations are implied by the principles of enhanced attention or task tension? How might such operations differ from those implied by the principle of depth (or elaboration) of processing? How can the depth (elaboration) explanation account for the rapid processing of self-referent judgments, or for the fact that self-referent processing enhances memory only for affect-involving judgments? There have been attempts to answer some of these questions (esp. by Bower & Gilligan, 1979; Keenan & Baillet, 1980; Rogers, 1981), but these have not sought to address the complete set of self/memory effects. The following description of a self system characterizes a set of cognitive mechanisms that is proposed to be able to generate the full range of self/memory effects.

Consider a cognitive organization—which we shall call a *self system*—that has the Properties S1-S3:

S1. *Self-activation:* The organization's availability is not dependent on external stimulation.

S2. *Ordered access:* The organization's activity can be characterized as an ordered search (or activation) of its components; the order is a consequence of the organization's structure.

S3. *Self-environment interaction;* The pattern of activity within the organization is determined by the interaction of its (relatively fixed) structure and the (relatively variable) structure of environmental input; further, the organization's structure is modified by its activity.

Properties S2 and S3 are found in a variety of psychological theories. Property S3 (self-environment interaction), for example, is central to both Bartlett's and Koffka's conceptions of memory. This property, along with S2 (ordered access), can be found in most contemporary interpretations of memory that employ a mechanism of search through a semantic network. The self-activation property (S1) is not found as an explicit assumption of existing theories of memory, but this property is critically necessary in order for the self system to have the capability of explaining the self/memory effects.

If there is a concrete inspiration for the crucial self-activation property, it is the bootstrapping or self-loading feature of many computer systems, by which a relatively short, immediately accessible, and invariant program is used to read into working memory a much larger, less readily accessible, and modifiable program (the operating system). In existing computers, this self-loading feature is usually under an operator's control, making it not strictly self-activating. However, the removal of this feature from external control is readily possible in principle, and, as I have argued elsewhere (Greenwald, 1981b), this removal portends a substantial change in the power balance between computer operating systems and their human operators.

C. Explanation of the Self/Memory Effects in Terms of the Self System

In order to show how Properties S1-S3 can be used to account for the self/memory effects, it is convenient to use, for illustration, a more tangible system that has a parallel set of properties. Properties D1 and D2 describe a *desk system.*

D1. *Activation:* The contents of the desk are always available when wanted.

D2. *Ordered access:* Some contents (items) of the desk are more accessible than others, by virtue of privileged location (for example, desk top, front of center drawer).

Properties D1 and D2 parallel S1 and S2 of the self system. (A parallel to S3 is not needed for present use of the analog system.) To explain the self-generation, egocentric perspective, and ego-involvement effects in

memory, we shall consider parallel effects that might be obtained in analog experiments using the desk system. The success of this explanation of the self/memory effects is to be measured by the plausibility of the parallel effects hypothesized for the desk system experiments. (The desk system is convenient as an illustration because its contents are more publicly accessible than are those of the self system and, therefore, their role in explaining the desired effects may be more easily appreciated.)

1. *Self-Generation*

The procedural feature shared by experiments showing the self-generation effect is that the subject is led to construct a response to a presented stimulus, rather than having the (same or comparable) response provided by the experimenter. The fact that the critical variation is in the source of the response can obscure the possibility that the events that immediately precede the response are the ones that are critical to explanation of the effect. In the self-generate condition, but not in the control condition (according to the present hypothesis), the subject is obliged to associate the response with some easily accessible component of the self system, which then can serve as a retrieval aid at test time. Consider the analog "desk-generation" experiment, with yourself as subject, seated at your desk. The instructions for the desk-generate condition are: "Here is a list of words that I want you to remember. Try to form associations of the to-be-remembered words with the items in your desk as you please." If you are in the control condition, the experimenter places a heterogeneous collection of objects on your desk and asks you to associate these extraneous objects with the to-be-remembered words. After a fixed-duration study period, the extraneous objects are removed for the control subjects, and all subjects are allowed to examine the desk contents during the subsequent recall test. Of course, the desk contents are not likely to be helpful if you are in the control condition. The analog of the self-generation effect that should be obtained in this experiment is due to the subject's use, during initial encoding, of retrieval aids that will continue to be available (Property S1 or D1) during the subsequent recall test.

2. *Egocentric Perspective*

We may go directly to the desk-system analog experiment, since its explanation builds directly on that of the self-generation analog experiment. The "desk-centric perspective" condition is the *same* as the desk-generate condition of the preceding experiment. The experiment differs in selection of the control condition with which the experimental treatment is compared. In the control condition you spend the study period seated at the experimenter's (or someone else's) desk and you are instructed to use the items available therein or thereon as associative cues for the to-be-remembered words. Unexpectedly, at the time of the recall test, you are moved to your own desk and permitted to use its contents as retrieval aids. Your own desk's contents may be helpful, as a function of the degree of their overlap with the contents of the experimenter's desk. [Recall Keenan and Baillet's (1980) finding that recall is facilitated in an orderly way by the subject's familiarity with the person concerning whom trait applicability judgments were being made. In the desk analog, overlap of contents functions as an analog of familiarity.]

3. *Ego-Involvement*

The preceding two experiments can be considered to provide analogs of the ego-involvement effect—to the extent that ego-involvement is understood as degree of involvement of the self system in encoding. The experimenal treatment in the desk-system analogs of the self-generation and egocentric perspective experiments employed the learner's desk contents in encoding, whereas the control conditions did not. In order, however, to conduct an analog experiment that is faithful to the present persisting-task conception of ego-involvement, a more subtle manipulation, which uses the ordered access (D2) property of the desk system, must be devised. Again the experimental (desk-involvement) treatment can be the same as in the preceding experiments, and only the control condition changes. In this control condition, the experimenter (without informing you of this fact) selects relatively inaccessible items from your desk and asks you to use these objects as retrieval aids. For the subsequent retrieval test these items are carefully restored to their original positions in your desk, with the usual instruction that you are free to use the items in the desk as memory aids. Now, if you (as control subject) do not detect the experimenter's strategy for selecting items as retrieval aids, your eventual recall performance should be much inferior to that of an experimental subject who, in normal search through the desk, readily stumbles upon items that are useful in retrieval.

What is it about this experiment that lets it provide a faithful rendition of the persisting-task conception of ego-involvement? It is the assumption that the easiest-to-find items in your desk will, by virtue of your natural use of the desk, be items that are of greatest persisting usefulness.

4. *The Common Principle*

The argument that the three self/memory effects have a common explanation has been made by devising three analog experiments that share the

same experimental treatment. The common principle underlying the three self/memory effects is that all the effects depend on the use, in encoding information, of a system with Properties S1 and S2. The effects, that is, depend on the fact that the instructions in the experimental treatments (if they are followed) oblige the subject to make use—and it is very likely unwitting use—of the self system in encoding information. Note that typical self/memory experiments have little ecological validity, in that the instructions used to bring the self system into the encoding process do not correspond closely to natural inducements to use the self system. I assume that natural inducements to use the self system are environmental indications that the information is associated with some persisting task (in other words, ego-involving).

5. *Increasing the Approximation of the Analog Experiments to the Self System*

A small modification of the desk-system experiments can result in Property D2 (ordered access) becoming a much more powerful determinant of results. The change is to oblige the experimental-treatment subjects to rely on *memory* of the desk contents at the time of the recall test. With this change the subject should, optimally, mentally (rather than visually and manually) search the desk contents at study time, attempting to use the items that come first to mind as retrieval aids whenever possible. This change substitutes the concept of accessibility of the desk contents in memory for their physical accessibility in the desk. The change increases the resemblance of the desk system to the self system. Once having thus changed from the desk-in-office version of the desk experiment to its desk-in-memory variation, we can easily make further changes to replace the desk contents by any other easily remembered set of items, such as the street names in the neighborhood of one's home or office, the names and occupations of one's neighbors, or objects that have names that rhyme with the first ten digits. The relation of these tactics to familiar mnemonic aids, such as pegwords or the method of loci, should be apparent. A conclusion of this analysis is that effective mnemonic aids are ones that possess Properties S1 and S2—they have assured availability (self-activation) and an internal structure that produces retrieval aids in reliable order (ordered access).

6. *Function of Property S3*

Property S3 acknowledges the complexity of the self system's interaction with its environment. In the present state of this formulation of the concept of a self system, Property S3 serves jointly as an expression of faith (that a system of the sort proposed has sufficient complexity to be a powerful and flexible retrieval device) and ignorance (as to the details of its operation). The faith is justifiable by pointing to the accomplishments of existing artificial intelligence systems (e.g., Anderson, 1974; Lehnert, 1978) in which large structured memories, when interrogated by variable probes, retrieve details suitable to the probe. (The ignorance can be accepted on faith.) It is interesting to compare Property S3 with Pribram's (Pribram, Nuwer, & Baron, 1974) proposal of hologram-like recording in the brain. In making a hologram, a three-dimensional object interacts with a coherent laser beam to produce a filmed record that distributes information about any portion of the object through the entire surface of the record (the hologram). The hologram (or a part of it) can then be used, together with another laser beam, to reconstruct a three dimensional image of the photographed object. In the case of the self system, the "beam" that is projected onto some complex environmental input is itself a complex structure (the perceiver's self system). The perceptual and memorial capabilities of two such complex interacting structures must be only mildly suggested by the hologram metaphor.

V. Scope and Importance of the Self System

There is some danger that the analysis presented in the preceding section might succeed too well, leaving the impression that the self system is "nothing but" an effective mnemonic device. Although the organization of an effectively functioning memory may indeed be the main function of the self system, it should not be assumed that this is any minor accomplishment.

A. Implicit Theories of Memory

How many readers would agree with the following statement? *All attended experience is registered in memory. Memory is imperfect, however, because associative interference (and perhaps other processes) can obstruct retrieval of these established memories.* This statement expresses a position that can be called the taken-for-granted theory of memory, according to which the real theoretical action in the study of memory concerns the process of forgetting—explaining, that is, how some memories, once established, manage to become inaccessible (see the discussion of this point in Loftus & Loftus, 1980). The influence of the taken-for-granted theory can be observed in the massive attention to inter-

ference theory in recent decades, as well as in the development of interest in intentional forgetting, which is well expressed in Bjork's observation:

> Intentional forgetting is a frequent event in one's everyday life; it is probably, in fact, more frequent than is intentional remembering. We overhear conversations, we see things in newspapers and store windows, we add up numbers, we dial phone numbers, we pay attention to advertisements, and so on—nearly all of which we have no use for beyond the point at which we attended to them. To the degree that we have any intentions at all with respect to that information, we intend to forget it rather than remember it. (Bjork, 1972, p. 218)

On the other hand, recent attention to the role of encoding processes in memory, as well as to the use of mnemonic strategies, are developments that move away from the taken-for-granted theory. These efforts look to the active role of the learner, at the time of initial receipt of information, in constructing the routes that can eventually permit retrieval. We might, following these developments, give serious consideration to the reverse of the taken-for-granted theory of memory, which might be called the forgetting-for-granted theory. According to this alternative implicit theory of memory, the brain, at birth, has essentially no capacity for retention—no ability to relate new input to previous input. The important theoretical action, by this theory, is in explaining the origin and functioning of the capacity to perform ordinary acts of recognition and recall, in explaining how these acts become so routine that we begin to wonder how things are ever forgotten.

It is from the vantage of the forgetting-for-granted theory that the mnemonic accomplishments of the self system are awesome. In this view, the self system functions as a trap that selectively latches onto potentially important (ego-involving) aspects of experience in a way that permits the effect of these experiences to be cumulative. But (it may be argued) I appear to be claiming for the self system precisely the function that is usually attributed to episodic memory (Tulving, 1972) in the contemporary view. Nothing could be closer to the truth. Indeed, I attempted to lay the foundations for drawing the connection between the self system and episodic memory by focusing (in Section I) on those aspects of Claparède's and Koffka's theories that attributed to the self (ego) system the properties of episodic memory.

B. The Self System and the Episodic–Semantic Distinction

Claparède distinguished between *egocentric* and *marginal* systems of memory, crediting egocentric memory with the capacity (apparently lacking in his Korsakoff patient) of ordinary, voluntary memory for personal

experiences. Similarly, Koffka distinguished between an *ego* system and an *environmental* system, suggesting that the former organized experience in terms of interests and also carried the temporal structure of remembered experience. I suggested earlier (Section I,B) that Claperède's egocentric–marginal distinction corresponds to Tulving's episodic–semantic distinction.[8] However, Koffka's distinction is a different one. In Koffka's conception, environmental traces were conceived as peripheral to the self (ego) system, whereas semantic memory may better be conceived as a foundation on which the self system resides, a foundation that has itself been built by the self system and that continues to grow through the activities of the self system. This conception of the episodic–semantic relation, it should be noted, is consistent with the earlier (Section V,A) suggestion that the self system retains potentially important experiences, thereby allowing them to have cumulative impact. To amplify, when any pattern of events is frequently repeated in experience, the cumulation of impact can be assumed to render the relationship among the components of the pattern more automatic—which is to say, more accessible without an active attentional process (see LaBerge, 1974). Such preattentive processing for meaning is not one of the properties of semantic memory that were stressed by Tulving (1972), but neither is it incompatible with Tulving's discussion. (Tulving addressed the functioning of semantic memory as an object of attention, rather than as the substructure of attention.)

Tulving's conception of the episodic–semantic distinction can be viewed as suggesting a (semantic) substructure of memory that is in some sense even more central or fundamental than the self (episodic) system. The suggestion that the semantic system is, in effect, built by and from the episodic (self) system is also consistent with recent arguments that episodic and semantic memory are not fundamentally different (e.g., Anderson & Ross, 1980).

C. Theoretical Status of the Self

In discussing the properties of the self system, I have so far avoided taking a position on the issue that divided Bartlett from Koffka, and that threatens to polarize contemporary researchers—whether or not such a thing as *the self* exists. I implied earlier that the issue was in part a pseudo-issue, since all the researchers and theorists whose work has been

[8] In Tulving's usage, episodic memory consists of events recalled in terms of the time and place of original experiences; semantic memory consists of knowledge of the interrelationships among events and facts, abstracted from the experiences on which this knowledge is based.

reviewed seem to agree that the memory phenomena associated with the self require the assumption of a great degree of organization in memory. They differ only in preference for using a special label to designate this organization, and in their conclusions as to whether or not this organization operates according to unique principles.

The functions of the self as a memory system are, in large part, amenable to explanation by applying familiar principles of memory to a "rich" (Keenan & Baillet, 1980) or "well-differentiated" (Bower & Gilligan, 1979) conceptual structure. Nevertheless, it does not seem justified to conclude that this particular rich and well-differentiated structure has no special (emergent) properties or that no special designation (self or ego) is justified. Among the apparent emergent properties of the self system are (*a*) the self-activation property described in Section IV,B, (*b*) the tendency for memory to be biased toward retrieving favorable information about oneself (Greenwald, 1980), and (*c*) the privileged treatment accorded to certain classes of encountered information, such as information that is relevant to persisting tasks or to self-evaluation.

None of the preceding discussion justifies a conclusion in favor of the conception of the self as a transcendental entity that receives and possesses knowledge. Of course, those who wish to reject the transcendental view should feel some obligation to explain one particularly intriguing "emergent" property of the self system—its tendency (in the normal case) to perceive itself as unitary and real.

D. Unfinished Business

What are the early experiences that are critical to initial establishment of the self system (apparently within the first two years of life—see Gallup, 1977; Lewis & Brooks-Gunn, 1979)? How does the self as a memory system interrelate with the self as a judgment system that is predisposed to cognitive biases (see Greenwald, 1980)? Is it possible to interpret high-level functional disorders of memory, such as amnesias and multiple personalities, as consequences of exotic or damaged organization of the self system (see Kihlstrom & Evans, 1979)? Can the effects on memory of drugs such as alcohol and barbiturates be interpreted as a suppression of the normal function of the self system (see Hull, 1981)? What are the important dimensions of individual differences in structure of the self system?

My treatment of self and memory has stayed away from such complex questions. I can justify this aversion in terms of a conviction that the focus on basic issues concerning self and memory is a necessary preliminary to treatment of the these deeper questions. That is, interpretation of the self as a memory system seems a promising starting point for dealing with phenomena involving emotion, personality, and pathology. It is fascinating to consider that the goal of using memory as an entering wedge to these important problems returns us, albeit facing in the other direction, to the starting point of this chapter—Freud's and Claparède's use of psychopathological phenomena as an entering wedge to the study of human memory.

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