Commentary on **Asher Koriat and Morris Goldsmith (1996). Memory metaphors and the real-life/laboratory controversy: Correspondence versus storehouse conceptions of memory. BBS 19:167-228**

Abstract of the original article: The study of memory is witnessing a spirited clash between proponents of traditional laboratory research and those advocating a more naturalistic approach to the study of "real-life" or "everyday" memory. The debate has generally centered on the "what" (content), "where" (context), and "how" (methods) of memory research. In this target article, we argue that the controversy discloses a further, more fundamental breach between two underlying memory metaphors, each having distinct implications for memory theory and assessment: Whereas traditional memory research has been dominated by the *storehouse* metaphor, leading to a focus on the *number* of items remaining in store and accessible to memory, the recent wave of everyday memory research has shifted toward a *correspondence* metaphor, focusing on the *accuracy* of memory in representing past events. The correspondence metaphor calls for a research approach that differs from the traditional one in important respects: in emphasizing the intentional–representational function of memory, in addressing the wholistic and graded aspects of memory correspondence, in taking an output-bound assessment perspective, and in allowing more room for the operation of subject-controlled metamemory processes and motivational factors. This analysis can help tie together some of the what, where, and how aspects of the "real-life/laboratory" controversy. More important, however, by explicating the unique metatheoretical foundation of the accuracy-oriented approach to memory we aim to promote a more effective exploitation of the correspondence metaphor in *both* naturalistic and laboratory research contexts.

Measuring accuracy is an intractable problem

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Abstract: The basic issue is the measurement of memory accuracy and how correspondence should be assessed. Problems of completeness and variations in the degree and type of inaccuracy make measurement intractably difficult. This difficulty places severe limitations on generalizing across tasks, domains, and individuals and, consequently, on theory construction.

Most commentators have found Koriat and Goldsmith's (1996t) (K&G's) distinction between the quantity-based storehouse approach to the study of memory and the accuracy-based correspondence approach to be important and insightful. However, an overwhelming majority of the comments have homed in on what K&G agree is the most basic issue – the problem of formulating criteria for measuring accuracy and assessing correspondence. K&G express the hope (p. 215) that the "difficulties will not deter researchers from accepting the challenge of developing such measures" and assume that in principle the difficulties can be overcome. But can they?

One line seems to be that accuracy is, in any case, not important in everyday memory except in relatively rare situations such as the courtroom. This view emphasizes that memories are highly personal interpretations of past events often used in social interactions where the primary aim is impression management rather than veridicality. Nevertheless, K&G are surely right to maintain that accuracy is still important. In problem-solving situations, inaccurate representations of past solutions will not help to solve current problems. In social situations people who grossly misrepresent themselves and their past experiences or give inconsistent accounts will be seen as pretentious, phony, or simply as nuisances. Failures of accuracy in everyday life can have serious consequences so accuracy does matter, but the problem of measurement remains.

As several commentators have pointed out, many different criteria can be applied, but none are very satisfactory. Correspondence to external reality may be difficult to establish, especially when the event is remote in time or the information is very complex in character. It is difficult to determine whether details were never encoded or have been lost or distorted over time. Many commentators have noted that measurement of accuracy cannot be wholly divorced from quantity since issues about the completeness and "grain-size," or level of generality, of a report cannot be ignored. The performance of a student who can recall only one fact or a witness who can report only a single detail is seriously flawed. K&G advocate using a quantity-accuracy profile methodology to overcome this difficulty but in natural contexts, such as autobiographical events or witnessed scenes, it may be as difficult to establish the maximum or optimum quantity as it is to establish a criterion of accuracy.

Accuracy of free reports can vary wildly in degree and kind. As well as being incomplete, accounts may be biased, distorted, or falsified. There may be omission of specific details, abstraction, intrusion of prior knowledge, or normalization to fit general knowledge schemas or stereotypes. As Neisser (1996) observed, memory reports are specific to a particular occasion and a particular context. Our study of the repeated recall of autobiographical memories (Cohen et al., in preparation) has shown that the overlap of content between successive recalls of the same event is typically about 45–55%. If, as this study shows, a single individual remembers an experience differently on different occasions, which account should be deemed more accurate? These characteristics of remembering in real life pose problems, which may well turn out to be insuperable, in measuring accuracy, in comparing accuracy across different tasks and different domains, in generalizing from one situation and one individual to another, and in predicting performance. These difficulties, in turn, limit the possibility of constructing a powerful theoretical framework that is general enough to encompass the many aspects of memory in everyday life. Unfortunately, I suspect they are not simply practical problems that can be overcome by the development of better methodologies but are logical constraints inherent in the study of everyday memory. The correspondence metaphor can be usefully applied to some particular memory tasks but is unlikely to generate new models that can apply more widely.

Metaphorical pluralism – not on the substantive level!

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Abstract: Koriat & Goldsmith (1996t) present two different programs for memory research. Different though they are on the methodological level, on the substantive level the two programs are based on the same view, according to which memory consists of represented information that is permanently stored in the mind (or brain). This view is, I think, wrong. One can support the methodological pluralism Koriat & Goldsmith advocate, but on the substantive level pluralism is not admissible.

Koriat and Goldsmith (1996t) (K&G) draw a contrast between two programs in the study of human memory which they denote by two

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metaphors – "storehouse" and "correspondence." The first highlights the capacity of the memory system to store units of information; the second highlights the ability of this system to faithfully represent the past. Underlying the differential advantages of the two, K&G advocate what they call "metaphorical pluralism," where the differences between the programs are sharpened and each is allowed "to draw the chariot of science as far and as fast as it can." One can be totally in favor of pluralism on the methodological level, without accepting such an ecumenical approach on the substantive level. Different though the two programs are methodologically, in substance both are grounded in the same view of memory. This view is, I think, wrong.

This view is known as the *representational model* or *trace theory.* According to it, memory consists of a database of information permanently stored by means of mental representations, and recollection is the retrieval of specific information from the representational store. The trace theory is at the core not only of cognitive theories of memory but also of neuropsychological ones (see Posner & Warren 1972). The storehouse program focuses on the built-in structural properties of the permanent database; the correspondence program focuses on the evaluation of recollection relative to the specific information to be remembered in the given situation. Yet, as far as the representational assumptions are concerned, there is no difference between the two.

In light of the discussions following the target article, I would like to further emphasize this statement. Some commentators, notably Ben-Ze'ev (1996) and Neisser (1996), have noted the inadequacy of the storehouse metaphor, but overall, the discussions fail to appreciate that K&G's critique of this metaphor is methodological, not substantive. Whereas the link between the representational view of memory and the storehouse metaphor may, for linguistic reasons, appear to be more salient, this view is likewise assumed by the correspondence metaphor, which K&G regard as the alternative approach to memory research. Two commentators, Conway (1996) and Larsen (1996), do in fact marshal criticism against the correspondence metaphor, but their reasons for doing so are different from those adduced here. Indeed, these commentators, and probably most of the others, still hold to a representational view, characterizing memory in terms of some underlying mental trace. The only commentator who advocates a nonrepresentational view of memory is Neisser (1996) who characterizes remembering as doing (see also Shanon 1990).

The trace theory of memory is part of a general picture of mind that grounds all cognitive activity in the processing of underlying mental representations. Various independently motivated lines of argument suggest that this picture, and with it the trace theory, is wrong (for a comprehensive critique of representationalism the reader is referred to Shanon 1993).

My critique of the representational characterization of memory follows Wittgenstein's (1953; 1980; see also Stern 1991). By the representational account, recognition consists of the comparing of a presently perceived image to an image represented in the cognitive agent's mental store. How does the agent ascertain that the two are indeed images of the same item? To do this, one should presumably compare the two images and judge their similarity. For this, some reference to a standard has to be presupposed. The postulation of such a standard is tantamount to the postulation of representations of a second order. These will in turn require representations of a third order, hence an infinite regress.

Retrieval presents further problems. How do I activate the representation that constitutes a memory? Don't I already have to know that there is in my representational store a memory pertaining to the stimulus at hand? Is it not the case that in order to wish to remember something, I already have to know, hence remember, that very same thing?

Suppose one has an image in front of one's mind's eye: How does one know that it constitutes a memory? Perhaps the image is something one perceives, fantasizes, or thinks about. There is nothing in the represented image itself (or in any mental representation) that distinguishes it as a memory of the past.

All told, self-evident though it seems to be, the characterizations of memory in terms of a representational trace is wrong. The consideration of the alternatives extends beyond the scope of this commentary. Essentially, what seems to be needed is an account of memory as direct, that is, not mediated by mental representations. For this, the reader is referred to Ben-Ze'ev (1986; 1993; 1996), Bransford et al. (1977), Bursen (1978), Earle (1956), Gibson (1966; 1979), Jenkins (1977), Locke (1971), Malcolm (1963; 1971), Munsat (1966), Ryle (1949), Shanon (1991), Stern (1991), Watkins (1990), and Wilcox and Katz (1981).

In light of the above considerations, it seems to me that memory research calls not only for a serious methodological evaluation, but a radical theoretical soul-searching. Students of both mind and brain have to rethink their very basic conceptualizations of memory and recollection. There is a big difference, however, between the methodological level and the substantive one. As far as methodology is concerned, there is (and should be) room for ecumenical pluralism, as advocated by K&G. By contrast, one's views of the basic nature of things, hence, *inter alia,* the conceptualization of mind in general and of memory in particular does not admit of pluralism. Either memory is stored information, represented in the mind, or it is not.

Authors' Response

Methodological and substantive implications of a metatheoretical distinction: More on correspondence versus storehouse metaphors of memory

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Abstract: In response to Cohen, we point out that many of the assessment difficulties raised by the correspondence metaphor stem from the assessment of memory in meaningful, real-life contexts rather than from the assessment of memory accuracy per se; these difficulties are equally troublesome for the assessment of memory quantity in such contexts. Moreover, the need to focus on particular aspects of memory performance – correspondence-oriented or quantity-oriented – does not preclude the development of useful and general theoretical models. In response to Shanon, we argue that (1) the distinction between the correspondence and storehouse metaphors of memory is metatheoretical, not substantive or methodological, (2) the correspondence metaphor is compatible with both a "representationalist" view of memory and a more "direct" view, and (3) as an epistemological strategy, metaphorical pluralism is both acceptable and desirable.

R1. Reasons for optimism in the assessment of memory correspondence

Cohen focuses on some of the problems inherent in the assessment of memory accuracy and reaches a rather pessimistic conclusion: "The correspondence metaphor can be usefully applied to some particular memory tasks but is unlikely to generate new models that can apply more widely." Here, we reexamine some of the points that led Cohen to this conclusion, and argue that (1) there are indeed many difficulties to be overcome in the assessment

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of memory correspondence, (2) most of these difficulties are related to the assessment of memory in meaningful, real-life contexts rather than to the assessment of memory correspondence per se, (3) memory correspondence measures may in fact need to be more task-specific or situation-specific than traditional memory quantity measures, but (4) the lack of an all-purpose measure of memory accuracy need not entail a lack of generality in correspondence-oriented memory theorizing.

Cohen agrees that accuracy is an important property of memory in everyday life but expresses concern about the problem of measurement. Some of the problems she considers seem to be of a practical nature, stemming from the attempt to evaluate memory in naturalistic, real-life contexts. For example, she points out that it may be difficult to evaluate accuracy when the target event is remote or complex, and one cannot know which aspects or details of the event were originally encoded by the person and which were not. This is certainly true, and in fact one often has no direct or independent knowledge at all of the target event in real-life memory situations. As we noted before (see Koriat & Goldsmith, 1996r, sect. R3.1), however, these problems are not unique to the assessment of memory accuracy, and in fact they are equally problematic for the assessment of memory quantity. It is simply because quantity-oriented research has been conducted primarily in the laboratory that it has generally succeeded in circumventing these problems (but not without a price). Thus, the difficulty stems from the lack of control in naturalistic research contexts, rather than from an inherent feature of the correspondence metaphor. What is needed, then, is the development of creative methodologies that can bring more experimental control into naturalistic memory research, or at least more "objective" information regarding the target memory events. Our hope is that by abstracting the critical variables from their naturalistic contexts, more correspondence-oriented research can and will be conducted in the laboratory (see Koriat & Goldsmith 1996t, sect. 6.1, p. 186).

Other complexities of accuracy measurement, however, seem to be more fundamental. As **Cohen** points out, a basic problem stems from the fact that there are many different ways in which a memory report can be either accurate or inaccurate (see Koriat & Goldsmith 1996t, sect. 2.2 and sect. 4). It may be distorted, incomplete, biased, oversimplified, and so forth. It may be accurate in capturing the gist, but inaccurate in its details, or it may be accurate in its details but still misrepresent the gist or "narrative truth" of an event. Moreover, what is "true" for one person may be "false" for another – or perhaps, as Cohen implies, even for the same person at different points in time. Finally, the correspondence between a verbal report and a witnessed event would probably need to be evaluated quite differently from, say, the correspondence between a perceived object and its pictorial rendition from memory. Cohen contends that such characteristics may pose insurmountable problems in comparing accuracy across different tasks and domains and in generalizing across situations and individuals. Furthermore, she believes that these problems in turn limit the possibility of constructing a general theoretical framework that can encompass the various aspects of memory in everyday life.

We agree that the assessment of memory correspondence can be very complex (see, e.g., Koriat & Goldsmith 1996t, sect. 4; Koriat & Goldsmith 1996r, sect. R3), but we disagree that the problems are intractable. First, it is a legitimate research strategy to identify different types or senses of memory accuracy and study them independently. Thus, for instance, in our own research (Koriat & Goldsmith 1994; 1996) we focused on memory accuracy in the sense of the (output-bound) *dependability* of the memory report in an item-based assessment context. Although the theoretical framework that we proposed (Koriat & Goldsmith 1996) is not task- or situation-specific, it is tied to this particular property of memory performance. We are now working toward an extension of this framework that takes into account the "grain size" or level of generality of the memory report as well (see Goldsmith & Koriat, in press). Of course a great deal of past and present work has focused on various kinds of distortions and biases in episodic, semantic, and spatial memories, as well as on false memories, confabulations, and so forth. It would be rather unfair to maintain that such research is of no value because it is limited to a particular domain or property of memory performance. Indeed, we should point out that the "general principles" and "general models" of memory that have been derived from traditional quantity-oriented research are "general" only insofar as it has been overlooked that memory quantity is but one of many potential properties of memory performance.

Second, if a more general, all-encompassing theory of memory is to be achieved, it will not be by ignoring those aspects of memory that are deemed too complex or multifarious to be evaluated. The best approach would seem to be to develop methodologies that can handle the various aspects of memory correspondence in their respective tasks, domains, and contexts first, and then to attempt to integrate the findings into a broader framework. Although we are undoubtedly still quite far from such a goal, this would appear to be the challenge for the future not only for correspondence-oriented memory research, but for the entire field of memory research.

R2. The correspondence-storehouse distinction is metatheoretical – not substantive

In his commentary on our target article (Koriat & Goldsmith 1996t), **Shanon** asserts that: (1) the distinction between the correspondence and storehouse metaphors of memory is methodological rather than substantive, (2) both metaphors necessarily entail a representational model of memory, and (3) whereas methodological pluralism is acceptable, pluralism in the conceptualization of memory is not. We disagree with all three of these points.

First, Shanon contends that although the correspondence and storehouse metaphors lead to methodologically distinct research programs, there are no "substantive" differences between the two, inasmuch as both presuppose a common, "representationalist" view of memory. In our analysis (Koriat & Goldsmith 1996t), we distinguished between the metatheoretical, theoretical, and methodological levels. We placed the contrast between the correspondence and storehouse metaphors at the metatheoretical level. As such, it is neither substantive nor methodological. Indeed, neither metaphor makes substantive claims about reality (Koriat & Goldsmith 1996t). Instead, each metaphor is a "cognitive vehicle" that offers a different way of *thinking* about memory which cannot be

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judged as being right or wrong (see also, Koriat & Goldsmith 1996r).

As pretheoretical conceptual tools, however, memory metaphors play a pivotal role in leading the researcher both to substantive assertions about memory, and to particular ways of studying memory (see Koriat & Goldsmith 1996t, Fig. 4). Perhaps, then, Shanon is claiming that by embodying the representationalist view, the storehouse and correspondence metaphors must engender substantively equivalent memory theories. Clearly, however, the representationalist view can breed a diverse array of models and theories that make divergent substantive claims, as even a cursory examination of the "representationalist" memory literature would confirm. In the target article, for example, we showed that as opposed to the quantity-oriented theories inspired by the storehouse metaphor, the correspondence metaphor naturally leads to a greater concern with the determinants of memory accuracy and distortion, such as metacognitive regulatory processes and functional variables (see also Goldsmith & Koriat, in press; Koriat & Goldsmith 1996). In contrast, Shanon's argument might be taken to imply that no important substantive issues remain once a representationalist view is adopted.

Second, we deny that the correspondence metaphor is inherently tied to a representationalist view of memory. Although the correspondence conception does imply that the *products* of memory (i.e., memory reports) should be treated as descriptions or representations of the past, it is indifferent to the manner in which those products are arrived at. In section 3 of the target article we point out that not only is the correspondence metaphor compatible with the view of memory as a reconstruction (Bartlett 1932) or attribution (Jacoby et al. 1989) process that is (perhaps) based on stored information (rather than a retrieval process; another "substantive" issue within the representationalist domain), but it also allows for more "direct" views of memory as well. Thus, several of the works mentioned by Shanon in support of the direct view of memory (e.g., Bransford et al. 1977; Gibson 1979; Watkins 1990) were referred to by us in our discussion of the potential compatibility between the correspondence metaphor and the functional (e.g., Bahrick 1987; Bruce 1991; Jacoby 1988; Neisser 1986; 1988), nonmediational (e.g., Watkins 1990), and proceduralistic (e.g., Crowder 1993; Kolers & Roediger 1984; Lockhart & Craik 1990) approaches to memory. These approaches share with the correspondence metaphor a treatment of memory as more like the "perception of the past" (see sect. 2.2 of the target article) than the recovery of stored information.

Finally, we disagree with **Shanon**'s assertion that "the conceptualization of the mind in general and of memory in particular, does not admit pluralism. Either memory is stored information, represented in the mind, or it is not." This assertion (as well as the assertion that the representationalist view is "wrong") misses the point that, like the storehouse and correspondence metaphors, both the "representationalist" and the "direct" views of memory are *metatheoretical* positions. As we argued earlier, such positions are best treated as offering alternative sets of conceptual tools (see also Koriat & Goldsmith 1996t, sect. 6), rather than as competing theories that make substantive, ontological claims. Indeed, how does one decide between the representationalist and direct views, or between the storehouse and correspondence metaphors? Not by making direct empirical tests as we do with theories. Rather, one tends to choose the position that is more compatible with one's own philosophical and personal inclinations, the one that is more elegant, the one that is more productive in generating testable theories, and of course, the one that leads to theories that are supported by empirical data.

Let us then not confuse ontological with epistemological issues. Our position is epistemological: we reiterate our belief that there is no single conception that can succeed in capturing the "true" state of affairs with regard to as complex a set of phenomena as human memory (see also, Koriat & Goldsmith 1996c, sect. R7; Koriat & Goldsmith 1997). Instead, different conceptions have their advantages. For example, it might be useful for some purposes to conceive of memory as the retrieval of stored information, whereas for other purposes it might be more useful to conceive of it as an "activity" (e.g., Alterman 1996; Karn & Zelinsky 1996; Neisser 1996) or as an achieved correspondence.

In sum, although we applaud the efforts of those who would bring the traditional representationalist view of memory under critical scrutiny and attempt to exploit alternative conceptions, we do so in keeping with our conviction in the need for metaphorical pluralism – at the metatheoretical level.

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