

Why is Survey Research 20 Years Behind?

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Abstract

The principal goal of this paper is to argue the presupposition of its title. More specifically, the claim is that survey research has fallen approximately 20 years behind developments in relevant basic science. The paper limits its scope to a single but broad topic, research on memory. A timeline is offered to establish both parts of the claim, namely (1) a qualitative claim that survey research overlooks important basic findings in memory, and (2) a quantitative claim that the gap is approximately 20 years. The timeline comprises papers and books chosen to illustrate advances in the basic science or implications of memory research for other areas of psychology and behavioral science generally. The paper offers a few examples of key issues in survey research where the effect of the 20-year gap is evident. The discussion section suggests a few answers to the *why* question of the title.

Key Words: cognitive psychology, cognitive interviewing, behavioral science, epistemic rationality, Acquired Soft Science Aversion Disorder

1. Introduction

This paper reflects on the status of survey research as part of the larger scientific community. The general question has attracted my interest for several years. Over a decade ago, I gave an informal talk to my colleagues at the U.S. Census Bureau entitled “A Few Answers to the Question, ‘If I Were a Real Scientist, What Would I Do Next?’ – Draft 1.” A later talk in 2004 in the same setting was entitled “The Seven Communication Standards of Highly Successful Scientific Disciplines.” In 2005, I voiced some of my general concern in “General Discussion: Play Acting at Science?” at a conference on total survey error, in which I raised broader scientific issues triggered by the presentation I was assigned to discuss. Some of my ideas reappeared at a roundtable discussion on “From Soft to Hard Science: Will Survey Research Make the Transition?” at the 2007 Joint Statistical Meetings. On numerous occasions, I have attempted to engage tolerant friends and colleagues in conversation on this general theme. But this paper is the first attempt at a written expression of my general observations on this topic.

Seemingly, survey research maintains close connections to cognitive science. Since the late 1980s, the term *cognitive* enjoys frequent use in survey research, and the term *cognitive interviewing* applies to a recognized set of procedures largely but not exclusively used to refine survey questions, often taking place in *cognitive laboratories*. Clear intellectual ties are implied to the basic sciences of cognitive psychology, a discipline within psychology, and to cognitive science, a collaboration of several disciplines. (In defining the scope of cognitive science, researchers often list the

disciplines psychology, philosophy, linguistics, anthropology, computer science, and neuroscience, but they also occasionally include other disciplines. For example, the Wikipedia entry on 3 May 2009 added sociology and biology.) Yet, the question may be asked whether the shared understanding within survey research community of either cognitive psychology or cognitive science is relatively current with developments in these fields of basic science, or whether instead it is considerably dated.

The intent of the title of this paper is to suggest the latter generalization: *The apparent understanding of cognitive psychology and cognitive science within survey research is more consistent with the state of research approximately two decades ago rather than with recent developments.* But the paper will only take up the challenge of supporting this claim on the basis of one broad research thread, research on memory, rather than the full scope of the cognitive sciences. The paper and timeline will also attempt to argue the relevance of this claim, that is, that the most recent two decades of research on memory have helped to reshape cognitive psychology and its applications over this period, and that many of these findings would carry important implications for survey research if integrated into the discipline.

Like cognitive science generally, memory research spans a number of disciplines, particularly biology, neuroscience, and psychology. Even within psychology, some memory researchers identify themselves primarily as social psychologists or developmental psychologists rather than as cognitive psychologists. The early intellectual history of memory research stood somewhat apart from cognitive science but is now more closely intertwined with it.

The restriction of scope of the claim to research on memory rather than cognitive science as a whole simplifies the argument somewhat. But the restriction still leaves the task of supporting the claim quite challenging. The claim can be unpacked as three important subclaims:

1. that research on memory has achieved a significant body of findings;
2. that the results show potential promise for understanding aspects of the limitations of survey research and the potential for improving it; and
3. that the survey research community appears largely unaware of most of these developments.

The paper adopts the strategy of focusing primarily on the first subclaim, suggesting a few examples to support the second, and indirectly implying the third. In particular, no individual researchers within survey research will be singled out to illustrate the third subclaim. To the extent possible, I hope to give the discipline a friendly nudge rather than spur a heated debate.

The three subclaims will be supported by a planned timeline. The next section describes the methods to construct the timeline, both its current version and plans for its further development. The results section summarizes a few of the 130 works listed in the current version of the timeline. The books and articles illustrate the growth of the underlying science and its impact on other areas in psychology and science generally. All of the elements have been selected based on a positive assessment of their influence or importance. The intention is that the timeline, as it is completed, will encourage others to investigate the current status of basic science in these areas.

Finally, the discussion section sets the effort reflected in constructing the timeline in a much broader context. I have an independent interest in the emergence and function of

modern scientific discourse, and research on memory appears invaluable in this research. The section draws a distinction between *soft science* and *hard science* on the basis of differences in discourse, and it then characterizes *Acquired Soft Science Aversion Disorder* as a possible affliction affecting some of those exposed to both scientific worlds. The section suggests some areas of survey research where a deeper understanding of basic science could offer new perspectives. Finally, it proposes a few answers to the *why* question of the title.

2. Methods

The timeline is a work in progress, but the ultimate objective is to produce a chronologically ordered annotated list of works. Version 1 of the timeline exists as a final list of 130 works, but the process of annotation has not yet begun. This section describes the methods for assembling the list, the intention of the annotations, and plans for further development.

2.1 The List

Leading up to the turn of the century, the Millenium Project of the Center for Cognitive Sciences at the University of Minnesota invited nominations to identify the “top 100 works of cognitive science from the 20th century,” as measured by their influence. The results are posted at

http://www.cogsci.umn.edu/OLD/calendar/past_events/millennium/home.html

The timeline includes 42 works from this list selected on the basis of direct or indirect connection with memory research. The selected references include a few before the cognitive revolution (dated by George Miller and others as beginning in 1956) and extend to 1990. The period, particularly before 1980, is primarily represented by works that are widely recognized as having advanced cognitive psychology, even though they are now regarded as largely dated. The list includes one textbook, Neisser’s (1967) *Cognitive Psychology*.

The balance of the timeline, 88 additional references primarily covering the 1980s through 2009, was selected by the author. These works are intended to illustrate both the continued growth in the basic science of memory research and its influence. The recent work includes review articles that summarize research on specific topics. The list also includes two textbooks, one in cognitive psychology cited here, Smith and Kosslyn (2007), and one in social psychology. Two books by the science writer Malcolm Gladwell also appear, because several of the findings he describes for the reading public can be traced back to advances in memory research.

Particular emphasis was placed on the work of two memory researchers:

- Daniel Schacter, and
- Endel Tulving.

The diffusion of results from memory research into related areas of psychology and neuroscience is illustrated by emphasis on the work of six other scientists, knowledgeable but not known specifically as memory researchers:

- Antonio Damasio,
- Philip Johnson-Laird,

- Daniel Kahneman,
- Stephen Kosslyn,
- Steven Pinker, and
- Keith Stanovich.

All have written or edited books that can be read without extensive technical background. Both Kosslyn and Pinker are particularly of interest as generalists, although each is also known for original research. Johnson-Laird, Kahneman, and Stanovich have studied reasoning and judgment, a psychological field that should, in principle, be of some interest to statisticians. Damasio, a neuroscientist, is one of many who have influenced cognitive psychology.

The list evidences a preference for work appearing in *Science* (published by the American Association for the Advancement of Science) and journals published by the Association for Psychological Science, where articles from two of their four journals, *Perspectives on Psychological Science* and *Psychological Science in the Public Interest*, make the list. The list is thus influenced by personal convenience but, I claim, reflects the same growth in basic science as frequent readers of *Nature* or many other journals are able to observe.

2.2 The Annotations

In its current state, the list is largely unhelpful except to make the point that the relevant literature is quite large. Indeed, the actual literature on memory and its impact is orders of magnitude larger, and it seems safe to say that no one scientist can keep up with it all. From the beginning of this project, the author has planned to annotate the list completely, although the effort to complete this will extend into 2010.

For work that I have not read, the annotations will include published abstracts, if available, and summaries derived primarily from other works in the timeline. With only a handful of exceptions, the remaining works will be summarized from notes taken during my reading of them. I will identify works that I consider entry-level; for example, Pinker (1994) is widely regarded as a highly readable book. Influence will be measured informally by citations reported by scholar.google.com.

The process of annotation has been delayed to take advantage of two works that serve as general reference points in the timeline. In publishing the paperback addition to his 1985 book, Gardner (1987) added a concluding “Epilogue to the Paperback Edition. Cognitive Science After 1984.” The epilogue reports on changes in direction in the mid 1980s. Smith and Kosslyn (2007) and their several contributors survey cognitive psychology up to about 2004. Comparison of this textbook to Gardner (1987) suggests how much cognitive psychology and its relationship to the other disciplines comprising cognitive science has changed over the 20-year period.

2.3 Plans for Development

Version 1 of the timeline will be final when it is completely annotated, but the overall task will be divided into subgoals. First, I intend to annotate the work reviewed in the next section, and to complete this subgoal before the end of 2009. Both Gardner (1987) and Smith and Kosslyn (2007) merit multi-page annotations in the timeline and will serve as key reference points for other annotations. When I finish Chapter 5 of Smith and Kosslyn (2007), “Encoding and Retrieval from Long-Term Memory,” I will begin the process of annotating work related to long-term memory. Reading of the remaining chapters of the textbook and annotating the selected work in the cited list can then

proceed concurrently. In my initial plans for this effort, I did not intend to rely on Smith and Kosslyn (2007) so heavily, but I now regard it as an important check that I have not missed important forests in the process of describing major trees. Other extended works, including Schacter (1996, 2001), will also merit multi-page annotations. The annotated list will soon become unpublishably long, except as an electronic document.

A second subgoal to complete Version 1 will be to annotate the remaining works I have read, roughly half the total. If I have not already done so by then, I will convert the entire timeline to html format, to allow for complex linking and searching.

As a final subgoal, I will annotate the remaining work, noting that I have not read it. Instead, I will cite sources for my summary, most of which will be other works in the timeline. I am unlikely to read books written before 1980, for example, but there findings are often summarized by more recent work. Although it may seem unusual to provide annotations for work I have not read, the annotations will mimic the state of knowledge that many research psychologists (except specialists in memory) have of this or any literature outside of their area of specialization.

The list of 130 works for Version 1 is final, but I might begin to collect work to be included in a Version 2. (I can already think of new additions.) With Version 2, the timeline may have finished serving its intended purposes. Possibly, the timeline could be opened to community development from that point if there is interest in doing so.

3. Results

Gardner (1987) has proven to be a key reference. The work is often cited for its impressive intellectual history of the discipline. *But to state the obvious, it is now more than 20 years behind.* The original edition was published in 1985, making most of the book current to about 1984. The short prologue at the end of the paperback edition notes in a few pages developing shifts in perspective. The original book traces the importance of the digital computer as a key analogy aiding the beginning of the cognitive revolution, yet it also identifies a computational paradox: As careful psychological research was pursued, Gardner observed that the mind and brain seemed progressively less well modeled by the modern computer. He also treated neuroscience as the most remotely related of the six disciplines he surveyed. The 1987 Prologue identifies key developments during this period that anticipate an increased interest in how the brain achieves mind, foreshadowing an increased shift of attention to neuroscience.

Gardner discusses at considerable length Bartlett's (1932) classic work on memory, which generally remains cited with respect by modern texts on memory and stands out as an exception in an era dominated by behaviorism. He also describes in detail Lashley's (1951) paper that was among the influences leading to the cognitive revolution, Miller's (1956) famous paper on the magical number seven, the impact of Chomsky's (1959) review on marking the beginning of the end of behaviorism, and the influence of Neisser's (1967) textbook. In hindsight, however, Gardner's book did not fully recognize important developments in memory research—including Scoville and Milner (1957) and Baddeley and Hitch (1974)—that are now regarded as classics.

The importance of a complete reading of Smith and Kosslyn (2007) has only recently become clear me. The book is an obvious answer to the question “What can advanced

undergraduates in psychology be expected to learn about cognitive psychology?” In this 12-chapter text, chapters 4-6 on “Representation and Knowledge in Long-Term Memory,” “Encoding and Retrieval from Long-Term Memory,” and “Working Memory” are all central topics in memory research. The chapters have titles familiar to survey researchers, yet their content may be considerably different from current understanding of these subjects. Chapters 7 on “Executive Processes” and 8 on “Emotion and Cognition” cover related topics that are also included on the complete timeline.

The selected references include working memory (Baddeley and Hitch, 1974; Baddeley 1986, 2006; and Cowan 2000), long-term memory (Scoville and Milner 1957, Schacter 1996, 1999, and 2001; Rubin, 2006) and the *Oxford Handbook of Memory* (Craik and Tulving, 2000). Kihlstrom (1987) summarizes the impact of pathbreaking work identifying implicit memory, in part through the collaboration of Tulving and Schacter (references in the complete timeline), and the discovery of implicit memory has in turn influenced many areas of psychology. Kihlstrom’s (1987) review in *Science* illustrates the beginning of this impact on other areas. An understanding of implicit memory provides a foundation for understanding the largely unconscious knowledge of syntax by native speakers of natural human languages (Pinker 1992).

Kosslyn and Koenig (1992) argued for the potential of cognitive neuroscience, a development already considerably advanced beyond the state of the science Gardner (1987) described. Smith and Kosslyn (2007) summarize the scope of cognitive psychology through a cognitive neuroscience perspective, and this approach represents a likely model for many future textbooks.

Much of the recent work cited in the full timeline illustrates the developing connections of memory research with other aspects of cognitive psychology, particularly the study of reasoning and decision making. The timeline also identifies ties to other areas of psychology, particularly social psychology and clinical psychology. Applications include long-standing work on interviewing witnesses to crime and newer work on education.

4. Discussion

The last paragraph of the introduction outlined the discussion. First, the topic of scientific discourse will be introduced, including connections I will suggest related to memory. I will then provide a few examples of where findings from research on memory might help to reshape survey research. Finally, I will return to the *why* question of the title.

4.1 Scientific Discourse and Memory

The timeline is a work in progress. My motivation for this paper stems from my attempt to attract colleagues to this body of developing research. But my primary motivation to study memory originates from my interest in the development and characteristics of scientific discourse. Often regarded as obscure to the uninitiated, good scientific discourse appears well designed for its multiple purposes. I continue to research an unwritten book entitled, provisionally, *The Seven Communication Standards of Highly Successful Scientific Disciplines*. Researchers in the physical sciences and biology routinely follow the same general principles in publishing their original research or writing technical summaries. So do many researchers in psychology, and as does the

original research in the timeline generally. Yet, in some social science disciplines it is too easy to encounter work that does not meet these standards.

If modern natural scientists and biologists reliably use standards of scientific discourse in publishing original research, why is this not universal in the social sciences? Although many people, including scientists, sometimes informally distinguish between *soft science* and *hard science*, there is no standard definition. I propose to distinguish individual papers, scientists, and disciplines according to the degree of adherence to modern scientific discourse. There are now several good textbooks on *how* to write scientifically (for the hard sciences), but I am still attempting to argue *why* every scientific discipline should aspire to write this way. In short, I am trying to argue that hard sciences write essentially the same way *because it is the best way*. I view good scientific writing as a concrete example of what Stanovich and others have studied as *epistemic rationality*, through its support of knowledge building and assessment. Some of my working hypotheses to account for scientific writing arise from or relate to properties of human memory. Thus, I am motivated to continue searching the memory literature.

My thinking about scientific writing for an extended period of time has induced, I believe, *Acquired Soft Science Aversion Disorder*, (ASSAD). I am attempting to introduce this term, in partial jest, into the scientific literature. I include in this “disorder” a heightened sensitivity to (1) weak or unclear arguments and (2) the failure in written arguments to clearly distinguish between belief and evidence-based knowledge. Elaboration of this idea will require separate development, but I mention it here to partially account for my motivation to study the memory literature.

4.2 Implications for Survey Research

Survey response depends on memory; yet not every survey question requires the most recent research on memory for its interpretation. Memory research is not necessarily the single most important aspect of basic science that survey research could call upon. But some survey questions clearly tax the limits of memory. The potential benefits of framing problems of recall in terms of current research on memory would seem self-evident.

I have devoted a considerable fraction of my career to attempting to measure the accuracy of the U.S. decennial population censuses. For several decades, the U.S. approach is highly dependent on respondents’ memory, yet virtually no systematic effort has been made to draw on this body of memory research. Simultaneously, there has been a general absence of high quality scientific writing on the subject. I can point to this experience as in large part responsible for my own case of ASSAD.

Survey researchers have made generalizations about memory errors, including telescoping, but the generalizations are not often evaluated relative to current findings from basic research. The discipline could shift perspective by framing some aspects of survey research as research questions in psychology rather than as unique findings from a separate discipline.

The use of cognitive interviewing in its various forms has on balance been productive for survey research; yet, its considerable limitations are too infrequently acknowledged. Cognitive psychology has occasionally used the same methods as found in “cognitive interviewing” in the sense survey researchers have used it, but in a circumscribed manner and often in conjunction with other methods. As one example, “cognitive interviewing”

is an almost completely ineffective method to provide a scientific answer to most questions involving memory. By heavily relying on this set of methods, survey research risks a distorted impression of the current scope and methods of cognitive psychology.

As I final example, item nonresponse occurs for a variety of reasons, but errors in memory may be a factor in some instances. I future goal for the discipline would be a more fine-grained approach to understanding the multiple causes of item nonresponse, with memory problems as one of them.

The preceding examples merely sketch what changes could occur in survey research. Once the timeline is adequately annotated, more detailed explanations could be developed based on it.

4.3 Why 20 Years?

In general, scientific disciplines, even in the hard sciences, are not continuously aware of relevant developments in other disciplines, particularly when there has been limited previous contact. During the 1980s, the survey research community “discovered” cognitive psychology. Yet there may have been too few resources, too little support, and too little opportunities for collaboration for survey research to keep up in general. Because of limited funding potential from survey research and limited reliance on the findings from surveys, few academic cognitive psychologists appear to maintain any active interest in survey research.

By my observation, in survey research the statistician who attempts to read the survey methodology literature in depth is the exception rather than the rule. Gardner (1987, p. 391) used the term *borderland discipline* to characterize new disciplines emerging from close collaboration of two or more disciplines, illustrating the concept with physical chemistry and biochemistry. (The more frequently used term is *border discipline*.) As an example closer to home, epidemiology combines methods and findings from medicine, statistics, and social science. There does yet appear to be a border discipline between the statistical and psychological professions, in spite of psychologists’ interest in human reasoning and decision making and the stated goals of statistics. For the most part, psychologists have generally recruited their own specialists in statistics and mathematical modeling.

Thus, it has fallen to a relatively small number of “survey methodologists” to try to bridge connections between survey research and the social sciences generally and psychology in particular. The number of researchers to serve this function appears quite small.

Thus, to provide a short answer to the question of the title, survey research is 20 years behind because it would have been hard for this not to happen. But I will hold out the possibility that the discipline benefit from a self-reassessment and perhaps close the gap.

Readers interested in an electronic copy of the timeline can contact me at my personal email, bofay@hotmail.com.

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