

# The Mind's Self-Portrait

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**ABSTRACT:** Scientific psychology and neuroscience are taking increasingly precise and comprehensive pictures of the human mind, both in its physical architecture and its functional processes. Meanwhile, each human mind has an abbreviated view of itself, a self-portrait that captures how it *thinks* it operates, and that therefore has been remarkably influential. The mind's self-portrait has as a central feature the idea that thoughts cause actions, and that the self is thus an origin of the body's actions. This self-portrait is reached through a process of inference of *apparent mental causation*, and it gives rise to the experience that we are consciously willing what we do. Evidence from several sources suggests that this self-portrait may often be a humble and misleading caricature of the mind's operation—but one that underlies the feeling of authorship and the acceptance of responsibility for action.

**KEYWORDS:** consciousness; mental causation; self-insight; volition

Minds are marvelous to look at from the inside. In addition to all the things we can see that seem to be *out there*—all the sights and sounds and feels and the like—our minds also afford us views of *themselves*. Gilbert Ryle (1949) described minds as seeming almost *self-luminous*, as though they light themselves up from the inside. The view of their workings that we gain through our minds moment-to-moment provides a series of ideas that seems to lay out their operation in full detail. In a sense, our minds present us with their own theory of psychology—or perhaps something more akin to a set of laws. The mind's self-portrait appears as a complete picture of its own operation, something so simple and clear that we can't help but believe it. And the major feature of this self-portrait is the idea that we cause ourselves to behave.

Consider the classic case of lifting a finger. You think of lifting it and it goes up. You think of putting it down and it goes down. Up, Down, Up,

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Ann. N.Y. Acad. Sci. 1001: 1–14 (2003). © 2003 New York Academy of Sciences.  
doi: 10.1196/annals.1279.011

Down. This regularity is striking. Your thought seems to cause your action, and you get a distinct sense of authorship with each movement. The mind depicts to itself no other part of the process whereby the finger moves. The thought pops into consciousness, and the action too is consciously observed, and that's *it*. All the machinery in the mind's basement that might be creating this conscious show—the *rest of the mind and brain*—remains unobserved. The mind's eye view of the causation of action creates a caricature, then, a simple conscious snapshot of what may be an immensely complicated set of processes involving multiple sites of brain activation and a welter of unconscious cognitive processes—a mechanism that could only be discovered in full detail with an infinite supply of government grant money. The mind simplifies itself.

As a rule, these are fighting words, pointed barbs against free will in the perennial battle between free-willers and determinists. Free-willers are students of mind who are entirely taken by the mind's self-portrait, and who have championed ideas of free will, self-determination, human agency, and rational choice to say that thoughts regularly do cause actions. The mind's self-portrait is accepted at face value, and other accounts of human action are accepted only to the degree that they can be fit with this fundamental canon. By this view, there really is a self, an author of our actions who creates them by consciously willing them. On the other hand, there are also students of mind who say the mind's self-portrait is bad art, no more than a misleading "folk theory" whose main feature is an impossible homunculus. This is the refrain of classically deterministic psychological theorists such as Freud and Skinner, of course, and more recently it is the assumption embraced by most sciences of the mind. The theme comes up often enough nowadays that Tom Wolfe titled an article on contemporary neuroscience "Sorry, but Your Soul Just Died."

The absurdity of all this, of course, is that the soul cannot die. As long as we have minds that keep presenting their self-portrait to us with every passing moment, we will continue to be convinced of the importance of our conscious will and will continue to feel we have selves no matter how much science piles up evidence for selfless mechanisms underlying our actions. Because the idea that minds are mechanisms will always suffer by comparison to the mind's self-portrait, it could be deeply useful to study how this portrait arises. How do we come to think that we have conscious will? How exactly does this portrait get painted every few moments every day of our waking lives? The challenge suggested by this analysis is to understand the mechanisms of mind responsible for the way mind appears to itself.

This paper begins with a *précis* of the theory of *apparent mental causation*, a set of ideas designed to account for the human experience of conscious will. The central notion is that people experience conscious will to the degree they can infer that their thought caused their action. Because this theory is detailed elsewhere (Wegner, 2002; Wegner & Wheatley, 1999), this paper only begins

with it, and then goes on to comment on the mind's self-portrait as it relates to the problem of self-insight. Why, in particular, would the mind's self-portrait be so limited? The first problem of insight is why we don't see the big picture. The second problem of self-insight is why the mind's self-portrait takes this particular form: Why is it useful for us to think that we have selves that cause our actions? In what follows, then, we consider how the mind reaches the intuition that it is an author, and then the implications of this system for understanding human self-insight more generally.

### APPARENT MENTAL CAUSATION

The basic idea of the theory of apparent mental causation is that conscious intention and action are caused by unperceived forces: You think of lifting that finger and then lift that finger—not because conscious thinking causes doing, but because other forces of mind and brain (that are not consciously perceived) cause both the thinking and the doing. On the basis of your conscious perceptions of your thoughts and actions, after all, it is impossible to tell in any given case whether your thought was causing your action, or something else was causing both of them. The deep intuition we all have about the power of our conscious will arises because thought and act are the only recognizable objects in our mind's self-portrait. We experience consciously willing our actions, then, when our minds lead us to make a further brushstroke on the canvas: We *infer* that our thought causes our action.

How do we go about drawing this causal inference? Imagine, for instance, the action of taking a drink from a glass. This is something that sometimes can feel quite willful, and at other times can feel absent-mindedly automatic. If you have just thought about drinking and then do so, it may feel more willful—whereas if you have been thinking about having a cookie and then suddenly find yourself drinking instead, it is likely to feel less willed. Furthermore, the thought of drinking must occur just prior to the action to maximize the experience of will, as thoughts that occur far beforehand (and that then are forgotten until the action), or thoughts of the drink that only appear after you've had the drink, do not seem to prompt a sense of willed drinking. And if someone else puts the glass in your hand and pushes it toward your mouth, you may discount the causal role of any prior thought and again feel the act is unwilled. These simple observations point to three key sources of the experience of conscious will—the *consistency*, *priority*, and *exclusivity* of the thought about the action. For the perception of apparent mental causation, the thought should be consistent with the action, occur just before the action, and not be accompanied by other potential causes.

Studies of how people perceive external physical events (Michotte, 1963) indicate that the perception of causality is highly dependent on these features

of the relationship between the potential cause and potential effect. The candidate for the role of cause must yield movement that is consistent with its own movement, must come first or at least at the same time as the effect, and must be unaccompanied by rival causal events. The absence of any of these conditions undermines the perception that causation has occurred (Einhorn & Hogarth, 1986; Kelley, 1972, 1980; McClure, 1998).

### *Consistency*

Consider the consistency principle first. The idea here is that for a thought occurring before action to be perceived as the cause of the action (and so prompt an experience of conscious will), the thought must be semantically linked to the action. A thought about changing the TV channel followed by the press of a button on the remote, for instance, will feel willed, whereas a thought about world peace followed by sitting down on the remote and having the channel change will not yield the same experience. The role of consistency is evident in Penfield's (1975) study of movements induced through electrical stimulation of the motor cortex. Conscious patients were prompted by stimulation of the exposed brain to produce movements that were not simple reflexes and instead appeared complex, multi-staged, and voluntary. Their actions looked nothing like simple shock-induced spasms, but like actions done on purpose. Yet, their common report of the experience was that they did not "do" the action, and instead felt that Penfield had "pulled it out" of them. Without thoughts consistent with the action, they experienced the action as an unwilled occurrence.

As another example of consistency, consider what happens when people with schizophrenia experience "hearing voices." Although there is good evidence that these voices are self-produced, the typical response to such auditory hallucinations is the report that the voice belongs to someone else. The inconsistency of the utterance with the person's prior thoughts leads to the inference that the utterance was not consciously willed—and so to the delusion that there are others' voices speaking "in one's head" (Daprati et al., 1997; Frith & Done, 1989; Graham & Stephens, 1994; Hoffmann, 1986). Ordinarily, we know our actions and verbalizations in advance of their performance, at least in rough form, and we experience the authorship of action because of the consistency of this preview with the action.

A laboratory test of the consistency principle examined whether people will accept authorship of actions merely because they have had thoughts consistent with those actions (Gibson & Wegner, 2003). For this study, participants were asked to type letters randomly at a computer keyboard without seeing the screen. They were told that the experiment was designed to examine "automatic typing" and that their random responses would be analyzed. Just before this task, participants were exposed 5 times to the prime word

*deer* in what they were told was an unrelated computer task. Then the “automatic typing” began and participants typed for 5 minutes. The experimenter ostensibly ran a program on the typed text to extract the words that had been typed, and then asked participants to rate each of a series of words to indicate the degree to which they felt they had authored that word. None of the words rated were actually produced. Participants reported higher authorship ratings for the word they had seen in the prior computer task (*deer*) relative to other words, and also reported relatively higher ratings that they had authored an associated word, *doe*. These findings suggest that people can experience will for an action that was never performed, merely when they have prior thoughts consistent with the action.

### *Priority*

The priority principle influences apparent mental causation when consistent thoughts appear at varying times around the action. Priority supports inferences of conscious will when the thought appears in a timely way just before the action, and departures from immediate priority lead to experiences of involuntariness. In a study of this principle, Wegner and Wheatley (1999) presented people with thoughts (e.g., a tape-recorded mention of the word *swan*) relevant to their action (moving an onscreen cursor to select a picture of a swan). The movement the participants performed was actually not their own, as they shared the computer mouse with an experimental confederate who gently forced the action without the participants' knowledge. Nevertheless, when the relevant thought was provided either 1 s or 5 s before the action, participants reported feeling that they acted intentionally in making the movement. The operation of the priority principle in this case was clear because on other trials, thoughts of the swan prompted 30 s before the forced action or 1 s afterward did not yield an inflated experience of will. It is worth noting, too, that on trials for which action was not forced, thoughts about actions that were provided to participants did not lead them actually to move toward the mentioned items. So, even when the action is forced and thought of the action is baldly prompted by an outside stimulus—appearing in this case over headphones—the timely occurrence of thought before action leads to an erroneous experience of apparent mental causation.

### *Exclusivity*

The exclusivity principle suggests that apparent mental causation is affected by the perception of alternative causes of action. When events other than one's own thoughts or agents other than oneself become known in the context of an action, their presence leads to the discounting of own thoughts as a cause, and thus undermines the experience of will. So, for example, hypnosis

leads people to perform actions that they attribute strongly to the hypnotist, and these actions are experienced as involuntary. Similarly, people who are not hypnotized but are merely obeying the instructions of another person may discount the influence of their own thoughts on the action and experience a lack of conscious will. Milgram (1974) commented on this phenomenon in his famous shock experiments, noting the occurrence of an “agentic shift” in which self loses the sense of authorship of the obedient actions.

Now as a rule, experiences of will are not undermined when alternative causes of action remain unperceived. If you don’t know what is causing your action, you continue to move along merrily thinking that you are driving the bus. So, for instance, people in one study were asked to choose to move one or the other index finger whenever they heard a click (Brasil-Neto, Pascual-Leone, Valls-Sol, Cohen, & Hallett, 1992). Transcranial magnetic stimulation (TMS) was applied alternately to the left or right motor strip to influence the movement. This stimulation led participants to have a marked preference to move the finger contralateral to the site stimulated, particularly at short response times. However, respondents reported consciously willing the movements during the TMS influence, indicating a lack of insight into the alternative causal mechanism producing their actions. The experience of conscious will in this study was not measured with precision, so it remains possible that slight adjustments to the experience occurred as a result of the unperceived stimulation.

Subconscious exposure to knowledge of outside sources of action does seem to influence conscious will in studies of the subliminal priming of agents (Dijksterhuis, Wegner, Aarts & Preston, 2003). Participants in these experiments were asked to react to letter strings on a computer screen by judging them to be words or not—and to do this as quickly as possible in a race with the computer. On each trial in this lexical decision task, the screen showing the letters went blank either when the person pressed the response button, or automatically at a short interval (about 400–650 ms) after the presentation. This made it unclear whether the person had answered correctly and turned off the display or whether the computer did it, and on each trial the person was asked to guess who did it. In addition, however, and without participants’ prior knowledge, the word “I” or “me” or some other word was very briefly presented on each trial. This presentation lasted only 17 ms, and was both preceded and followed by random letter masks—such that participants reported no awareness of these presentations.

The subliminal presentations influenced judgments of authorship. On trials with the subliminal priming of a first-person singular pronoun, participants more often judged that they had beaten the computer. They were influenced by the unconscious priming of self to attribute an ambiguous action to their own will. In another study, subliminal priming of the word “computer” reduced judgments of own agency. And in a third study, participants were subliminally primed on some trials with the thought of an agent that was not the

self—God. Among those participants who professed a personal belief in God, this prime reduced the causal attribution of the action to self. Apparently, the decision of whether self is the cause of an action is influenced by the unconscious accessibility of self versus nonself agents. This suggests that the exclusivity of conscious thought as a cause of action can be influenced even by the unconscious accessibility of possible agents outside the self.

Normally, the influence of outside forces on one's experience of will for an action occurs because of conscious belief in the presence of those forces. This occurs, for example, in the intriguing phenomenon of "facilitated communication" or FC. FC was introduced as a technique for helping autistic and other communication-impaired individuals to communicate without speaking. A "facilitator" would hold the client's finger above a letter board or keyboard, ostensibly to brace and support the client's pointing or key-pressing movements, but not to produce them. Clients who had never spoken in their lives were sometimes found to produce lengthy typed expressions this way, at a level of detail and grammatical precision that was miraculous. Studies of FC soon discovered, however, that when separate questions were addressed (over headphones) to the facilitator and the client, those heard only by the facilitator were the ones being answered. Facilitators commonly expressed no sense at all that they were producing the communications, and instead attributed the messages to their clients. Their strong belief that FC would work, along with the conviction that the client was indeed a competent agent whose communications merely needed to be facilitated, led to a breakdown in their experience of conscious will for their own actions (Wegner, Fuller & Sparrow, 2003). Without a perception that one's own thought is the exclusive cause of one's action, it is possible to lose authorship entirely and attribute it even to an unlikely outside agent.

The principles of consistency, priority, and exclusivity appear to govern the inferences people make about the mind's influence on action. Their operation can push the perception of authorship around quite independent of any actual causal relationship between thought and action. The self-portrait that the mind presents to us can sometimes be a very poor likeness, in other words—a portrayal built on information that happens to be accessible, and on some causal guesswork about what that information means. Although the experimental study of apparent mental causation is only in its inception, there exists a wide array of anomalous phenomena whose interpretation is rendered more tractable by the logic of apparent mental causation (Wegner, 2002).

## SELF-INSIGHT

Of all the different forms that the mind's self-portrait might take, why does it take this one? Imagine for a minute that we are building a robot and want it to know itself (McCarthy, 1995). Would we start immediately to build a

robot that would think it is *causing itself to behave*? In giving it this rather abbreviated and conceited view of itself, would we also then leave out the vast amounts of process information it might conceivably be wired up to access? Such a robot would not know the contents of most of its memory registers, the signals sent to its motor units, the status of its logic circuits, or most other things about its own operation—but it would know that it had moved its finger (presuming, of course, that it had a finger). Why would we want a robot, or for that matter a person, with such an understanding of its own mind?

### *Capacity Limitations*

One possibility is that this is simply all we can get. Perhaps self-insight takes mental resources that are normally devoted to other things. Whatever self-insight might arise from contemplating one's navel, after all, has never been highly compatible with effective action (unless that action specifically involves the navel) and contemplating the mental operations underlying thought and action may similarly not be the best use of the limited resource of mind. The greatest difficulty of achieving self-insight is, of course, doing this in any reasonable way *in parallel* with effective cognitive operations of other kinds (Ericsson & Simon, 1984; Nisbett & Wilson, 1977; Wilson, 2002). Thinking about the mind's operations may be difficult during the mind's operations because thinking about them is a secondary task that interferes with the operations themselves. As Ryle so keenly observed, the mind is far from self-luminous. It seems to require considerable focused candle-power merely to light up the main hall leading to its labyrinthine depths.

The problem of capacity limitation is not, by itself, insurmountable. Conceivably, if attempts at self-insight were undertaken often enough and the mental task requiring insight were simple enough, one might begin to assemble a more complete picture of the mind's operation (Ericsson & Simon, 1984). But there could still be a problem inherent in the simultaneity of these tasks that presents a further complication. Minsky (1968) and McDermott (2002) have pointed out that in simple artificially intelligent systems, there could be a logical limitation to self-knowledge. If a system is operating and has not yet finished its job, perfect self-knowledge of its operation (the relevant inputs, the processes operating on them, the resultant outputs) also contains information indicating what the system's operation will be. Self-insight into a mental operation, in other words, presumes that the mental operation is complete and is completely specified. Any mental operation that is to remain open to change cannot be open to full insight as it is ongoing. Self-insight seems to limit the flexibility of the mind's operations because it presumes their completion.

Self-insight may be limited to the experience of willing our own actions because we don't have the mental resources to see more than this, or because

the pursuit of insight is precluded by the unfinished nature of our mental activities. These ideas suggest that in building a robot mind or designing a human one, we may need to accept a shorthand version of self-insight. Rather than expecting to collect large amounts of information, we might better plan on getting only a relatively focused set of insights. The mind's self-portrait will have to be less a mural and more a doodle. Still, why would the doodle look the way it does? Why does it portray the self as an author?

### *Mind Perception*

Self-insight may also be shaped by processes involved in figuring out minds in general—not just our own. The perception of minds seems to require a set of special skills that go beyond the skills involved in perceiving the world of objects and events. Minds require an appreciation of goal-directedness, for example, which seems far less important for the perception of other things. Knowing what a mind believes is also helpful, as is knowing where a mind is attending, what it can remember, how it feels, and so on. A range of abilities may be required for appreciating that minds are even possible, let alone for apprehending the qualities of minds that might be relevant to their operation. Psychologists and philosophers of many stripes have contributed to the idea that people have “theories of mind” that are involved in the tasks of mind perception, and without the ability to use these theories such perception might be cumbersome or unattainable (Astington, 1993; Baron-Cohen, 1994; Dennett, 1987; Flavell, 1999; Hauser & Carey, 1998; Heider, 1958; Wellman, 1992).

The special skills that support the perception of other minds serve to constrain the range of causal forces we can perceive in our own minds. Because the general process of mind perception involves looking for the mind's goals and processing observed behavior in terms of those goals (Heider & Simmel, 1944), the application of this strategy in perceiving own mind tends to focus our attention on our own goals. The general tendency in mind perception to perceive behavior as resulting from prior mental states (such as desires or thoughts) likewise prompts us to apply this same causal template to the conscious evidences we perceive in our own minds. Perhaps the most general property of mind perception, however, is the tendency to perceive minds as origins of behavior. We see gods or spirits or people or animals behind many events in the world, ascribing these events to them as authors and often ending the analysis at that point (Guthrie, 1993). Without insisting on further insight into mechanism, we assign authorship to minds. It seems, then, that our proclivity for believing that we are agents who cause our actions is not a private conceit but an application of a general principle. We find origins of our actions in ourselves just as we find origins in faces in the clouds. The insight offered by the mind's self-portrait is, in this sense, largely a matter of perceiving oneself as the origin of one's actions.

It may even be that perceiving our own minds *as* minds cuts short any further analysis we might normally apply to systems we do not perceive as having minds. The assumption that a rock *wants* to fall, for example, might obviate any examination of the forces of gravity, friction, and the like that could aid in understanding its physically determined trajectory. The perception of our minds as minds brings in one set of tools of understanding, but suggests we entirely discard others (Carey, 1996). Our minds' self-portraits will not entertain them as objects, as cascades of events, or as mechanisms, even though they might appear to be just such items in the eyes of an outsider wearing a white coat.

### *Conscious Previews*

The logic we have examined to this point suggests that we might view our minds in a limited way, using a template we use for the perception of minds in general. We see ourselves as origins of our actions because this is a shorthand view that we often use to understand minds of all kinds. However, there is an important feature of the mind's inner world that dramatically enhances our inclination to understand our minds in this way: We are often the beneficiaries of a mental system that delivers previews of action to consciousness before the action occurs. Thinking about a finger movement just before the finger movement may not be the cause of the movement—but it is certainly an attention-getting attractor for any causal inferences the mind might be inclined to make. Intentions are private previews of action that invite the mind's standard self-portrait. Of course we are agents who cause our actions—we know them in advance!

Let us stop for a moment and reconnoiter. The theory of apparent mental causation turns the everyday notion of intention on its head, and it is useful to review what things look like from this new perspective. The theory says that people perceive that they are intending and understand behavior as intended or unintended—but that they do not really intend. Instead, conscious thoughts coming to mind prior to action are described in the theory as *previews* of action, ideas that surface into consciousness as the result of unconscious processes like those that create the action itself. The theory is mute on whether these thoughts actually cause action, as it treats only the perception of the thought/action relationship, not the true relationship. Conscious previews of action are fundamentally involved in how the mind portrays its operation to itself, however, and thus they deserve careful analysis. Previews pretty much nail shut the case for the mind's self-portrayer, as they seem to indicate that some part of the mind knew about the action all along, before it happened.

Why would previews of action come to mind so regularly before action if *not* to cause action? If conscious will is indeed the construction that the the-

ory of apparent mental causation suggests, we must wonder why thoughts that look and feel like intentions might have evolved in humans when they may not have the function of causing action. What good are epiphenomena? One way to account for previews is to suggest that they are deeply adaptive for people, both in a simple sense and in a more profound sense.

Previews are adaptive in a simple sense because they create a social signaling system—akin to turn signals on motor vehicles. Telling others which way we are going is not only useful in traffic, but can be lifesaving in a variety of circumstances. Reporting previews to others allows us to keep others out of our way, it often helps us to excuse our behavior, and it can invite others to join with us as well. These functions would be unavailable to a person who could not discern what he or she might do next, or to someone who was unable to report these self-predictions to others. In this simple sense, conscious previews could have evolved merely to allow us the luxury of bending our social world to our mind's imagined futures.

The more profound evolutionary story for conscious previews draws upon their usefulness in establishing personal experiences of will—and so in creating a deep sense of authorship. Conscious previews of action create feelings of conscious will when we find ourselves doing the actions we premeditated. These feelings would seem unlikely to arise if we did not experience previews of action. The experience of conscious will is valuable as a marker, a quasi-emotional experience that highlights the actions that feel as though they are our own, and this marker function is sufficiently important for human social life that it could well motivate the processes that produce previews.

Conscious will serves as a personal guide to authorship of action—an *authorship emotion*. The person who feels will for an action typically then feels responsibility for that action, and so will also be susceptible to moral emotions such as pride or guilt depending on the action's effects. Just as emotions of sadness or anxiety serve as "somatic markers" and draw the person's sustained attention toward evolutionarily relevant behaviors (Damasio, 1994), experiences of conscious will serve as feelings that anchor self-perceptions of authorship. Although a thought that previews an action may not have caused the action, the person's *perception* of a causal link is enough to activate the entire system of perceived personal causation that anchors the moral evaluation of self. Moral actions, in other words, need not to be traceable to a mind for the owner of that mind to experience moral emotions. All that is needed is the occurrence of previews, and the subsequent self-attribution of authorship that results when the person perceives them as causes of action. The mind's self-portrait leads the person to think of the self as an author of action—a certain *kind* of author, one who does good or bad things. This, in turn, creates opportunities for subsequent behavior. Thoughts and feelings about the self derive from memories of what one has done, and the determination of authorship is the basis for these memories.

## CONCLUSION

According to the theory of apparent mental causation, the feeling that we consciously will our actions is traceable to an inference we make from the match between our conscious thoughts and observed action. When a thought appears in consciousness just prior to an action, is consistent with the action, and is not accompanied by salient alternative causes of the action, we experience conscious will and ascribe authorship to ourselves for the action.

The mind's self-portrait thus features the sense of authorship. By arranging for a limited view of itself, by portraying itself as an agent that causes action, and by developing the capacity to preview actions in support of this system, the mind comes to discern its own actions and accumulate a sense of self. This sense of self accrues from estimates of the role of own thoughts in action, and is produced by the system that infers apparent mental causation. Far from a simple homunculus that "does things," then, the self can be understood as a system that arises from the experience of authorship, and is developed over time. We become selves by experiencing what we do, and this experience then informs the processes that determine what we will do next. The self, in this view, is not an agent, an origin of action—but instead is an accumulated structure of knowledge about *what this particular mind can do*.

## REFERENCES

- ASTINGTON, J.W. (1993). *The child's discovery of mind*. Cambridge, MA: Harvard University Press.
- BARON-COHEN, S. (1994). How to build a baby that can read minds: Cognitive mechanisms in mindreading. *Cahiers de Psychologie Cognitive*, 13(5), 513–552.
- BRASIL-NETO, J.P., PASCUAL-LEONE, A., VALLS-SOL, J., COHEN, L.G., & HALLETT, M. (1992). Focal transcranial magnetic stimulation and response bias in a forced-choice task. *Journal of Neurology, Neurosurgery, and Psychiatry*, 55, 964–966.
- CAREY, S. (1996). Cognitive domains as modes of thought. In D.R. Olson & N. Torrance (Eds.), *Modes of thought: Explorations in culture and cognition* (pp. 187–215). New York: Cambridge University Press.
- DAMASIO, A.R. (1994). *Descartes' error: Emotion, reason, and the human brain*. New York: Avon.
- DAPRATI, E., FRANCK, N., GEORGIEFF, N., PROUST, J., PACHERIE, E., DALERY, J. & JEANNEROD, M. (1997). Looking for the agent: An investigation into consciousness of action and self-consciousness in schizophrenic patients. *Cognition*, 65, 71–86.
- DENNETT, D.C. (1987). *The intentional stance*. Cambridge, MA: Bradford Books/The MIT Press.
- DIJKSTERHUIS, A., WEGNER, D. M., AARTS, H. & PRESTON, J. (2003). Unconscious priming of conscious will. Manuscript submitted for publication.

- EINHORN, H.J. & HOGARTH, R.M. (1986). Judging probable cause. *Psychological Bulletin*, 99, 3–19.
- ERICSSON, K.A. & SIMON, H.A. (1984). *Protocol analysis: Verbal reports as data*. Cambridge, MA: MIT Press.
- FLAVELL, J.H. (1999). Cognitive development: Children's knowledge of the mind. *Annual Review of Psychology*, 50, 21–45.
- FRITH, C.D. & DONE, D.J. (1989). Experiences of alien control in schizophrenia reflect a disorder in the central monitoring of action. *Psychological Medicine* 19, 359–363.
- GIBSON, L. & WEGNER, D.M. (2003). *Believing we've done what we were thinking: An illusion of authorship*. Paper presented at the Society for Personality and Social Psychology, Los Angeles, CA.
- GRAHAM, G. & STEPHENS, G.L. (1994). Mind and mine. In G. Graham & G.L. Stephens (Eds.), *Philosophical psychology* (pp. 91–109). Cambridge, MA: The MIT Press.
- GUTHRIE, S.E. (1993). *Faces in the clouds: A new theory of religion*. New York: Oxford University Press.
- HAUSER, M. & CAREY, S. (1998). Building a cognitive creature from a set of primitives: Evolutionary and developmental insights. In D.D. Cummins & C. Allen (Eds.), *The evolution of mind* (pp. 51–106). New York: Oxford University Press.
- HEIDER, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.
- HEIDER, F. & SIMMEL, M. (1944). An experimental study of apparent behavior. *American Journal of Psychology*, 57, 243–259.
- HOFFMANN, R.E. (1986). Verbal hallucinations and language production processes in schizophrenia. *Behavioral and Brain Sciences*, 9, 503–548.
- KELLEY, H.H. (1972). Causal schemata and the attribution process. In E. E. Jones, D.E. Kanouse, H.H. Kelley, R.E. Nisbett, S. Valins & B. Weiner (Eds.), *Attribution: Perceiving the causes of behavior* (pp. 151–174). Morristown, NJ: General Learning Press.
- KELLEY, H.H. (1980). Magic tricks: The management of causal attributions. In D. Gurlitz (Ed.), *Perspectives on attribution research and theory: The Bielefeld Symposium* (pp. 19–35). Cambridge, MA: Ballinger.
- MCCARTHY, J. (1995, July 15, 2002). *Making robots conscious of their mental states*. Retrieved September 22, 2002, from the World Wide Web: <http://www-formal.stanford.edu/jmc/consciousness/consciousness.html>
- MCCLURE, J. (1998). Discounting causes of behavior: Are two reasons better than one? *Journal of Personality & Social Psychology*, 74(1), 7–20.
- MCDERMOTT, D.V. (2002). *Mind and mechanism*. Cambridge, MA: MIT Press.
- MICHOTTE, A. (1963). *The perception of causality* (T. R. Miles & E. Miles, Trans.). New York: Basic Books.
- MILGRAM, S. (1974). *Obedience to authority*. New York: Harper & Row.
- MINSKY, M. (1968). Matter, mind, and models. In M. Minsky (Ed.), *Semantic information processing* (pp. 425–431). Cambridge, MA: MIT Press.
- NISBETT, R. E. & WILSON, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, 84, 231–259.
- PENFIELD, W. (1975). *The mystery of mind*. Princeton, NJ: Princeton University Press.
- WEGNER, D. M. (2002). *The illusion of conscious will*. Cambridge, MA: MIT Press.

- WEGNER, D.M., FULLER, V.A. & SPARROW, B. (2003). Clever hands: Uncontrolled intelligence in facilitated communication. *Journal of Personality and Social Psychology*, 85, 5–19.
- WEGNER, D.M. & WHEATLEY, T.P. (1999). Apparent mental causation: Sources of the experience of will. *American Psychologist*, 54, 480–492.
- WELLMAN, H.M. (1992). *The child's theory of mind*. Cambridge, MA: MIT Press.
- WILSON, T.D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious*. Cambridge, MA: Harvard University Press.