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## THE EVOLVING BEHAVIORIST/MENTALIST DISAGREEMENTS

### *LA EVOLUCIÓN DE LOS DESACUERDOS CONDUCTISTAS/ MENTALISTAS*

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#### **Abstract**

While introspective structural analyses of consciousness faded from psychological discourse, awareness and rationality within psychological interpretation were issues of contention throughout much of the 20th century. Behaviorist positions evolved, with neobehaviorism adhering to Watson's position and the Skinnerian system (behavior analysis as method; radical behaviorism as philosophy) providing alternatives. Mentalistic psychology evolved as well, with the "cognitive" label appearing after mid-century along with theoretical constructs modeled upon the digital computer. Debate raged over behaviorists' experiments on the reinforcement of verbal behavior: Behaviorists found no necessary role of awareness in this; cognitivists vociferously objected. Then in recent decades, with cognitivist's own experiments yielding data on nonconscious functioning, discussions of implicit (thus, nonconscious) processes — memory, attitudes, etc. — have become typical fare in the literature. Cognitivist interpretations of these phenomena show no recognition of their contradicting a major premise of past cognitivist critiques of behavioral work. Recently, the term, "behavioral" has been rather widely adopted — notably in behavioral economics, where assumptions of psychological rationality have been discredited, but with little recognition that core concepts originated within (or at least were anticipated by) behavior analysis. Thus, the behaviorist and cognitivist traditions remain distinct, albeit perhaps with less heated disagreement. The continuing separation may be attributable to constraints within the patterns of explanatory language that we all share.

*Keywords:* behaviorist theory, cognitivist theory, development, disagreements

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## Resumen

Mientras que el análisis introspectivo y estructural de la conciencia se desvaneció del discurso psicológico, la conciencia y la racionalidad como parte de la interpretación psicológica fueron aspectos de conflicto a través de gran parte del siglo 20. Las posturas conductistas evolucionaron, el neoconductismo se adhirió a la postura de Watson y el sistema Skinneriano (el análisis de la conducta como método con el conductismo radical como filosofía) proveyó alternativas. La psicología mentalista también evolucionó, con la etiqueta de “cognoscitiva”, la cual apareció después de la mitad del siglo junto con constructos teóricos que fueron modelados conforme a la computadora digital. El debate se propagó a los experimentos de los conductistas sobre el reforzamiento de la conducta verbal. Los conductistas no consideraron que la conciencia jugara un papel necesario en esto; los cognoscitivos se opusieron tajantemente. Luego, en décadas recientes, con los experimentos de los cognoscitivos produciendo datos del funcionamiento no consciente, las discusiones sobre procesos implícitos (por lo tanto, no conscientes) — memoria, actitudes, etc — se han convertido en casos típicos en la literatura. Las interpretaciones cognoscitivas de estos fenómenos no reconocen que contradicen una premisa principal de las críticas cognoscitivas del pasado hacia el trabajo conductual. Recientemente, el término “conductual” ha sido adoptado ampliamente, de manera notable en la economía conductual, donde los supuestos sobre la racionalidad psicológica se han desacreditado, pero con poco reconocimiento de que los conceptos centrales se originaron dentro (o al menos fueron anticipados por) el análisis de la conducta. Por lo tanto, las tradiciones conductista y cognoscitiva permanecen diferenciadas, sin embargo, tal vez, con un desacuerdo menos exaltado. La separación puede ser atribuible a las restricciones dentro de los patrones del lenguaje explicativo que todos compartimos.

*Palabras clave:* teoría conductual, teoría de la cognición, desarrollo, desacuerdos

In discussing what has become of the issues raised by Watson's (1913) manifesto, it is useful to begin by summarizing Watson's position with his own opening paragraph:

Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness. The behaviorist, in his efforts to get a unitary scheme of animal response, recognizes no dividing line between man and brute. The behavior of man, with all of its refinement and complexity, forms only a part of the behaviorist's total scheme of investigation" (p. 158).

Introspection and consciousness, then, were front-and-center in his initial critique of mainstream psychology. Over time, introspection as a primary explicit method faded from the discourse, however, while issues concerning consciousness have endured. As will be described here, the possibility of conditioning without awareness inspired heated disagreement between mentalistic vs. behavioristic viewpoints during the third quarter of the 20th century. The final quarter saw increasing acknowledgement of nonconscious functioning in mainstream psychology (e.g., Nisbett & Wilson, 1977; Kihlstrom, 1987; Nosek, 2007), albeit without appreciably mitigating the behaviorist/cognitivist schism.

In contrast, the thoroughgoing environmentalism that began with Watson, with its emphasis on prediction and control, has endured as an undiminished source of controversy. My own longstanding view concerning the basis for this is that a fundamental incompatibility arises from something more pervasive and yet more subtle than the mentalist/behaviorist distinction — that it arises from the nature of explanatory language (Hineline, 1990, 1992; Field & Hineline, 2008). Explanatory/interpretive prose is inherently bipolar in character: noun-verb, cause-effect, agent-action, and even independent variable-dependent variable. The phenomena we are concerned to interpret, however, are inherently tri-polar: 1) the individual's behavior; 2) the characteristics of (and processes within) the individual; and 3) the surrounding present and past environmental events relating to that behavior. Given that we all are concerned with what the individual does (i.e., behavior, although behaviorists and cognitivists do not entirely agree about what constitutes that category) the bipolarity of interpretive prose constrains us to offer either environment-based or organism-based locutions. Organism-behavior locutions, then, account for what an individual does by appealing to characteristics of the individual (personality, attitudes) or to inferred internal states (motivations, moods, representations) or processes (associations, encoding, information processing). Environment-behavior locutions are well illustrated by appeals to the various components of behavior-analytic theory (reinforcement, conditional discrimination, establishing operations, and the like) — focusing in principled ways upon what the individual will do under what circumstances. Attribution theorists, in social psychology, have drawn a similar distinction, between situational vs. dispositional explanations of behavior (e.g., Kelly, 1967, Jones & Nisbett, 1971). They even have identified a strong cultural bias favoring the latter calling it the *fundamental attribution error* — thus, Ross (1977) described the fundamental attribution error as “the tendency for attributers to underestimate the impact of situational factors and to overestimate the role of dispositional factors in controlling behavior” (p. 183). Attribution theorists have unwittingly demonstrated the subtle pervasiveness of that bias, by frequently committing the fundamental attribution error even while theorizing about it (Field & Hineline, 2008). The continuing intractability of the organism-based vs. environment-based difference as played out in psychological discourse, was aptly characterized by Wessells:

For Skinner, no theory concerning inner events, even a noncircular theory, can explain behavior" (1981, p. 158); "... for cognitivists, functional relations between environment and behavior are not explanatory. No amount of order among observables will satisfy the desire to discover internal processes through which the environment influences behavior" (1982, p.75).

### Developments Within Behaviorist Theory

In the middle third of the 20th century, a schism developed between two types of behaviorist positions, with one coming to be called *neobehaviorist*, and the other, radical behaviorist or behavior analytic. Thus, writing 20 years ago in another special issue of this Journal inspired by Watson (1913), Amsel (1993) found the views expressed in Watson's essay to be "indistinguishable from what later became the body of metatheoretical tenets known as neobehaviorism," (p. 25), a position that Amsel shared. Neobehaviorists rejected mentalistic terms, but retained the organism-based interpretive pattern of ordinary language, accounting for behavior by appeal to mediating terms — hypothetical but presumably physical constructs whose scientific validity was anchored in operational definitions (e.g., Kendler & Spence, 1971). Thus, neobehaviorist theory shares a key feature with mentalistic theory, being couched mainly in organism-based locutions. To be sure, neobehaviorists rejected introspection as a method, replacing it with inferential methods referring to events and processes internal to the organism.

B. F. Skinner steered clear of appeals to such mediating events, coining the term *radical behaviorism* while introducing an approach that included the verbal behavior and other practices of the scientist within the account (Skinner, 1945). While declining to adopt mentalistic terms as explaining behavior, he addressed what is at issue when such terms are used, discussing such topics as "having" a poem (Skinner, 1972) and "seeing that we see" (Skinner, 1963). Others, to name three among many, followed this lead: with Schnaitter (1978) and Himeline (1992) providing behavior-analytic interpretations of behavior-analytic interpretation, Palmer (1991) providing a behavior-analytic interpretation of memory (or rather, of remembering), and Himeline (2004) writing about "When we speak of intentions."

Watson's identification, in the passage quoted above, of prediction and control as a *theoretical* goal is a bit odd, for as Morris, Todd, & Midgley (1993) have spelled out in detail, the importance of prediction, for Watson, was mainly a pragmatic matter, whether that of demonstrating experimental rigor in the laboratory, or of proposed social engineering during the latter years of his career. This emphasis has endured in applied work within the behavioristic tradition, for a hallmark of contemporary applied behavior analysis is the verification of control through routine monitoring of data, and use of within-subject research designs to verify the effectiveness of the intervention for each individual (e.g., Cooper, Heron & Heward, 2007). Conceptually, however, as Morris et al. (1993) go on to document with supporting quotes from Skin-

ner as well as other behavior analysts, prediction and control for behavior analysts, serve as the primary truth criteria in support of their theory:

In basic research, the functional relations enter into the construction of an inductively-derived theory of behavior, where 'theory' implies an understanding of behavior. A theory of behavior, in turn, provides abstract descriptions or 'general expressions' of behavior (e.g. reinforcement). Additional and more generalized control follows from a theory based on prediction and control and, thereby, affirms the 'truth' of the theory. Thus, like much of traditional psychology, a theory signifies 'understanding' for Skinner. Unlike most of psychology, however, control is both antecedent to and a consequence of a theory of behavior. (p. 124)

Regarding Morris et al.'s last sentence above, control as antecedent to theory is conventional, for the development of most any good theory is facilitated by good experiments. Control as a consequence of the theory, however, follows especially if not uniquely from the nature of Skinnerian theory: ". . . an attempt to describe efficiently the effective environment in interactions between behavior and environment" (Hineline, 1984, p. 560). Thus behavior analysis, the empirical branch of radical behaviorism, developed and extended Skinner's theory, expanding upon environment-based interpretation by using prediction and control as its pragmatic truth criteria.

### **Developments Within Cognitivist Theory**

Meanwhile, mainstream psychology also evolved from that of Watson's time, most notably in the early 1960's with "cognitive" advanced as the descriptor for the rehabilitation of mentalistic terms, along with the introduction of computer-based metaphors. As characterized in a representative textbook of that period (Norman, 1969), traditional terms like perception were replaced with the processing of impinging events through the involvement of "working" or "short-term" memory, which became roughly equated with conscious functioning. Its organism-based locutions conformed to the patterns of ordinary language, but did not accept all vernacular assumptions. The dualistic conundrum of mentally initiated action was sometimes finessed by positing an identity between mental function and brain function, and at other times by positing a formalism identifying structural relations with presumed physical bases, but not defined in terms of what they are composed (Putnam, 1973). A characterization by Kiehlstrom (1987) is informative:

"Cognitive psychology comes in various forms, but all share an abiding interest in describing the mental structures and processes that link environmental stimuli to organismic responses and underlie human experience, thought and action" (p. 1445).

The concern with mental structures and processes is explicitly stated, and it is also made explicit that cognitivist theory is mediational theory. Notably, however, Kihlstrom's statement seems not to acknowledge that *it is assuming* a distinct domain of structures and processes. Even more subtly, the statement assumes that environment-behavior relations require connective (mediating) linkages. Thus, cognitivist accounts typically seem to assume that causation requires contiguously connected events (Lacey & Rachlin, 1978; Morris, Higgins, & Bickel, 1982) — a primary justification for mediational theory.

While cognitivists abandoned formal introspection as a salient methodology, inferences of conscious agency can be discerned in most cognitivist accounts. Thus, writing in terms of mental representations, Fodor (1981) said that his theory about thinking “construes the concept of causal role in such a way that a mental state can be defined by its causal relation to other mental states” (p. 118). Shepard and Metzler (1971) interpreted their experiments on “mental rotation” as showing how mental representations can be moved, manipulated and transformed within a person's mind. The individual is thus portrayed as actor upon the contents of his or her mind, as when Weisberg (1980) described the person as acting upon previously acquired knowledge. Flavell (1971) introduced a cognitivist concept strongly implying awareness, that of metacognition, which, as elaborated by Kluwe (1982), was said to be of two kinds: “(a) the thinking subject has some knowledge about his own thinking and that of other persons; (b) the thinking subject may monitor and regulate the course of his own thinking, i.e. may act as the causal agent of his own thinking” (p. 202).

The second of these, sometimes called “executive control” or “executive process,” asserts a role of awareness as a special order of thinking with causal status with respect to other thinking. Thus, the distinction between cognition and metacognition preserves a role for conscious functioning even though, as we shall see, nonconscious functioning eventually came to be embraced within cognitivist theory.

### **Cognitivist Attacks Upon Behaviorism, and Behaviorist Replies**

The best known cognitivist attack on Skinnerian behaviorism is, of course, Chomsky's (1959) scathing review of Skinner's book, *Verbal Behavior*. As documented by Harris (1993), Chomsky's main agenda was to undermine the position of Leonard Bloomfield, a prominent, empirically oriented linguist, and, as pointed out a decade later by MacCorquodale “Chomsky's actual target is only about one-half Skinner, with the rest a mixture of odds and ends of other behaviorisms and some other fancies of vague origin” (1970, p. 83). Nevertheless, cognitivist psychologists seized upon it as a rallying cry. The lack of a direct reply from Skinner, despite his justification offered from hindsight (Skinner, 1972), left the psychology of language pretty much to the cognitivists for most of the remainder of the century. It was only when Chomsky's star began to fade within linguistics (Andresen, 1990, 1991, 1992) and behavior analysts began to do research predicated on the concepts introduced in Skinner's book (e.g. see *The Analysis of Verbal Behavior*) that this began to change.



Other cognitivist attacks on behavior-analytic work prompted rebuttals supported with empirical data; the relevance of those data hinged upon whether consciousness needed to be invoked to account for published experimental results. This history of experiments and interpretations has been previously described in extensive detail (Hineline & Wanchisen, 1989), and so just a sketch of that history will be provided here with few illustrative examples. The focus of cognitivist attacks was mainly upon experiments that behavior analysts understood as demonstrating susceptibility of verbal behavior to reinforcement. The initial target was a study by Greenspoon (1955; see also 1963), in which the subjects' uttering plural nouns was observed to vary systematically with changes in contingencies whereby the experimenter systematically supplied inarticulate indications of attention ("uh huh"). Greenspoon found that although their behavior consistently varied in accordance with the contingent consequences, most experimental subjects were unable to describe that relation. In rebuttal, several cognitivists (Adams, 1957; Dulany, 1961; Spielberger & DeNike, 1966) proposed, in direct opposition to Greenspoon's interpretation, that in experiments such as Greenspoon's, human participants are aware of being in an experiment, and that this is essential to the conditioning effects even though the awareness may not be accurately related to the contingencies. They suggested that a participant may employ a "correlated hypothesis" when participating in an experiment, thus deciding consciously and rationally what to say.

Meanwhile, behavior analysts published several studies using more naturalistic, conversational settings, finding again, that individuals' verbal behavior was susceptible to reinforcement while those individuals, like Greenspoon's participants, were unaware of the experimental contingency, or even of anything being requested or demanded of them. In a typical example, Centers (1963) conducted an experiment in the "waiting room" to his laboratory, with three phases. First, baseline rates were recorded for three targeted categories: opinion statements, the offering of information, and the asking of questions while a confederate experimenter responded to all three with general, noncommittal attention. Next, the confederate reacted to each of the three types of utterance by nodding, agreeing, and/or restating what the subject had said. Importantly, instead of a stereotyped "uh huh," which had been specified as the consequence in Greenspoon's experiment, the putative reinforcers were varied, presumably making them less obtrusive and more like social reinforcers in ordinary conversation. Extinction was arranged during the final 10 min of the procedure, whereby the confederate either disagreed, disapproved, or did not respond to the targeted responses. Results were clear and systematic with respect to the conditioning of opinion and information statements, but no systematic result was obtained with respect to the behavior of questioning.

It was often clear that many of the cognitivist critics had, at best, a superficial understanding of behavior-analytic theory. For example, Levine (1975) described a sequence of experiments and data as leading him from a behavioral to a cognitivist theory of learning. His experiments, with human subjects, entailed the delivery of



presumed reinforcers for the final response in a sequence of alternating responses. For the author, the crucial detail was the fact that responses within the sequence were never immediately followed by the reinforcing consequence, and yet they were learned just as the final response was. Aside from apparently being oblivious to the effects of intermittent reinforcement, of the behavioral account of rule-governed behavior, and of the extensive literature on conditional discriminations, Levine clearly did not grasp the principle of extended units of behavior, whereby elements within an extended behavioral unit would not require their own, separate and immediate consequences. For example, if a sequence of four left-and right-button presses is always terminated with reinforcement immediately following a right-button press, the left-button presses will be acquired and maintained as part of the four-response unit. This can be extended even to include the continual generation of novel sequences of responses (e.g., Neuringer, Deiss, & Olson, 2000).

A commonly asserted basis offered by cognitivists for favoring their viewpoint over a behavioral one is the occurrence of actions that do not have evident causes in their immediate environments. The assertion, then, is that behavior with no clear immediate consequence must be accounted for in terms of proximal mediating process within the organism. In this maneuver, the behaviorist position is portrayed as requiring close, one-to-one connections between stimuli and responses and between responses and consequences. But, as I have noted earlier in this essay, it is the *cognitivist* interpretation, along with the neobehaviorist one, that requires contiguous connections. To the extent that it is well understood, behavior-analytic theory is untouched by such arguments. Taking rate of occurrence as a fundamental dimension of behavior, and thus of environmental events as well, behavior-analytic theory embraces temporal extension as a fundamental property of behavioral process, because a rate cannot occur within an instant (Baum, 1997; Hineline, 2006). Furthermore, scale-independence is ubiquitous among reinforcement effects, with similar analyses applicable to relative frequencies of behavioral units that range from saccadic eye-movements (Madelain, Paeya & Darcheville, 2011) to 3-point basketball shots (Vollmer & Bourret, 2000) to patterns of attendance at a gym (Dingfelder, 2011) and beyond.

Other behavioral experiments demonstrated operant conditioning of a kind where a role of awareness was even less plausible. For example, Hefferline, Keenan, and Harford (1959) recorded electromyographic responses generated by a thumb-twitch that was too small to produce overt movement. Then they arranged for thumb twitches to prevent or eliminate noise that was superimposed on recorded music. Although the participants proved to be unable to describe the ongoing relations or even the kind of behavior that was involved, their thumb-twitches varied systematically with the contingent consequences. Hefferline et al. was subsequently replicated by Laurenti-Lions, Gallego, Chambille, Vardon, and Jacquemin (1985), who used a similar but improved experimental design and computer-based technology. They obtained similar results, with even more convincing evidence of the participants' inability to describe the experiment as involving what they did with their hands.

Hefferline and Pererra (1963) used similar recording techniques to Hefferline et al. (1959) in an experiment yielding an unanticipated result suggesting that a reinforcement procedure could actually generate new sensory perceptions. This raised the provocative possibility that operant conditioning can shape processes that, for cognitivists, are the presumed bases for, and thus prior to, the processes that constitute awareness. The experimenters electromyographically detected tiny thumb-twitches, presented a tone whenever the left-thumb muscle had twitched, and arranged for overt key-presses with the right hand to produce money only if this occurred within two seconds of the tone. Again, the participants were unable to report that their thumbs were in any way involved. Then the intensity of the tone was gradually reduced to zero; the participants continued to press the key only when the thumb twitches had occurred (no other presses were reinforced); they also reported that the tones were becoming difficult to hear. When the experimenters reintroduced the tone, its onsets were slightly after the thumb twitches (due to the experimenter's reaction time in detecting the twitch via oscilloscope and turning on the tone), the participants reported hearing two tones in rapid succession. One can argue that hearing is behaving, and fifty years later, the "conditioned hearing" suggested by this study still awaits further investigation.

Despite demonstrations such as the above, Brewer (1975) published a provocative review under the title, "There is no convincing evidence for operant or classical conditioning in adult humans." Pushing the "correlated hypothesis" position to its extreme, his agenda was an attempt to place behaviorists in the position of having to prove an unconditional negative — that there is no possibility of *any* kind of awareness operative in the effects of a conditioning experiment with humans. Of course, experimenters cannot prevent their experimental participants from being aware of *some* aspects of the experimental situations, and these participants may be, in at least an informal sense, hypothesizing about what will produce rewarding consequences. Brewer also described experiments that, in his view, indicated a decisive role of verbally mediated effects in conditioning. There was, of course, no acknowledgement of the behavior-analytic account of verbal behavior as derived from conditioning principles, and thus no recognition that behavior analysts would find his demonstrations to be straightforward examples of instructional control and rule-governed behavior. From Brewer's stance, *any* demonstrations of instructional control were taken as evidence exclusively favoring cognitivist theory.

Since my cognitivist colleagues appeared to be taking Brewer's position seriously despite countervailing evidence such as that sketched above, and the "correlated hypothesizing" argument had achieved some currency, Hineline and Wanchisen (1989) provided a more detailed analysis and reply than is presented here. We spelled out how the "correlated hypothesis" notion maps directly on the distinction between descriptive vs. functional operants (Catania, 1973). A descriptive operant is the class of responses with topography and temporal distribution that can produce a reinforcing consequence, which maintains them. A functional operant includes not only the re-

sponses that comprise the descriptive operant, but also responses that are also systematically maintained by the contingency even though they cannot produce the reinforcing consequence that maintains them. For example, on a differential-reinforcement-of-low-rate (DRL) 20-s schedule of reinforcement, contingent upon lever-press responses, any response that occurs at least 20 s since the preceding response will be reinforced; those comprise the descriptive operant. However, the schedule reliably maintains many presses with inter-response times (IRTs) in the range of 16-19 s even though these are never reinforced; these, plus the reinforced presses, comprise the functional operant. If the schedule is changed to DRL 10 s, the functional operant will include many responses with IRTs of 8 or 9 s along with those exceeding 10 s. The unreinforced responses may be maintained adventitiously, thus “superstitious,” or through a ‘spread-of-effect’ such as response induction, or through a linkage such as behavioral chaining, or even as members of a higher-order class (Catania, 1995). The main point: Just as responses with the slightly-too short interresponse times are maintained despite the fact that they have no effect on reinforcement, the “correlated hypothesizing” that may accompany reinforcement of human behavior, also may be maintained despite its having no effect on the delivery of the reinforcer. Wanchisen and I also noted, however, that if the human participant is explicitly hypothesizing and acting in accordance with the hypotheses, it is to be understood as rule-governed behavior, which has also been researched and interpreted from a behavioral perspective (see, e.g., Matthews, Catania, & Shimoff, 1985; Zettle & Hayes, 1982). Commenting further on Brewer’s position, we went on to say:

From a behaviorist viewpoint, the first part of Brewer’s argument merely reflects gratuitous assumptions. Brewer accepts the vaguest of relationships between verbal reports (often prompted after the experiment) and experimental conditions as enabling those relationships to account for the detailed effects of those conditions. Hence the inferences are tantamount to *assuming*, rather than demonstrating, that aware, logical functioning must be primary in human action. In addition, a great deal remains unspecified in Brewer’s version of cognitivist theory — such as what consciousness *is* that gives it a special causal role. There is no indication of how expectations are generated, and especially, how they translate into actions. Virtually always, those terms seem to be mere labels, borrowed from the vernacular, for sensitivity to environmental events. The second part of Brewer’s argument was out of touch with the behavior-analytic theory of its time and has been made thoroughly obsolete by subsequent behavior-analytic developments regarding the interactions between verbal and nonverbal behavior. (pp. 250-251)

### **Radical Change in the Cognitivist Position on Awareness**

Ironically, not long after Brewer’s manifesto, mainstream psychologists began to question the role of consciousness, albeit while retaining cognitivist theoretical stanc-

es. A notable contribution to this shift was Nisbett & Wilson (1977). Citing an impressive range of findings, mainly from the literature of social psychology that indicated the unreliability and/or gratuitousness of introspective reports, these authors asserted that such reports cannot be taken at face value. They provided a cognitivist interpretation, however, suggesting that the individual was invoking *a priori* causal theories. No detailed account was supplied, however, as to how such theories would generate the verbal reports.

The subsequent decade was marked by an especially influential report that threw into question the presumed relation between volition and consciousness. Libet (1985) reported an ingenious series of experiments focusing upon the relations between verbal reports and directly measured electrical brain activity. Instructing his participants to move a hand whenever they wanted to do so, he measured electrical potentials at the scalp that were known to begin a few hundred milliseconds before such movements actually occurred. The occurrence of such precursors, while marking the beginnings of the initiation of voluntary movement, did not, in themselves, indicate anything special about conscious volition. However, Libet's participants were asked to simultaneously observe a rotating clock-like device, and report its position that corresponded to the moment when they became aware of intending to move their hand. The moments of awareness thus identified consistently began *after* the physiological precursors of the movement were well under way. Although the experience of intention was not questioned, the precision of its identification as occurring *after* the initiation of the intended act, threw into question the status of conscious experience as a causing overt action.

Reviewing the evolving as well as more conventional information-processing models in light of relevant research on perception and memory, Kihlstrom (1987) concluded:

One thing is now clear: Consciousness is not to be identified with any particular perceptual-cognitive functions such as discriminative response to stimulation, perception, memory, or the higher mental processes involved in judgment or problem solving. All of these functions can take place outside of phenomenal awareness. Rather, consciousness is an experiential quality that may accompany any of these functions. The fact of conscious awareness may have particular consequences for psychological function — it seems necessary for voluntary control, for example, as well as for communicating one's mental states to others. But it is not necessary for complex psychological functioning. (p. 1450)

With countervailing evidence coming from research within their own interpretive tradition instead of from behavior-analytic studies, cognitivist researchers have subsequently embraced the likelihood of a broad range of various kinds of nonconscious psychological functioning. "Implicit" is the term for such activity, and thus the past few decades have seen a burgeoning of research on topics such as implicit memory

(where one cannot accurately report memories that, with various prompting procedures can be shown to be operative) and implicit attitudes (where one's reaction times differ in interesting ways, to a word denoting some category — religious, political, etc. — when it is combined with positively vs. negatively valenced words. The reaction times, taken as indicating implicit attitudes, often yield results inconsistent with the individual's overt attitude statements (e.g. see Nosek, 2007). The logic of these latter studies is that of the Stroop test, where two verbal repertoires are placed in competition — one's reaction time is longer when naming the color of printed ink when the printing shows a color name that is inconsistent with the color of the ink (Stroop, 1935). Techniques based on the logic of this effect have even been used to study the inferred mentalistic construct of implicit self-esteem (Baccus, Baldwin, & Packer, 2004).

Thus, with no acknowledgment of their implications regarding past critiques of behavior analysis and rejections of data from behavioral laboratories, the evolving versions of mentalistic/cognitivist psychology have come to acknowledge a greater and greater role of nonconscious processes. And with respect to Watson (1913, p. 158) recognizing “no dividing line between man and brute,” the cognitivist position regarding humans vs. nonhuman animals has also evolved in a way that has become somewhat consistent with his assertion of continuity between humans and members of other species. Even during the peak of heat in the behaviorist/cognitivist controversies, some animal learning researchers who worked outside the behavior-analytic tradition interpreted their experiments in cognitivist terms (e.g. Hulse, Fowler, & Honig, 1978; Mellgren, 1983). Notably, Gallup's (1982) interpretation of mirror-recognition in primates has been widely, although not universally, accepted as indicating self-concepts as present in nonhumans (Burghardt, 1985). And in 1998, the journal, *Animal Cognition* was founded without evident controversy within the cognitivist community.

### **The Current Situation, and Possibilities for Rapprochement**

With consciousness no longer being a bone of contention, one might have thought there would be substantial convergence between behavior-analytic and cognitivist interpretation. Indeed, within the past fifteen years or so, “behavioral” is no longer a pejorative term within mainstream psychology and within society at large. For example, *behavioral economics*, has been adopted as an identifying label by authors who have been notably successful in addressing mainstream audiences (albeit without recognition that many of their operative concepts originated in behavior-analytic research with nonhuman subjects, such as that of Rachlin et al. 1976; Lea, 1978; Hursh, 1980). While its defining feature is a rejection of rationalist assumptions, much of behavioral economics is framed in terms of how people think, and studied in terms of what they say they would do in hypothetical circumstances (e.g., Kahneman, 2011). Notably, there are exceptions to this, in which environment-behavior relations are

addressed without depending heavily on verbal mediation (Thaler & Sunstein, 2008). Other mainstream authors have succeeded in making distinctly behavioral arrangements newsworthy, and worthy of social approval, without apparent recognition of behavior-analytic techniques as such (Gawande, 2009; Levett & Dubner, 2005). Also, the wide recognition of applied behavior analysis as uniquely effective for addressing autism, a problem of great social importance, has most likely also contributed to the term, “behavioral,” being viewed more favorably.

Despite the reduced animosity, there remains a schism between behavior-analytic and cognitivist approaches, and I attribute that substantially to the constraint of interpretive language patterns, yielding the intractability of organism-based vs. environment-based interpretation. One author who has achieved some success in finessing this problem is Susan Oyama, a developmental biologist who treats the events of an individual’s environmental history as just as heritable as the individual’s genetic tissue (Oyama, 1985, 2001; see also Midgley & Morris, 1992). Another is Susan Schneider, a behavior analyst whose recent book, *The Science of Consequences* (Schneider, 2012) has received favorable reviews in the mainstream press. Schneider begins by emphasizing the role of consequences in the flexibility of instinctive behavior, and by describing the role of behavioral consequences in epigenetics — both of these being topics of broad general interest. Furthermore, unlike traditional genetics, with its emphasis on populations or on individuals such as twins, who do or do not have certain enduring characteristics, epigenetics deals with the synthesis of proteins within an individual on a time scale commensurate with the changes in behavior that behavior analysts study. Schneider’s success suggests that these complementary time scales may facilitate our learning to re-characterize the phenomena we study, capturing the tripolar relations between organism, environment, and behavior, and accomplishing this without obscuring the importance of behavioral concepts or otherwise transmogrifying our approach.

## Conclusion

Watson certainly started something, and it’s not yet over. To be sure, introspection as an explicit scientific technique has been thoroughly discredited. Implicit (thus, non-conscious) processes are now embraced by cognitivist theorists, with little if any acknowledgement that this discredits many of their own past criticisms of behavioral work. Mentalist conceptions continue to grant a role to conscious functioning, as in executive functions contrasted with automatic functions, while the Skinnerian account of verbal behavior includes the situations whereby one speaks of awareness. Contemporary cognitivism depicts the human thinker in terms of limited, even faulty rationality, whereas behavior analysis builds upon processes of behavior-environmental interaction to address both nonverbal and verbal/logical behavior, whether faulty or effective. In recent years the behaviorist/mentalist tensions seem to be somewhat reduced, with the term “behavioral” even adopted by some cognitivists to characterize their approach to decision theory. Nevertheless, a schism remains



between behavioral and cognitivist conceptions. It is a schism that may be attributed to constraints of explanatory language, with a bipolarity that yields intractable differences between organism-based and environment-based, between meditational and nonmediational modes of interpretation.

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