Current Diversification of Behaviorism

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Abstract

Over the last few decades, behaviorism as a philosophy of the science of psychology, especially in the field of behavior analysis and related areas, has diversified to the point that scholars from inside and outside the field are often confused about what exactly behaviorism is. The aim of this study is to analyze how such diversification of behaviorism has arisen over time and what factors might have contributed to it using evolutionary biology's concept of adaptive radiation as an analogical process. Diversification of behaviorism has occurred in many areas over time as behaviorism has extended its field of practice. Although some characteristics of behaviorism remained, other characteristics were modified. One such characteristic that went through extensive modification is the agent-free approach to the analysis of behavior: the agent problem. This approach has met criticism from inside and outside the field and has been under a strong selective pressure. The present article discusses how the agent problem in a different niche has shaped behaviorism into new forms that we see today.

Keywords Behaviorism · Radical behaviorism · Agent problem · Behavior analysis

Over the last few decades, behaviorism as a philosophy of science of psychology, especially in the field of behavior analysis and related areas, has diversified to the point that scholars from inside and outside the field are often confused about what exactly behaviorism is. For example, Foxall (2008), reviewing comments from fellow behaviorists on his paper on intentional behaviorism, wrote, “A difficulty that arises in discussing radical behaviorism is that its adherents claim that it exists in more than one form and these forms are incommensurable. . . .” (p. 114) and suggests a review of such differences. The aim of the present study is not to discuss the similarities and differences of various forms of behaviorism proposed by contemporary behaviorists, but rather to analyze what factors might have contributed to such diversification of behaviorism we see today.

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Table 1 shows a list of major behaviorisms proposed in recent decades after B. F. Skinner's radical behaviorism in 1945. It is safe to say that these current versions of behaviorism have developed as a reaction to radical behaviorism in one way or another. The focus of the present article is to understand how these reactions reached the point at which they became their own versions of behaviorism. In order to investigate the factors that might have contributed to the diversification of behaviorism in recent decades, this article uses evolutionary biology's concept of adaptive radiation as an analogical process. Adaptive radiation refers to an emergence of different species from one ancestry species over time and place (diversification) due to a selection process based on differences in environment (niches/geographical isolation), the availability of resources, and competition for the resources against other species, among other factors (Schluter, 2000). Simply put, one species diverges into a different species as it migrates from its original niche to a new niche, where the nature of the resources and the competition for resources among species of different ancestry origins differ from its original niche. When this selection process is repeated over time, many new species emerge from the single ancestry species: the process of adaptive radiation. A famous example is Darwin's finches. The ancestral finch built a nest on the ground and ate seeds on one of the Galapagos Islands. As it migrated to other islands, it diverged into 13 different species with different sizes and shapes of the beaks. Some nested in cactuses and ate seeds. Some nested in trees and ate insects. It is a tradition in behavior analysis to use biological evolution as an analogical process to understand the social dynamics of behavior analysts (e.g., Rider, 1991).

Behaviorism can be seen as a species: a field of practice (Skinner calls this a verbal community) is a niche, other professionals in the same field are the competitors, and the reinforcing consequences of their behavior in their verbal community are the resources. For example, radical behaviorism is the species, experimental psychology (and its journals and academia) is the niche, cognitive psychology, social psychology, and neuropsychology are the competitors, and the resources are financial rewards, reputation, career rewards, social interaction, scientific discovery, and knowledge (e.g., on the rewards for scientists' activities, see Lam, 2011). Suppose that radical behaviorism is the ancestral species, adaptive radiation occurs as it migrates to other niches. As it migrates to other niches, it undergoes different selective pressures to the point that it diverges into a new form of behaviorism. Thus, we see the current diversification of behaviorism.

Niches and Their Resources

At present, behaviorists are in the fields of experimental psychology, experimental analysis of behavior, applied behavior analysis, comparative psychology, clinical psychology/psychotherapy, education, behavioral economics, and philosophy of science, to name a few. A variety of resources and competition in each niche might have been contributing factors in the diversification of behaviorism that we see today. Behaviorists themselves often discuss their niches and resources to encourage this point of view. For example, Hayes and Hayes (1992) described their clinical psychology niche as:

Table 1. List of Behaviorisms and Their Characteristics

Behaviorism	Behaviorists	Year	Field of practice	Subject matter	Atheoretical	Empirical	Pragmatic	Agent
Radical Behaviorism	Skinner, Moore, Catania, Palmer	1945	Experimental Analysis of Behavior, Applied Behavior Analysis	Animal and human behavior	Yes	Yes	Yes	N/A
Emergent Behaviorism	Killeen	1984	Learning theory, Cognitive Psychology, Neuropsychology	Animal and human behavior and cognition	No	Yes	Yes	Cognition
Theoretical Behaviorism	Staddon	2001, 2017	Learning theory, Cognitive Psychology, Neuropsychology	Animal and human behavior and cognition	No	Yes	Yes	State
Contextualistic Behaviorism	Hayes & Hayes	1992	Psychotherapy	Human behavior	Yes	Yes	Yes	Organism as a whole
Teleological Behaviorism	Rachlin	1994	Experimental Analysis of Behavior	Animal and human behavior	Yes	Yes	Yes	Organism as a whole
Multiscale Behaviorism	Hineline, Shim	2001	Experimental Analysis of Behavior	Animal and human behavior	Yes	Yes	Yes	N/A
Molar Multiscale View	Baum	2002	Experimental Analysis of Behavior	Animal and human behavior	Yes	Yes	Yes	N/A
Intentional Behaviorism	Foxall	2007	Behavioural economics/ Consumer psychology	Human behavior and subjective experience	No	Yes and No	Yes	Person

The context of emotional control is a core issue for many clients. It is common for clients to come into therapy with a list of undesirable thoughts, feelings, memories, and bodily sensations that seemingly need to be removed, altered, or avoided, and indeed we as therapists name most of the disorders we treat and the treatments themselves in the same way. (p. 244)

That is, in the field of psychotherapy, the ones who address subjective experiences obtain the resources. The resources, in this case, can be the increase in client referrals, financial success, treatment success, fame, and so on. Because both the therapists and the clients in this verbal community expect therapy to reflect on such issues as thought, feeling, and other cognitive processes, naturally a therapist of any kind adapts to such demands in order to obtain resources. Hayes and Hayes continued:

A few early behavior therapists encouraged a focus on overt behavior only, on the assumption that thoughts (and feelings, etc.) would change on their own. The current mainstream position in behavior therapy is that a change in thoughts will produce changes in overt activity. Traditional associationistic forms of behavior therapy and cognitive therapy do not differ in this regard. (p. 239)

An interesting point is that behavior therapists have adapted and behaved like cognitive therapists in this community due to its selective pressure. Thus, when radical behaviorism, one of which characteristics is to disregard subjective experiences as a controlling variable of behavior, entered in this community it faced the same selective pressure to adopt the niche's need of addressing subjective experience, and the outcome was contextualistic behaviorism (Hayes & Hayes, 1992). This niche's selective pressures were twofold. One was that the niche rewarded a cognitive approach. The other was that there were already behavior therapists in the niche as a competitor. It is possible to see contextualistic behaviorism as a result of these two selective pressures. To distinguish itself from other behavior therapists as well as from cognitive therapists, contextualistic behaviorism adopts radical behaviorism's functional approach that behavior is an outcome of the interaction with the environment (context). The authors wrote, "Skinner defined behavior both mechanically and interactively. . . . As a result, some Skinnernians have defined behavior . . . as movement in a frame of reference. . . . Conversely, some radical behaviorists view behavior as an event of a whole organism interacting in and with a context. . . ." (p. 228), and declares to adopt the latter interpretation. They criticize cognitive therapy and other behavior therapy as mechanistic and only focusing on a part of the organism such as cognition, thought, and feeling and not the organism as a whole. They suggest that this distinction from other forms of therapy would enable contextualistic behaviorisms to obtain resources in this niche. They wrote, "We suspect that contextualism represents a more palatable philosophical position for clinical workers than did traditional mechanistic behaviorism" (p. 234). At the same time, contextualistic behaviorism must adapt to this community's preference for subjective experience. To do so, the authors place emphasis on the stimulus equivalence phenomenon as a behavioristic way to understand cognition and psychological disorders, and spend the majority of time discussing its implications in psychotherapy to appeal to the traditional audience in this field. Contextualistic

behaviorism can be seen as a result of radical behaviorism migrating to the field of psychotherapy.

Another example can be observed in Rachlin (2011). In this paper, Rachlin discusses how both Baum's molar multiscale view (Baum, 2002) and his teleological behaviorism (Rachlin, 1994) came about in the field of behavior analysis, how they were similar to each other, and how they differed from radical behaviorism. Rachlin attributes the causes of their similarities to their shared past as the graduate students, the professors they had studied under, the experiments they had conducted together, and a success they had entertained. Unlike Catania, who studied under Skinner at Harvard University and remained a radical behaviorist throughout his career (Baum, 2011b), Rachlin and Baum were under the influence of Skinner, Stevens, and Herrnstein. Rachlin discusses how all three professors specified the nature of the resources in this particular niche and shaped Rachlin and Baum's scientific activities. Rachlin, describing the successful experiments he had conducted with Baum under Herrnstein, wrote, "these experiments made us dedicated molarists" (p. 210) and indicates that their works afterwards were largely an extension of those early experiments. Thus, came teleological behaviorism and the molar multiscale view, two modern versions of behaviorism.

These adaptations have occurred in many areas over time as behaviorism, especially radical behaviorism in recent years, has expanded its niches. Although some characteristics of behaviorism such as the emphasis on behavior, scientific approach, and pragmatism worked favorably for its survival in new niches, other characteristics faced challenges. One such characteristic that went through extensive selective pressure is what this article calls the agent problem.

The Agent Problem

In this article, the agent is defined as a hypothetical entity that is present across time and environments and changes behavior according to the differences in time and environments. A typical psychology-related niche demands its inhabitants to be interested in dealing with some form of an agent such as the mind, cognition, personality, perception, sensation, emotion, physiology, and the like. Kantor (1963) showed that, for the last 2,000 years, the subject matter of psychology has mainly been the mind, and the behavior was seen as a result of the working of the mind. In other words, there is a general demand in the field of psychology and, at least in Western culture, that psychologists be interested in studying some aspect of the agent that is responsible for the occurrence of behavior. Most fields of psychology today still carry this tradition. Moreover, almost all the fields beyond psychology such as education, economics, and entertainment take such a view for granted. On the other hand, behaviorism traditionally has either negated or downplayed the role of the agent. Baum (2013) described:

In commonsense folk psychology, behavior is done by an agent, and behavioral events or actions seem to be a different category. . . . [To the behaviorists, however,] The organism . . . is only the medium of the behavior as water may be the medium of a chemical reaction. . . . This aspect of behavior analysis puts it at odds with common sense and most philosophy of mind. (p. 284)

This behaviorist approach has met criticism wherever behaviorism went, and the handling of the agent problem is a crucial selective pressure that determines behaviorism's survival not only in the field of psychology but also in every other field of practice. Thus, the current diversification of behaviorism can be seen mainly as a result of facing the agent problem as they migrated to different niches.

The Origin

When Watson first introduced behaviorism in the field of experimental psychology in 1913, it was a success largely due to the community's preference for scientific methodology. At the time, there was an increasing demand and aspiration to a "hard" science such as physics and chemistry, and the competitors in the field such as mentalism, functionalism, and structuralism failed to provide a satisfactory answer to the community's demand. Behaviorism, as a new species in psychology based partly on the works of Ivan Pavlov, who applied a rigorous scientific method of physiology to study the phenomenon he called conditioned reflexes (Pavlov, 1927/1960), became a dominant force in the field (Day, 1980; Kantor, 1963). With its rigorous scientific methodology, behaviorism at the time introduced the idea that any event that was not directly observable was not an appropriate subject matter of psychological investigation, rejecting the studies of the mind. Watson's interest was the reaction of the whole animal in its relation to a given stimulus (Watson, 1930/1957, p. 11). That is, Watson considered the relationship between a stimulus and a response as a complete and independent phenomenon of itself and did not take it as a manifestation of the mind as the structuralists or the mentalists did or of brain activity as Pavlov did (Pavlov, 1927/1960, p. 7). Likewise, Kantor (1933) viewed behavior as a "complete body action . . . a total neuro-musculo-glandular configuration" (p. 331) and wrote that behaviorism's S-R formulation rejects the existence of an agent as an isolated, independent factor that can be a cause of its action or a subject matter of its study. This rejection of the agent as an independent causal factor and the subject matter of psychology has remained one of the defining characteristics of behaviorism to this day. Skinner's radical behaviorism and its three-term contingency also maintained behaviorism's agent-free characteristic.

Mainstream Experimental Psychology and Behaviorism

Behaviorism was largely successful in scientific psychology at the time and influenced the fields of experimental psychology, learning, psychophysics, and comparative psychology, among other fields, and demanded other disciplines to adopt a behavioristic approach to the study of their interests (Day, 1980). However, as other disciplines had begun embracing the scientific methodology and regained popularity (e.g., the cognitive revolution), behaviorism had begun losing the favor of the niche and left with the criticism that behaviorists did not pay attention to the agent. Behaviorists were well aware that such an agent-free view was not a mainstream view of their culture. In fact, opposition to behaviorism's agent-free approach has been loud and continuous since behaviorism was first introduced. Kantor (1933) described scholars' oppositions to the S-R conceptualization: the S-R formulation paid no attention to "the dynamic character of the organism" (p. 325) and psychological phenomena were not reducible to or to be

ignored by studying a physiological stimulus and response relationship. When scholars had adapted behaviorism's scientific approach in the field of experimental psychology, Hull, Spence, and Tolman had all begun studying the intervening variable or an organismic variable, O, in their S-O-R formulation (Smith, 1986, as cited in Moore, 2001), whose activities led to the cognitive revolution and brought the agent back as the main subject of study in psychology. These cognitivists, also called neobehaviorists and methodological behaviorists, had adapted the scientific rigor of behaviorism to the study of their subject matter, cognition, using a hypothetico-deductive approach, and became the mainstream approach of scientific psychology we see today. Cognitivists had an evolutionary advantage over behaviorism such that their interest in the working of the mind met the demand of the niche.

Many behaviorists have adapted to the change in trend and embraced cognitivism. A recent exemplary adaptation of behaviorism to cognitivism is Killeen's emergent behaviorism (Killeen, 1984) and Staddon's theoretical behaviorism (Staddon, 2001, 2017). Emergent behaviorism suggests that cognitive processes are not the same as behavioral processes as Skinner suggested and advocates that they are a proper subject of scientific psychology. It views cognitive processes as a part of a causal chain between a stimulus and a response and can be studied scientifically using a hypothetico-deductive method. By doing so, emergent behaviorism rejects several characteristics of radical behaviorism such as atheoretical approach, the exclusion of the agent, and positivism, while maintaining its anti-dualistic stance, empiricism, and pragmatism. Likewise, Staddon (2017) stated that radical behaviorism was not successful in explaining experimental phenomena due to its atheoretical approach. He suggests adding a "state," a construct that includes behavioral repertoire of the organism, a motivational state, and a species type to the three-term contingency as stimulus, state, response, and consequence in order to accurately depict changes in behavior of one organism across different conditions, much like the S-O-R formula of early scholars. And the way in which to study this "state" is through a hypothetico-deductive method. Both emergent behaviorism and theoretical behaviorism assume the presence of the agent, a theoretical construct such as memory or a state, that produces different responses given different experimental conditions. For them, Skinner's three-term contingency is not an independent, isolated phenomenon but a part of a larger system, the agent. Staddon (2017) wrote, "As the organism learns, behavior adapts, reinforcement rate increases, and the repertoire shrinks to a class of responses defined by their consequences and controlled by a class of stimuli that are a reliable signal of the contingencies. This is Skinner's three-term operant" (p. 42). For theoretical behaviorism, the organism carries many sets of three-term contingencies across environments and time, and some sets are called upon given a situation and others are latent. This is different from Skinner's approach to three-term contingency, which does not assume an agent that stores multiple three-term contingencies.

It is a reasonable accommodation given the present state of mainstream experimental psychology that emergent behaviorism and theoretical behaviorism include an agent. Experimental psychologists today are rewarded by building a system (whether it is a hypothetical nervous system, neurological system, or a mathematical model) that can account for behavior change across different situations and time. Both emergent behaviorism and theoretical behaviorism criticized radical behaviorism's atheoretical and agent-free approaches as a product of the time where data collection and

mathematical methods were not as precise as those of today. In addition, Malone (2004) pointed out that these behaviorists' emphasis on a theory building comes from the growing demand of the field of experimental psychology to predict proximal causes of behavior in different environments. A subtle, but statistically significant, difference in behavior across different experimental conditions is an important indicator of whether their theories are sound or not. For example, in the field of temporal perception, scholars are interested in whether the point of subjective equality is at 4 or 5 s because such a difference would determine the fate of some major theories (e.g., Gibbon, 1981; Killeen, Fetterman, & Bizo, 1997). In this field, the survival of a theory, the agent, is directly related to the survival in the niche.

Radical Behaviorism

Away from the mainstream experimental psychology, Skinner established a new niche, the experimental analysis of behavior (the field and its journal), in which radical behaviorism thrived without competitors. In this analogy, a paradigm shift (Kuhn, 1970) can be seen as an establishment of a new niche and the domination of resources. Although radical behaviorism maintained the agent-free approach to the analysis of behavior, its version was different from those of Watson and Kantor. For Watson and Kantor, the functioning of the agent was manifested in the observed behavior but not isolated as a controlling variable of behavior. They viewed behavior as the working of a whole organism of which the agent is a part. On the other hand, Skinner's radical behaviorism treated behavior as an independent and stand-alone phenomenon emerging as a consequence of manipulating the environmental variables. Baum (2013) wrote, "Skinner . . . implicitly assume that even though function or outcome defines an activity, agency plays no part. . ." (p. 284). This is similar to a chemist observing an emergence of water by mixing hydrogen gas and oxygen gas together in high temperature or a meteorologist creating a tornado in a lab. In both cases, a phenomenon arises as a result of environmental manipulations and a resulting phenomenon is not seen as an act of some mediating agent. In behavioral research, this view can be employed to explain a phenomenon completely agent-free. For example, a researcher can place a pigeon, a keylight, and food in an operant box in a specific order and produce a keypeck (e.g., Brown & Jenkins, 1968). In this view, one does not interpret that the pigeon "understands" that when the keylight is lit, food follows. Instead, the pigeon is not the center of interest nor a mediating whole between a keylight, food, and a keypeck, but simply one of the factors necessary to produce a keypeck. That is, the pigeon is a variable that is equally important as a keylight, food, and an operant box, but no more than them. Just like behaviorists do not study physics of the keylight or computer chips that operate the operant box, they do not study biology/physiology of the pigeon. By removing the agent from his equation, Skinner successfully established the principles of behavior. Baum stated, "Behavior analysis is the science of behavior; it is about behavior and not about organisms. It views behavioral events as natural events to be explained by other natural events" (Baum, 2007, abstract).

Radical behaviorism and private events Radical behaviorism was not immune to criticism on the agent-free approach from outside its niche. Criticism from nonbehaviorists on this issue abounds. For example, Bandura (1986) wrote that the

three-term contingency cannot accommodate observational learning without referring to cognitive processes and advocated for the study of such a process. Chomsky (1959, as cited in MacCorquodale, 1970) indicated that Skinner's treatment of language was too simple and urged analysis of complex cognitive and neurological processes in order to understand human linguistic behavior. These criticisms stemmed from the assumption that there is an agent that governs social and linguistic activities, something Skinner's agent-free approach did not assume.

Nevertheless, radical behaviorism's treatment of private events is clearly a response to such criticisms. Skinner's antecedent to write a book *Verbal Behavior* was Professor Whitehead's comment that Skinner's analysis of behavior was plausible for all human behavior except human language (Claus, 2007). In addition, Skinner wrote:

Methodological behaviorism and certain versions of logical positivism could be said to ignore consciousness, feelings, and states of mind, but radical behaviorism does not thus "behead the organism"; it does not "sweep the problem of subjectivity under the rug"; it does not "maintain a strictly behavioristic methodology by treating reports of introspection merely as verbal behavior"; and it was not designed to "permit consciousness to atrophy." (Skinner, 1974, quoted in Day, 1983, p. 219

Skinner's willingness to address the agent problem led to one of the most heated discussions in radical behaviorism: the status of private events. In this article, the private event can be seen as a subcategory of the agent problem.

Although maintaining the position that radical behaviorism is interested in dealing with private events and strictly adhering to the three-term contingency analysis of behavior, Skinner's approach to this issue had changed over time (Day, 1980). In the early phase of his career, Skinner had used the operational definition approach to tackle this problem. For example, Estes and Skinner (1941) operationally defined anxiety as an observable behavior, a decrease in the rat's lever-pressing behavior, and studied its occurrence while presenting a shock-paired light. The operational definition approach to the agent problem is to identify an observable behavior that causes an experimenter to infer a supposed inner state (or an intervening variable) and reveals the behavior's function in its relation to environmental events. In the folk psychological view, anxiety would "cause" a decrease in lever-pressing, but the operational definition approach indicates that anxiety was inferred from the observation of a decrease in behavior. Private events are revealed as a tautological label of the observed behavior and not an explanation (or a cause) of the observed behavior, thus eliminating the agent. Later in his career, Skinner used the functional/contingency analysis of verbal behavior (Moore, 2007; Skinner, 1945) as well as the analysis of the history of reinforcement of such verbal operants in a given verbal community (Catania, 2011; Skinner, 1957). That is, the use of a word that is associated with private events such as "I have a toothache" is a) a function of contingency such as getting attention from others and b) taught by other members of the community who did not have direct access to the person's private event. Thus, analyzing these two aspects of verbal behavior would reveal the controlling variables of the verbal report of a toothache in the environment and eliminate the agent. Skinner and other radical behaviorists argue that these

approaches to private events are the heart of radical behaviorism, and some scholars indicate these approaches to private events make radical behaviorism comprehensive against criticism from others (e.g., Moore, 2001).

It is noted that some scholars' differences in the interpretations of Skinner's radical behaviorism might partly stem from Skinner's changing attitude toward private events over time (see Foxall, 2008). Behaviorists such as Baum and Staddon often cite Skinner's early works such as *Behavior of Organisms* (Skinner, 1938/1990) as a reference, whereas Catania, Moore, and others usually resort to his later works such as *Verbal Behavior* (Skinner, 1957). At one point, Day (1969) suggested distinguishing these as "early" Skinner and "late" Skinner to clarify the confusion as philosophers do with "early" and "late" Wittgenstein.

Experimental Analysis of Behavior after Radical Behaviorism

In the field of experimental analysis of behavior, new behaviorisms have emerged after radical behaviorism. Although the niche is relatively stable and without competitors from outside (but see the cultural pressure of the agent problem among behavior analysts in Branch & Malagodi, 1980), behaviorists are still competing for resources: scientific discoveries. As new behavioral phenomena were discovered, such as matching law, free-operant avoidance behavior, and reconceptualization of contingency (as opposed to contiguity), scholars were forced to see operant behavior in different ways, which led to an update of radical behaviorism. These include multiscale behaviorism (Hineline, 2001; Shimp, 2013), teleological behaviorism (Rachlin, 1994), and the molar multiscale view (Baum, 2002). What they have in common is that they maintained the basic characteristics of radical behaviorism such as the atheoretical approach, anti-dualism, and the agent-free approach, while updating the scale of operant behavior to embrace a broader framework. They call a radical behaviorist a molecular behaviorist because radical behaviorism's unit of analysis of behavior is the three-term contingency and distinguish themselves as molar behaviorists, whose analysis of behavior includes multiple sets of three-term contingencies across time and environments. Shimp (2013) wrote:

A molecular analysis describes how reinforcement shapes and organizes continuous, moment-to-moment behaving into new higher order patterns, and a molar analysis describes how reinforcement affects averages of aggregates of different instances of the same behaviors that occurred at different times. (p. 295)

The molar behaviorists are facing the same challenge as emergent and theoretical behaviorisms: how to account for a change in behavior that is not directly a function of the immediate antecedent and contingent stimuli, such as in a choice situation, contrast effect, and contingency analysis, where behavior change is a function of the differences in the accumulated rate of reinforcement across different environments and time. In addition, although emergent and theoretical behaviorisms use an agent such as memory and the decision-making process to account for these phenomena, molar behaviorists cannot invoke an agent. Baum (2002) is aware of the challenge and offers an alternative:

Any science that deals with change, whether phylogenetic change, developmental change, or behavioral change, requires entities that can change and yet retain their identity . . . because only such entities provide historical continuity. In other words, because only individuals can change and yet maintain historical continuity, such a science must deal with individuals. Although individual usually means individual organism in everyday discourse, philosophers mean something more general. Organisms exemplify cohesive wholes, but so too do activities or allocations. (p. 108)

The molar behaviorists' solution is to look at time and activities. To resolve the issue of behavior change across time and environments without using the agent, the molar multiscale view sees behavior as activities, a chain of responses, instead of the molecular behaviorists' position that a response is a discrete unit. By using activities as a unit of operant, the molar multiscale view states that time (or reinforcement frequency within a given timeframe) selects different activities (behavior chains) across different environments instead of a single reinforcement that selects a single response in a single condition in a single moment as in Skinnerian and molecular behaviorist views (Baum, 2012). Unlike a single instance of reinforcement specific to one environmental condition, response class, and moment, time is present across environments and selects activities that produce the maximum rate of reinforcement per situation. That is, instead of looking at behavior across environments and time as completely unrelated instances of the three-term contingencies as the molecular behaviorists do or a "behavior change" of one agent as the cognitivists do, the molar behaviorists view behavior in different environments as separate activities, each competes for time. By doing so, the molar multiscale view can account for "behavior change" beyond the scope of the single three-term contingency without introducing the agent.

Because the molar behaviorists do not see the need to include the agent in its analysis of "behavior change" across time and environments, their take on the private events, a subcategory of the agent problem, is also dismissive. The molar multiscale view takes the stance that private events are not needed to explain, predict, and control behavior (Baum, 2011b). Likewise, teleological behaviorism takes a position that "behaviorism is the study of the overt behavior, over time, of the organism as a whole in its temporal and social context . . . an organism's mental life resides in its overt behavior" (Rachlin, 2013, p. 209). Differences aside, their approaches have been in favor of their niche, the journals such as the *Journal of the Experimental Analysis of Behavior*, and they succeeded radical behaviorism's agent-free approach despite the differences between the molecular and molar stances.

Radical Behaviorism in Applied Behavior Analysis

The mainstream experimental psychology's interest in the proximal causes of behavior and theory development is in stark contrast to the field of clinical psychology/psychotherapy, especially in applied behavior analysis, where radical behaviorism still dominates. In discussing the characteristics of applied behavior analysis, Baer, Wolf, and Risley (1968) point out that a small change in behavior is not important in clinical settings and therefore not emphasized in applied behavior analysis. They wrote:

Non-applied research often may be extremely valuable when it produces small but reliable effects, in that these effects testify to the operation of some variable which in itself has great theoretical importance. In application, the theoretical importance of a variable is usually not at issue. Its practical importance, specifically its power in altering behavior enough to be socially important, is the essential criterion. (p. 96)

Thus, the selective pressure in clinical psychology is different from that of experimental psychology and such a difference shapes behaviorism differently (see also Rider, 1991).

It is not to say that radical behaviorism in applied behavior analysis is free of the agent problem. As discussed above, this problem is deeply rooted in Western culture and in the field of clinical psychology/psychotherapy as seen in the development of contextualistic behaviorism. The struggle is evident in the field of applied behavior analysis as well. Although radical behaviorism in applied behavior analysis maintains its agent-free approach, it largely operates in clinical and educational settings and with people with autism spectrum disorder and other developmental disabilities. These clinical/educational settings are not different from other fields where the agent is seen as the controller of behavior. The pressure to include an agent in the analysis of behavior is high and behavior analysts are often asked to “translate” their terminologies to “a layperson’s” language in order to appeal to the general public (e.g., Rolider & Axelrod, 2005). Unlike Baum (2011a), who assumes that a therapist needs only to pay attention to a therapeutic effect on behavior and not to subjective feelings, therapists in this niche have long recognized that a client’s and family’s subjective experience of the therapy is an important variable in the survival of their method in this niche (Wolf, 1978). This selective pressure can be seen in a recent modification of the three-term contingency. Two such examples are the treatment of motivation and genes.

Although the concept of motivation is accepted without scrutiny in folk psychology as a controlling variable of behavior, behavior analysis has been taking a conservative stance. Miguel (2013) described how the concept of a drive/motivation has been treated in the field of behavior analysis over time. He points out that the concept of a drive was originally used by learning theorists as an internal hypothetical construct to explain the effect of reinforcement. “Early” Skinner had adapted the use of the drive concept as an internal intervening state (Skinner, 1938/1990), but gradually shifted his position to describe it as an environmental operation (Skinner, 1957) such that food deprivation replaced hunger and water satiation replaced the reduction of thirst (Miguel, 2013; Sundberg, 2013). For Skinner, motivational operations remained independent of the three-term contingency similar to the choice of animal species and the operant box arrangement.

Later, Skinner’s effort to externalize the concept of a drive/motivation was extended by Michael (1982, 1993) in applied behavior analysis. Given Michael’s concept of the motivating operations, Sundberg (1993) proposed reconceptualizing the three-term contingency as a four-term contingency by including the concept of motivating operations: motivating operation, antecedent, behavior, and consequence. Although treating the motivating operation as an independent variable is operationally sound, to include it in the three-term contingency implies the presence of the agent whose state influences the effectiveness of the environmental stimuli across time and environments. This is evident in Michael’s (1993) description of the concept:

An *establishing operation* . . . is an environmental event, operation, or stimulus condition that affects an organism by momentarily altering (a) the reinforcing effectiveness of other events and (b) the frequency of occurrence of that part of the organism's repertoire relevant to those events as consequences. (p. 192; emphasis in original)

Michael assumes that the motivating operation affects “organism” that carries and executes multiple sets of three-term contingencies (“repertoire”) given different environments. One can foresee that the logical extension of this approach is the introduction of the agent in the three-term contingency just like in the S-O-R formula in which the drive concept played a significant role in the explanation of behavior. One of the reasons behind Michael's reconceptualization of motivational variables was that behavior analysis would become vulnerable to criticisms by others in psychology without addressing motivation (Sundberg, 2013). Here, one can see behavior analysts' struggle to stay agent-free while adapting to the demand of the niche.

Another example is the treatment of genetic factors. As applied behavior analysts expanded their professional niches to the area of clinical psychology, especially in the field of developmental disabilities, the role of genetic factors became potent. Langthorne and McGill (2008) discussed the importance of incorporating genetic influence on the development of self-injurious behavior (SIB) with people with certain developmental disabilities such as Down syndrome and Rett syndrome. Their model of the early development of SIB was an extended version of the three-term contingency incorporating factors such as genes and motivations. They indicated that genetic events influence the nature of motivation, topographies of behavior later conditioned to be an operant, stimuli that are later discriminated, and contingencies that would function as a reinforcer. The authors suggest that acknowledging and incorporating genetic influence in the analysis would enhance a therapist's ability to assess, treat, and prevent SIB among people with a given disability. Again, just like Michael, the incorporation of the genetic variable in the three-term contingency also implies the presence of the agent whose state alters the effectiveness of the environmental variables across time and settings.

A similar issue can be seen when behavior analysts migrated to the animal training field. Behavior analysts had been criticized for the use of a limited kind of animal species as their experimental subjects and disregarding a species-specific behavior or instincts in their analyses of behavior. When Breland and Breland (1961), animal training specialists, adapted the behavior analytic approach to animal training, they encountered a similar issue such that they had difficulty conditioning the behavior of different species of animals in a uniform fashion without taking into consideration each animal's instinctive behavior pattern. They offered a way to redefine instincts in a behavior analytic term and urged operant psychologists to incorporate and study animals ethologically and as a whole in their experimental works. Here, too, is an emphasis to include an agent, an animal as a whole, in behavior analysis.

In all cases, the agent problem is a constant selective pressure that demands responses from behavior analysts. Instead of introducing the agent directly, applied behavior analysts extended its three-term contingency formula to respond to such a demand, but the inclusion of variables such as the motivating operation and the

subject variable as an extension of the three-term contingency could lead to something similar to the cognitivists' S-O-R formula in the future.

Human Behavior and Behaviorism

The agent problem is most salient in the niche where human behavior is of interest. This is even more so in the niche where the behavior of typically developing, language-able adult humans is concerned. In the field of economics, intentional behaviorism (Foxall, 2007, 2008) actively incorporates the agent, a language-able person, into its formula. Foxall (2008) points out that radical behaviorism cannot account for "(a) behavior at the personal level (as opposed to accounting for behavior-environment relationships), (b) the continuity of behavior over time and space, and (c) the delimitation of interpretations of behavior" (p. 119). Foxall argues that even though radical behaviorism is sufficient in predicting and controlling behavior using extensional (objective) language, it still misses information at the personal level, such as subjective experience, without which the analysis of human behavior is not complete. By including the personal level with the analysis of intentional idioms (statements using the first-person point of view such as "I think," "I believe," and "I want"), intentional behaviorism aims to fill the gap between the external stimulations (antecedents and contingencies) and behavior, providing continuity of behavior (Foxall, 2007, 2008). By incorporating intentional explanations in behaviorism, Foxall argues that one can interpret behavior even though one does not have access to information about antecedents, contingencies, and history of reinforcement of a person of interest in the everyday situation, un-limiting behavioral interpretation.

Unlike emergent behaviorism and theoretical behaviorism, which incorporate the agent in the form of a hypothetical construct such as memory and attention, intentional behaviorism permits a person to mediate time and environments. In this case, a person is a language-able human being who uses first-person statements. Personal experience and a report of it, Foxall argues, would not be reducible to the functional analysis as radical behaviorism proposed nor could it be broken down into mathematical or cognitive mechanisms as emergent behaviorism and theoretical behaviorism proposed. He wrote, "The intentional terms ascribed in intentional behaviorism result entirely from an attempt to overcome radical behaviorism's problem of legitimately applying theoretical terms of an intentional nature. Intentionality is ascribed only to the person not to sub-personal entities" (Foxall, 2008, p. 129). Foxall provides an example:

We can say that the fact that he is looking for his glasses is "something *he knows*" without scrutinizing or making reference to his past or future behaviors . . . it is to argue that the man does not need to say, to himself at least, that he is enacting behavior that has culminated in his finding his glasses in the past. There is a level of understanding of his behavior, expressed in terms of what the man knows without external reference, that cannot be expressed in language other than the intentional. (p. 126; emphasis in original)

Here, intentional behaviorism assumes that the "man" is the mediator between the environmental events and his own behavior who is to look for the glasses. Unlike the molar behaviorists who would argue that one can explain this person's behavior if one

extends the observation in space and time, Foxall argues 1) the man's self-report suffices the identification of the cause of his behavior and 2) subjective experience is unattainable to such an observer and requires incorporation of the subjective dimension into the analysis. In this case, intentional behaviorism indicates that there is a qualitative difference between the extensional (objective, third-person) and intentional (subjective, first-person) statements that a person verbalizes. Thus, intentional behaviorism advocates for the inclusion of reports of subjective experience (the use of intentional idioms) as a part of a comprehensive analysis of human behavior.

When dealing with typically developing, language-able humans, one's subjective experience is difficult to exclude as a subject of study and the agent-free approach is least understood. As a means of adapting, intentional behaviorism makes a bold modification: its only concern is human activities and it actively incorporates a person as the agent in its formula as the interest of its study, both of which are a drastic move away from the other behaviorisms. Such an adaptation can be seen as a result of the selective pressure of the niche. In the field of economics, theories of human economic behavior heavily employ the concepts such as "satisfice," "optimal decision making," "nudging," and "preference," all of which infer a person (i.e., the agent) when explaining the results of quantified human economic behavior (e.g., Foxall, 2017). Intentional behaviorism's adaptation is evident in Foxall's (2017) statement, "... consumer behavior analysis has sought to meld behavioral psychology, behavioral economics, and marketing science into a unified whole that comprehends consumer behavior in a unique way" (p. 309). For a person whose aim is to incorporate behavior analysis into this niche, it is understandable that their version of behaviorism takes a shape of intentional behaviorism.

An interesting comparison can be made between intentional behaviorism and contextualistic behaviorism where both claim that their subject matter is human behavior and no other animals. They differ in their attitude toward the agent problem. Whereas intentional behaviorism embraces the agent as a necessary component of the analysis of behavior, contextualistic behaviorism diminishes it as a mechanistic component that does not represent a whole organism. Although intentional behaviorism preserves a separate analysis to a person's subjective experience, contextualistic behaviorism redefines the "psychological level of analysis as the study of whole organisms interacting in and with a context," and indicates that the agent in its isolation from the context is not appropriate for their analysis of behavior (Hayes & Hayes, 1992). How can two behaviorisms that both focus on human behavior differ? A factor that could have influenced this difference might be their competitors in their niches. As discussed above, contextualistic behaviorism competes with behavior therapists who embraced cognitivism in their understanding of human behavior. Thus, accepting the agent in a causal chain of behavior would not distinguish contextualistic behaviorism from the rest. On the other hand, intentional behaviorism is in the field of behavioral economics where psychological behaviorism is a new perspective. It would be difficult for intentional behaviorism to stay agent-free and be accepted by such a niche.

Pragmatism and Diversification

Behaviorism is unique in the way that it is adaptive to a given environment compared to other schools of philosophy. One characteristic of behaviorism that

permits such flexibility is pragmatism, and all the new versions of behaviorism discussed above adhere to this characteristic. This aspect of behaviorism has provided success in many niches where behaviorists have migrated. Its commitment to pragmatic success in changing behavior is often one of the strengths against its competitors in a given field such as clinical psychology. As discussed above, this aspect of behaviorism also allows it to change its own shape to adapt to a given niche. On the other hand, such adaptation to the niches often causes a debate among behaviorists of different niches as to what the subject matter of their study is, what measurement and criteria are to be used, and how to interpret the results. The practicality of using theory is emphasized by emergent behaviorism and theoretical behaviorism. The use of time and activities are advocated by molar behaviorists. The inclusion of intentional terms is suggested by intentional behaviorism. A socially significant behavior change is emphasized by radical behaviorists in applied behavior analysis and contextualistic behaviorism. Baum (2002) writes, for example, when discussing the unit of analysis of his dependent variable, “Where should subdividing stop, and how does one define the parts? Answers would depend on the purpose of the analysis, whether it be therapeutic intervention, basic research, or something else” (p. 111). Some scholars are cautious about the pragmatic nature of behaviorism. Burgos (2003) discusses the danger of pragmatism by pointing out that, “. . . Jamesian pragmatism is the most discussed form of pragmatism in philosophy and science (behaviorism and behavior analysis included. . .). Under Jamesian pragmatism, anything goes, even nonsense, as long as it is useful to someone. . .” (p. 42). He also writes, “Pragmatism leads to a relativism that is seriously at odds with an emphasis on science as the best way of knowing” (Burgos, 2007, p. 63). Thus, one can argue that the diversification seen in this article is a result of behaviorists not strictly adhering to the original core values that early behaviorism advocated. Staddon (2018) also argued that the diversification of social science is disadvantageous to the field because it would prevent a healthy and open scientific communication and criticism between niches. Likewise, Rider (1991) shows a concern that there has been less and less communication between the experimental analysis of behavior and applied behavior analysis. On the other hand, diversification is a natural phenomenon that is a product of the environment and is largely uncontrollable. It is a part of the survival of the species without which no behaviorisms would exist today. Time will only show which behaviorism will survive tomorrow.

Conclusion

This article reviewed the diversification of behaviorism in recent decades using the concept of adaptive radiation as a guiding principle. As behaviorism migrated from its original niche of experimental psychology into new niches such as clinical psychology and economics, it has diversified into new forms. Although some characteristics of behaviorism remained, other characteristics were modified. One such characteristic that went through extensive modification was the agent-free approach to the analysis of behavior. The article discussed the agent problem as one of the major selective pressures that influenced the shape of new kinds of

behaviorism in different niches. The presence of competitors and the nature of the resources were also factors in the emergence of new forms. Thus, variations in present-day behaviorism can be thought of as a product of the selective pressure of each niche.

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