Chapter 35

A Non-Cognitive Alternative for the Study of Cognition: An Interbehavioral Proposal

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SUMMARY

The conceptual and methodological characteristics of an alternative proposal for the study of a group of phenomena traditionally called "cognition" are described. The basic assumptions of this proposal are discussed in order to show their coherence with the contemporary generic version of behaviorism. I characterize first the "behaviorist family," understanding it as a complex conceptual framework that embraces multiple behavioral traditions and today represents the philosophy of a science called "behavior analysis." Later, I specify the underlying conceptual assumptions of one of the types of behaviorism, the Interbehavioral theory, emphasizing how it orientates the study of complex behavior by following J. R. Kantor's ideas and the subsequent developments of Emilio Ribes-Iñesta. Finally, I provide an example of the interbehavioral approach by describing how a research group at the Universidad Nacional de Colombia developed current studies focused on the factors associated with the emergence of intelligent behavior.

The main purpose of this document is to describe an alternative approach for studying a group of phenomena known in a broad sense as problem solving, language, reasoning, intelligence, etc. Before going any further, I will attempt to clarify some issues related with the title of the paper; otherwise some readers may find it incoherent. I will demonstrate that "non-cognitive," "cognition" and "behavioral" are categories that can be related without any conceptual or historical confusion.

Similar to other words used in psychology, "cognitive" and "cognition" are both technical and non-academic terms and their interchangeability sometimes leads to misleading assumptions. Aside from any technical use in psychology, "cognition" is a word originally related to knowledge (the Oxford English Dictionary defines it as "the action or faculty of knowing; knowledge, consciousness; acquaintance with a subject") and the word "cognitive" is defined in the same dictionary as "of or pertaining to cognition, or to the action or process of knowing; having the attribute of cognizing."

During the last four decades a diverse collection of theories and philosophical orientations in psychology have included the adjective "cognitive" as a part of their names (e.g., cognitive science, cognitive psychology, etc.). This, however, does not imply that other psychological approaches (without sharing the same kind of principles and titles) cannot maintain an interest in studying how organisms gain knowledge. If we accept this possibility, it is not "profane" to develop a "non-cognitive" approach for studying cognition, even though this alternative proposal does not subscribe to the actual mainstream family of psychological theories.

Despite this first clarification, the reader may still be confused about something else: "a behavioral proposal?" How can it be? Weren't Watson, Skinner, and their theories dead along time ago, especially after the famous "cognitive revolution"?

This second issue is related to another set of common misunderstandings about what "behavior analysis" and "behaviorism" mean today and how modern behavioral theories (many of them not directly aligned to the Skinnerian tradition) address the problems of cognitive phenomena, again understanding "cognitive" as "related to how organisms gain knowledge." For an example of this kind of confusion an anecdote may suffice: a couple of years ago, during an introductory class to the problems of "language and thought," I had the opportunity to listen to a well-known professor summarize the controversial book *Verbal Behavior* (1957), written by Skinner more than 50 years ago, as "the last and failed attempt to explain human language by using only the principles of Stimulus-Response theory and Pavlovian conditioning." Aside from the fact that the professor's entire statement was incorrect because of its conceptual and historical mistakes, it was also evident how necessary it is to halt the dissemination of these types of false ideas in order to give a fair recognition to the past and actual contributions of the behavioral tradition to the understanding of human nature. This is the reason for beginning with a description of what today is widely understood as behaviorism and behavior analysis, and subsequently presenting in detail one of the versions of behaviorism that coexists among many others: *Interbehaviorism.*

After describing the conceptual principles that underlie the interbehavioral theory and how it is coherent with the "behaviorist" conceptual framework, an example of the type of research oriented by this approach at the Universidad Nacional de Colombia will be explained. Specifically, I will describe the methodological and conceptual background of a research program focused in the factors associated with the emergence of intelligent behavior.

This paper has a purpose similar to what Salzinger (1973) tried to accomplish more than 30 years ago: ". . . to show how radical behaviorism's concepts [this time, interbehaviorism's concepts] can address themselves to the problems that our cognitive psychologist colleagues have (temporarily) sequestered unto themselves." (p. 369)

CONTEMPORARY DEFINITIONS OF BEHAVIORISM:
THE FAMILY SEMBLANCE

Zuriff (1985) and O'Donohue and Kitchener (1999) argue that it is possible to consider "behaviorism" as a valid name for a group of psychological traditions and, in some cases, a group of philosophical and therapeutic orientations. Even though "mainstream" psychology has maintained ancestral and typical confusions about behaviorism (for a full revision of this topic please refer to Hurtado-Parrado, 2006; Freixa I Baqué, 2003; Malone, 2001; O'Donohue, Callaghan & Ruckstuhl, 1998), behaviorism(s) as a "family semblance" (Zuriff, 1985, following Wittgenstein's expression), must be considered as an underlying conceptual foundation of a science of behavior (called Behavior Analysis) instead of considering it as a science or a theory itself. Today, many psychological theories that are oriented towards the study of behavior coexist and develop their own research programs. Despite differences in their methodologies, influences, topics of interest, etc., what those theories have in common is a conceptual structure called "behaviorism."

Several forms of behaviorism have emerged and developed during the last few decades. Following the reconstruction made by O'Donohue and Kitchener (1999) in their *Handbook of Behaviorism*, it is possible to identify more than 10 types of behaviorism since the days of Watson to the present. In their list of behaviorisms the

authors include: Tolman's, Hull's, and Skinner's behaviorisms; and Kantor's interbehavioral proposal (e.g., Kantor & Smith, 1975). Also included are Rachlin's teleological (e.g., Rachlin, 1999), empiric (e.g., Bijou, 1999), theoretical (e.g., Staddon, 1999), and biological (e.g., Timbelake, 1999) behaviorisms. Hayes' functional contextualism (Gifford & Hayes, 1999) makes part of the reconstruction as well. Controversially, O'Donohue and Kitchener (1999) argue that some of the ideas of philosophers like Wittgenstein, Ryle, and Quine constitute forms of behaviorism (Bloor, 1999; Gibson, 1999; Place, 1999).

Despite the diversity among the various types of behavioral theories, are there any shared components that may constitute a generic "conceptual" structure named "behaviorism"? Zuriff (1985) answers this question by describing four groups of principles he discovered in all the forms of behaviorism he examined.

First, behaviorism is the underlying philosophy of a behavioral science (sometimes called "Behavior Analysis"). Before any empirical findings, behaviorism dictates canons concerning what sorts of psychological questions are worth pursuing and what methods are acceptable in searching for answers. Similarly, behaviorist doctrine defines what kinds of concepts are acceptable and what form a psychological theory should take. Thus, behaviorism provides a strict framework in which behaviorist scientific activity takes place; thereby determining a priori, important characteristics of the resulting behavioral science (Zuriff, 1985).

According to Zuriff's conceptual structure (1985), a second principle:

> [B]ehaviorism is also a philosophy of the mind with firm assumptions about human nature and the essential workings of the mind. This philosophy of mind is interdependent with the behaviorist philosophy of science whereby each one justifies the other. A science restricted to a limited set of methods and explanations will tend to confirm a particular conception of mind. (p. 2)

The third principle, described by Zurrif:

> [B]ehaviorism has several important empiric assumptions. These empirical principles consist of a few basic assumptions about behavior and its relationship to the environment and also a set of beliefs about the relative effectiveness of some methods in scientific research and theorizing. (p. 3)

And finally, the fourth principle:

> [B]ehaviorism also represents a firm set of values. It recommends goals for behavioral science and suggests standards for scientific activity. Values are even more prominent with respect to applied behavioral science in which behaviorism promotes applications congruent with particular social aims. Behaviorism must, therefore, be seen as an ideology as well as a philosophy of psychology. (pp. 2-3)

What is Behavior Analysis?

Behavioral psychologists have defined behavior analysis as a scientific, global approach for the study of the organisms' interaction with the environment. For this scientific

community the term implies an approach which includes principles about how to deal with the object of study (i.e., principles about how to study behavior), strategies for developing a proper analysis of the behavior phenomena, the need to build a systematic body of knowledge in psychology, and the development of technologies which solve social problems.

Finally, it is important to mention the following subdivisions of the discipline that today are widely accepted among behavior analysts (Morris, 1998; Pierce & Epling, 1999):

- Experimental Analysis of Behavior (EAB): in charge of basic research and discovering fundamental behavioral processes (laws).
- Applied Behavior Analysis (ABA): in charge of basic behavioral processes implementation, behavioral technology development, and improvement of research methods for solving social problems.
- Conceptual Analysis of Behavior: in charge of philosophical, historical, theoretical and methodological investigations regarding the study of behavior.

A BEHAVIOR ANALYTIC ALTERNATIVE FOR STUDYING COGNITION: THE INTERBEHAVIORAL APPROACH

Whereby "Behaviorism" in mainstream psychology is a term restricted to a small group of conceptual proposals that are typically associated with controversial names such as J. B. Watson and B. F. Skinner, modern behaviorists recognize that the "behaviorism" picture is more complicated and, consequently that the theoretical and empiric panorama within behavior analysis has its own diversity which is not so easy to comprehend.

A research program rooted in one of the rather unfamiliar behaviorisms called "interbehaviorism" will now be discussed. Although interbehavioral ideas were proposed originally by J. R. Kantor (Kantor & Smith, 1975; Midgley & Morris, 2006; Ribes, 1984; Verplank, 2001), contemporary developments can be related to the Mexican psychologist Emilio Ribes Iñesta who continued Kantor's historical and philosophical reflections and lead a research program with different "branches" and topics of interest (e.g., Ribes, 1990a, 1990b, 1990c; Ribes-Iñesta, 2004a, 2004b, 2006, 2007; Ribes & López, 1985; Varela, 2005, 2008).

I will begin by describing the interbehavioral assumptions and later, will briefly mention how they can be applied to understanding what is traditionally called "cognitive phenomena" (problem solving, intelligence, reasoning, etc.). For expositive reasons during this first part of the conceptual reconstruction I will not differentiate between Kantor's original ideas and those of Emilio Ribes-Iñesta, as they are very similar; however, later it will be necessary to describe Ribes-Iñesta's specific set of ideas.

Evidently, the description of the following theoretical and meta-theoretical issues is an example of the kind of interests the Conceptual Analysis of Behavior have; whereas the later discussion about the methods, strategies and specific experimental arrangements for studying complex behavioral phenomena can be included under the Experimental Analysis of Behavior areas of interest.

Basic Assumptions of the Interbehavioral Psychology and their Coherence with Zuriff's List of Principles

The group of assumptions described by Zuriff (1985) (common to all forms of behaviorism) can also be traced as well in the interbehavioral proposal:

1. Psychology will succeed only if it rejects any form of ontological dualism (coherent with the second and fourth assumptions).

2. Each natural science studies different forms of interactions. Psychology, a natural science, studies the interaction between an organism and its surrounding objects. This type of interaction is called "behavior," or more precisely, psychological "interbehavior." What makes this different from other behavioral traditions is its emphasis on the "interactive segment" (i.e., the possible relations) and not in the isolated actions displayed by an organism (usually called "responses") or the isolated actions provided by the objects placed in the environment (usually called "stimuli"). The interaction itself constitutes the subject matter of the psychological science (coherent with the first and third assumptions).

3. One way to differentiate psychological interactions from others—for example, the biological ones—is to attend to the historical essence of each one. Biological interactions are fixed and can be traced phylogenetically (i.e., the understanding of an individuals' biological interactions implies assumptions about the interaction's invariability among subjects, generations and time, and the evolutionary history of a particular group of organisms). On the other hand, psychological interactions are flexible and need to be understood ontogenetically (i.e., the understanding of an individuals' particular psychological interaction implies assumptions about an idiosyncratic history of contact with the environment and supposes variability across time, space and subjects) (coherent with the Zuriff's first and third assumptions).

4. Some of the psychological behavior characteristics are differential, integrative, variable, modifiable, delayed in time, and inhibitive (coherent with the first and third assumption)

Specifically, Ribes-Iñesta has developed other critical aspects for understanding psychological events (many of these ideas are discussed in Ribes & López, 1985):

5. The concept of behavior as an interaction implies the assumption that behavior is not ostensible; instead, we must consider behavior as an abstraction (Ribes, 2004a). Interaction means relation, relations are abstract, and abstractions are "grasped" from particulars. So, which are those particulars? They are actions of the organism and actions of the surrounding objects, both interdependently related (coherent with the first and third assumption).

6. Psychological interactions can be of five different levels of complexity (the simplest levels have been the ones studied by behavioral analysts during the past 60 years: the famous classical/Pavlovian conditioning and operant/instrumental conditioning). For Ribes and López (1985) complexity depends on two factors: the individual's level of participation in the organization of the interactions by means of his actions (see concept of "mediation," Ribes & López, 1985) and the level of temporal and spatial independence of the individual's actions from the present and immediate situation ("extended" interactions), a concept labeled by Ribes and López (1985) as "Functional Detachment" (see Ribes, 1991) (coherent with the first, second, and third assumptions).

7. Problem solving, reasoning, and verbal behavior are considered as interactions, ways of knowing, cognitive phenomena; or in other words, behaviors. For an interbehavioral theory, these behaviors are considered to be of a higher level of complexity because the individual, by means of his/her actions, partially or completely changes their present situation (therefore transforming the interaction with the objects in the environment). For example, a child who is learning how to play with a new toy, first in the company and orientation of his/her mother and then (in another situation) alone. The child's level of participation in the second situation is greater than in the first situation: in the first circumstance when the child is in the company of his/her mother, the child requires the mother to mediate his/her interaction with the toy, whereas in the second situation the child, through his/her actions (e.g., verbalizations) mediates his/her own interaction with the toy (which is coherent with the first, second, and third assumptions).

Currently, our research group at the Universidad Nacional de Colombia manipulates simple interactive histories of experimental human participants. We expose participants to different kinds of computerized tasks, shaping by these means qualitatively different interactions (following the taxonomy of behavior proposed by Ribes & López, 1985); we then introduce changes to different aspects of the original learning situation, conceptualizing these changes as "learning transference tests." By these means we are attempting to find which factors influence the adjustment of the participants to novel situations. At this point, some variables have been clearly identified, such as different kinds of rule governance or a history of differential exposure to multiple examples of the task.

The following is an example of the type of research oriented by the Interbehaviorist approach. By using a simple definition of "intelligence" as a dispositional-adverbial concept that refers and qualifies the tendencies of the participants to interact with the objects surrounding them (i.e., the concept of intelligence applies to variable and effective interactions), rather than considering "intelligence" as an entity or a property of an entity which "causes" certain socially valuable actions (e.g., an informational processing system, module or a property of that system or module), it is, thereby, possible to consider that intelligent interactions (i.e., intelligent behaviors) will be those which fulfill two characteristics: (1) they are variable, or in other words, have changes along a temporal continuum, and (2) imply an adjustment to a socially constructed "criteria" (i.e., effectiveness criterion) (Ribes, 1990a; Varela & Quintana, 1995; Varela & Ribes, 2002).

One of the basic purposes of our studies is to explore the interactions between linguistic factors, human learning effectivity, and behavioral variability by means of shaping the stable interactions of the participants with different versions of experimental computer-assisted tasks (e.g., Hurtado-Parrado, 2008; Hurtado-Parrado, Robayo, & Peña-Correal, 2007; Hurtado-Parrado & Robayo, 2005). By means of the feedback we provide through the use of specially designed software, the participants get to solve a computerized task. This feedback is contingent on correct or incorrect actions that the participant displays and consists of points, money and/or verbal reinforcement. Once the subject fulfills a pre-established effectivity criterion on the task, the original conditions of this problem-solving-interaction changes, including the removal of the feedback. Different variations of the task have been conceptualized to measure the complexity level of the interaction the participant is displaying (the same levels conceptualized originally by Ribes & López, 1985).

As an example of this methodological approach, a participant learns to select among several figures that appear on the computer screen, the one that is different in shape and color to a sample or the one that is similar in color but not in shape to the sample; in both cases the correct response depends on an arbitrary contextual clue that changes trial after trial. For example, even though the same set of figures appears on the screen over two or more trials, on each trial the correct figure will be different depending on the contextual clue that is present. It is said that the contextual clue is "arbitrary" in the sense that it does not have any formal or explicit relation to its meaning or to the other figures that appear on the screen; in addition, "arbitrary" means that the participants have no previous experience with this clue.

When the participant reaches the stage that interacts effectively with this kind of task (i.e., shows a conditional discrimination), several changes can be introduced (i.e., different learning transference tests), including the display of new figures, changing the relevant relations between the samples, comparisons and contextual clues (e.g., instead of difference and similarity, the relevant relations are identity or opposition) or changing the relevant dimension of the relations implied (e.g., instead of relating figures by similarity or difference, now we expect the participant to choose the synonym or the antonym of a sample word).

Each one of these types of changes is conceptualized as requiring qualitatively different interactive levels (i.e., qualitatively different behaviors) in order to be solved correctly. In other words, because each change implies different levels of mediation and functional detachment for the subject to be effective, it is said that different levels of the Ribes and López (1985) behavior taxonomy are being displayed. The construction and use of more abstract rules by the individual would be an example of the higher level of participation in the configuration of the interaction (i.e., mediation level), whereas the possibility of continuing to respond to new relations, figures and/or dimensions in the absence of feedback would represent higher levels of functional detachment.

When we observe that the subject's interactions change accordingly to the introduction of novel requirements (i.e., the interactions are variable and effective), we state that the subject is interacting "intelligently" since the interaction shows variation across time and fulfills the arbitrary experimental criteria (e.g., solving correctly 90% of all the imposed tasks). We do not affirm that the participant behaves (interacts) intelligently because he/she has an entity (intelligence) that causes the interaction to be the way it is (as many other psychological theories accept), instead, we attempt to reconstruct the type of history, actions, environmental variables, etc., which are necessary to occur for what we have defined as an intelligent interaction. Finding these fundamental critical-historical elements constitutes itself the "explanation" of the chosen phenomena and also definitively implies an alternative proposal for the study of a frequently mentioned "cognitive topic" named intelligence.

Finally, it is important to mention that this research area is directly linked to a broader and older interbehavioral program developed by Emilio Ribes-Iñesta and his colleagues in México (see Mares & Guevara, 2001; Tena et al., 2001). In Ribes (2006) own words:

[The human learning project] . . . systematically explores the development of cognition. Cognition is understood as the transition from interactions regulated by factors present in a situation to interactions regulated by implicit events dependent on linguistic factors. This transitional process is evaluated in terms of the

acquisition, maintenance, and transfer of complex discriminations, both in problem-solving tasks and in categorization experiments . . . The basic assumption of these studies [that show the complex relations taking place between human learning and linguistic factors] is that instructions and feedback limit human learning to variables acting within the situation, and that transfer to different situations or to purely abstract variables depends on the occurrence of appropriate descriptions of the performance and task criteria. (p. 441)

While many psychologists, even those trained during the golden age of behaviorism, now believe that behaviorism has given way to cognitivism and is a dead-end for understanding complex human interactions, this paper, however, has outlined a different history. This counter-history shows the proliferation of different forms and strains of behavioral theory within the growing professional discipline known as behavior analysis. In addition, this paper has discussed an approach for conceptualizing and studying complex human behavior, which not only constitutes an alternative with respect to mainstream "cognitive" psychology, but also constitutes an alternative within the behavioral tradition itself.

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