

Revista Mexicana de Análisis de la  
Conducta  
Sociedad Mexicana de Análisis de la Conducta  
jburgos@ cucba.udg.mx  
ISSN (Versión impresa): 0185-4534  
MÉXICO

2004

Livia M. Sá / Diana M. Delgado / Linda J. Hayes  
THE FUNCTIONAL NATURE OF THE BEHAVIOR SEGMENT  
*Revista Mexicana de Análisis de la Conducta*, diciembre, año/vol. 30, número 002  
Sociedad Mexicana de Análisis de la Conducta  
Guadalajara, México  
pp. 181-187

Red de Revistas Científicas de América Latina y el Caribe, España y Portugal

---

Universidad Autónoma del Estado de México

<http://redalyc.uaemex.mx>



## **THE FUNCTIONAL NATURE OF THE BEHAVIOR SEGMENT**

*LA NATURALEZA FUNCIONAL DEL SEGMENTO DE CONDUCTA*

**LIVIA M. SÁ, DIANA M. DELGADO & LINDA J. HAYES**  
UNIVERSITY OF NEVADA, RENO, USA

### **ABSTRACT**

As the subject matter of the science of interbehavior, the behavior segment is analyzed in terms of its functional composition. It is suggested that the psychological event differs from other types of events, in that it includes both a physical/biological and a historical dimension. In discussing the co-actualization of stimulus and response coordinates and the continuity of interbehavioral adjustments, the historicity of the behavior segment is especially highlighted.

### **RESUMEN**

En tanto objeto de estudio de una ciencia inter-conductual, el segmento de conducta es analizado en términos de sus componentes esenciales. Se sugiere que los eventos psicológicos difieren de otro tipo de eventos debido a que incluyen tanto una dimensión física/biológica como una dimensión histórica. Se resalta la relevancia de la historicidad del segmento de conducta en la descripción de los procesos de co-actualización de coordinadas de estímulo y respuesta, y del carácter evolutivo de los ajustes inter-conductuales.

One of the ways in which Kantor's (1924, 1926) interbehavioral view differs from the more traditional behavioral approach is in the assumption of bi-directionality in the relation between stimuli and responses. In this position, the notions of causality and dependency are substituted for interaction and interdependence; wherein stimulating conditions and responses can be said to engender one another. In other words, since a response is specific to a particular

set of stimulus conditions, the response is a function of the stimulus in much the same way as the stimulus is a function of the response (Kantor, 1958). As is the case in the equation of a mathematical function, the two-way arrow involved in this position ( $S \leftrightarrow R$ ) implies that nothing can be altered in one aspect of the relation without altering in the same way the other aspect. Assuming that psychological events do not occur in a coordinated sequence of causes and effects or antecedents and consequences, one is compelled to describe the relation between a stimulus and a response as a simultaneous occurrence.

Implied by this description is the notion that a psychological act is a unitary phenomenon, whereby the parts designated as organismic responses and conditions of stimulation are segmented only for purposes of scientific and technological investigation. Also implied is that a psychological event is an occurrence of the continuous present. However, an act of this sort is possible only if it is itself an historical occurrence. This is to say, upon any new interaction between object and organism, a new adjustment between the two takes place. Therefore, "historical" refers to the relation between the prior occurrences of a given event and the subsequent changes in the functional relation between stimulus and response. Accordingly, time is relevant to the analysis of psychological events, not because of its relation to the number of prior occurrences of the event, but because of its relation to the adjustments resulting from new occurrences of that particular event. Further, the temporal circumstances of psychological events differ from those of the non-psychological domain. These relations will be analyzed here, as Kantor's model of stimulus and response functions, stimulus objects and responses, and organisms and objects in the world, unfolds to identify the boundary conditions of a science of interbehavior. From this analysis, Kantor's conception of the behavior segment will be elaborated on the basis of the distinction between uni-dimensional and bi-dimensional relations, the historicity of functional relations, and the adjustive character of psychological events.

## THE WORLD OF THINGS AND EVENTS

From an interbehavioral perspective "... *stimuli and responses are different from objects and organisms which are their carriers*" (Kantor, 1958). This statement refers to the notion that not all objects are stimuli. Few behaviorists would object to this notion. It reflects a basic philosophical and ontological assumption, namely that there is a world of nature and its existence is independent of the observer. This world includes: the things within the observer's perceptual range, the things that a person has interacted with in the past but are physically outside of the observer's present perceptual range, and all the things that the person has never had contact with but are nonetheless as-

sumed to exist. Thus, the interbehavioral view stands on the pre-analytic assumption of reality or objective existence of objects and organisms.

### THE PHYSICAL AND BIOLOGICAL DIMENSIONS

This is a very general level of interaction among things and events in the world. In any kind of contact between objects, objects and organisms, or contact between organisms, there is an interaction whereby one or all the members in contact are affected in their physical or chemical compositions. The structural properties of two inorganic objects in direct contact are different from the properties of each object alone; and the way this contact affects one or both objects may be evident only on a very large time scale. The formulation of principles describing the composition and the nature of the relations between inorganic objects is the subject matter of physics.

With effects and reactions occurring in a much smaller time scale, the same occurs with interactions between organisms and objects and between organisms. Tropisms, cellular reactions, and reflexes are examples of these relations, which constitute the subject matter of biology. These types of relations are typically described as unidirectional in the sense that the occurrence of an event B is dependent upon the occurrence of an event A and the reverse is not true. In other words, the first event is not altered in any way by the occurrence of the second event. For example, the cellular composition of a plant is altered when exposed to light, but the light is not altered by any change occurring in the plant.

Of course, the relation encompasses both as photosynthesis cannot occur without the presence of the light and the plant. The dependency in such relations is not with respect to the parts involved in the relation, but it is defined by the changes in only one of those parts as a result of contact with the other. While changes in Y are dependent on changes in X, changes in X are independent of changes in Y. The whole event is determined by the characteristics of the parts involved in the relation just as a different line results given different ranges of X and Y. However, this is an analysis of the whole event and its features as defined by the features of X and Y (e.g., the process of photosynthesis per se is different from one plant to the other according to the amount of light received or to the structural cellular composition of a particular plant). The event itself however, occurs by virtue of the dependency relation that exists between X and Y.

Even though the difference between unidirectional and bidirectional is commonly established on the basis of temporal relations (i.e. the gap between instances of occurrences), that difference is indeed a functional one. More specifically, what differentiates a unidirectional relation from a bidirectional

one is the interdependency between the processes of developing stimulus functions reciprocally to response functions. Accordingly, a biological event is unilateral because of a lack of interdependency between the processes involving the reacting of the organism and the stimulating of the object. This can be explained by the fact that biological organisms are not inert, as it the case of physical events. Biological organisms are sensitive to variations and changes in the environment, such that their organic maintenance is secured.

### THE HISTORICAL DIMENSION

In contrast to the physical and biological domains, the psychological domain is characterized by relations of interdependence between responses and environmental conditions of stimulation. A psychological event can be defined as one in which, in addition to the physical dimension, a historical dimension is involved. Notice that in the physical dimension, an interaction between an organism and its environment will remain unchanged if the same event is observed after any number of occurrences. The event is psychological however if its present occurrence reflects its past occurrences. Kantor's differentiation of stimulus and response functions from stimulus objects and responses indicates his awareness of the historicity of the psychological act. The historical dimension is a relational dimension wherein the notion of time expresses the relation between different occurrences of a given event. Accordingly, it implies the evolution of adjustments which result from the accumulations of interactive contacts.

A stimulus object comprises the interbehavioral history of an organism with that particular object. Even though only a particular set of functions are actualized in a given psychological event (that we identify as the stimulus functions of that object), different properties of that object may have been actualized for that organism on previous occasions. This is to say, the stimulus object comprises all of the properties that could be actualized as functions of stimuli, given that they had been actualized as such at some previous point in time. This conception is expressed in formal terms as  $\sum t (S \leftrightarrow R)_n$ , where the subscript  $n$  indicates that the psychological function is but one of many other possible functions that have occurred over time.

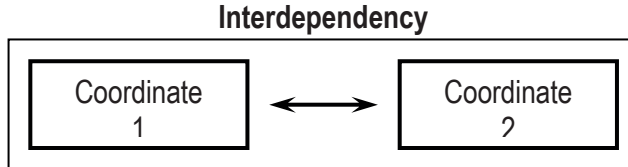
Given the interdependence of stimulus and response that characterizes the psychological event, the same analysis applies to the distinction between responses and response functions. A response is not a concrete event; rather it refers to the historicity of response functions. In other words, it comprises all of the properties that could be actualized as functions of response, given that they had been actualized as such at some previous point in time.

In order to conceptualize the historical character of stimuli and responses, Kantor proposes the notions of stimulus evolution and reactional biography.

Those two notions refer, respectively, to the changes in the functional relation between stimulus objects and organisms. Stimulus evolution and reactional biography refer to the process of developing stimulus-function and response-functions, respectively; whereas stimulus objects and responses are the comprising of those functions, which might be said to be equivalent to the product of those processes.

### THE PSYCHOLOGICAL DIMENSION

When explaining the origin and evolution of the psychological event, Kantor conducts his analysis moving from the pre-psychological stage of the organism and object, to the development of specific adjustments, to the probability of a stimulus-response functional relation being engendered. The psychological adjustment resulting from the interaction of properties (i.e. physical, chemical, biological, and anatomical) between the stimulating object and the responding organism is what Kantor calls the stimulus-response functional relation. In other words, stimulus function and response function represent the two interdependent coordinates of the process of adjustment that occurs whenever a stimulating object and a responding organism interact (see Figure 1).



*Figure 1. Stimulus-Response Functional Relation*

For Kantor, the psychological event is the adjustments of organisms to environing things and conditions, and in order to analyze such event, he establishes the behavior segment as the descriptive unit of psychological events (Kantor, 1958, p. 84). The construct of the behavior segment is conceptualized as a three dimensional model, including: 1) the interactional dimension, referring to immediate, physical, direct contacts between organisms and things and conditions; 2) the adjustive dimension, referring to the establishment of interdependent stimulus and response functions; and 3) the historical dimension, referring to the potential relation between a stimulus and a response.

In order to exemplify the analysis of the behavior segment and the functional relations involved in a psychological event, we will examine the event of drawing. While drawing, one needs to press a pencil against a surface at a certain angle, in a certain direction, and with a certain force. As such, a set

of specific anatomical movements is actualized, a certain amount of lead is transferred from the pencil to the surface, forming different contours on the tip of the lead. In other words, the amount of lead consumed together with the contour being formed is a function of the angle, direction, and force of the anatomical movement, as much as the angle, direction, and force of the anatomical movement is a function of the amount of lead and contour needed to generate the line intended. Mathematically, that same functional relation could be represented by stating that  $y$  is a function of  $x$ , which likewise means that  $x$  is a function of  $y$  (see Figure 2 for mathematical representation).

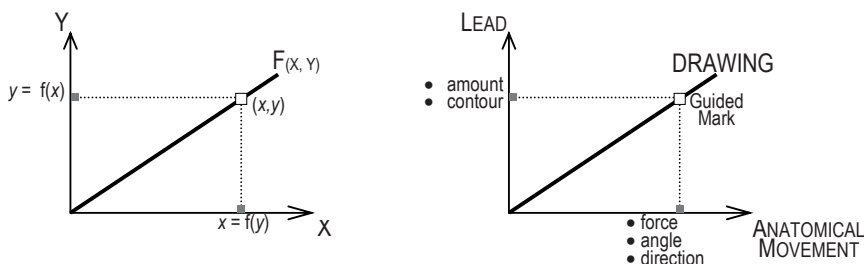


Figure 2. *Mathematical Representation of a Functional Relation*

It is this functional relation between the physical properties of the lead and the anatomical properties of the human hand that makes the actualization of marks or lines possible. Specific interactions between the anatomical properties of the human hand ( $x$ ) and specific physical properties of the lead ( $y$ ) generate specific guided marks or lines ( $x, y$ ). The continuous interaction between the human hand and the lead, on the basis of the functional relation described thus far, actualizes what we call drawing ( $F_{(x,y)}$ ).

From an interbehavioral perspective, the event described above consists of a responding organism and a stimulating object that, through immediate direct contact and the previous establishment of corresponding matching functions, engender a psychological situation.<sup>3</sup> The person drawing (i.e. the responding organism) and the pencil (i.e. the stimulus object) interbehave with one another making possible the co-actualization of both the anatomical properties of the human hand and the physical properties of the lead. This co-actualization of properties is the very marks and lines forming the drawing.

3. It is assumed here that previous interactions between the organism and the object have already occurred, and that such a history of interactions has resulted in the building up of coordinate stimulus and response functions. In other words, there is already a certain kind of stimulation and responsiveness available in the interaction between the human hand and the lead. The possible types of adjustment resulting from prior encounters between the organism and the object represent the potential functional relation taken on by the stimulating object and the responding organism.

The event of drawing, as understood within an interbehavioral framework, is a functional relation: drawing occurs as soon as the interaction between the properties takes place, wherein the stimulus object takes on specific stimulus functions and the responding organism builds up specific response functions in a simultaneous and interdependent manner. Hence, stimulus function and response function do not exist separately as independent units. Stimulus function is the participation of the stimulus object (i.e. pencil) in the psychological event (i.e. drawing), and it determines how the stimulus object interbehaves with the psychological organism. Response function, on the other hand, is the participation of the responding organism (i.e. the person drawing) in the psychological event, and it determines how the responding organism interbehaves with the stimulating object. It is this functional relation between stimulus function and response function – namely, psychological adjustment – that evolves over time. Accordingly, psychological evolution does not refer not to changes in the organism but to the development of such adjustments – more specifically, to changes in the functional relation between stimulus function and response function.

In sum, the psychological event of drawing comprises: 1) the reciprocal interaction between the physical properties of the lead and the anatomical properties of the organism; 2) the actualization of those properties as interaction takes place; 3) the correlation between the stimulus function of the pencil and the response function of the organism; and 4) the evolving adjustment between stimulus function and response function as the interaction occurs. By this analysis, the psychological event may be defined as the co-actualization of potential properties on the basis of simultaneous and interdependent functional relations.

## REFERENCES

- Kantor, J. R. (1924, 1926). *Principles of Psychology*, Vol I & II. Granville, OH: The Principia Press.
- Kantor, J. K. (1958). *Interbehavioral Psychology*. Bloomington: The Principia Press.