Some Thoughts on Thinking and Its Motivation *

Algunas Consideraciones Sobre el Pensamiento y su Motivación

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"Thanks to Ryle and Wittgenstein, we are beginning to understand that the intellectual status of a publica performance does not depend upon its being caused, backed or shadowed by a parallel private performance. It would be a sad reversion to a worse-than-Cartesian position if, in a case where a certain kind of performance does have both public and private versions, we were to regard the latter as the only truly thoughtful versions just because they alone were private."

Jonathan Bennett, 1971

"Thinking', there we have a terrible ramified concept. A concept that comprehends multiple manifestations of life. The *phenomena* of thinking are very different one of each other."

Ludwig Wittgenstein, 1979

ABSTRACT

Traditional psychological formulations in the study of thinking have generated two general problems: 1) how thinking is related to language and imagining, and 2) how to study thinking given its covert nature. This paper critizes these approaches and proposes a conceptual revision of the term "thinking" from a wittgensteinian and aristotelic perspectives, and offers an alternative to the treatment of this subject by the operant conditioning theory, based on interbehavioral theory.
DESCRIPTORS: thinking, conceptual analysis, interbehavioral theory, operan theory.

RESUMEN

Las formulaciones tradicionales en Psicología en el estudio de pensamiento han generado dos problemas generales: 1) en que forma se relaciona el pensar con el lenguaje y la imaginación, y 2) como se puede estudiar al pensamiento dada su naturaleza cubierta. Este trabajo critica esas aproximaciones y propone una revisión conceptual del término

"pensamiento" desde las perspectivas wittgestenianas y aristotélicas, y ofrece una alternativa al tratamiento de esta área por la teoría del condicionamiento operante, basada en la teoría interconductual.

DESCRIPTORES: pensamiento, análisis conceptual, teoría interconductual, teoría operante.

Thinking is the most elusive topic in psychology. Partially, its elusiveness comes from the semantic amplitude of the term itself: it includes reasoning, conceptualizing, certain kinds of remembering, imagining, judging, problem solving, and many other ancilliary concepts. But there is also a historical background that gives account of this fact: the assumption that the term corresponds to a mental process or entity, hidden from public observation, and consisting in a kind of internal stage where the individual mirrors his or her own experience as a privileged spectator.

Two general problems have emerged from this traditional formulation of thinking. First, the relation between thinking, language and imagining. Second, the experiential nature of thinking as a covert, silent process or activity, which builds up the representation of the world as meaningful objects and things for the individual. Both features may be critized on the grounds of a conceptual analysis of the use of thinking as a language game (Wittgenstein, 1953; Ryle, 1949, 1979), or through the historical assesment of the logical and empirical fallacies which have distorted the original meaning of the term in the writings of Aristotle, who is considered the beginner of the discipline which today we refer to as Psychology (Kantor, 1963; Ribes, 1984, 1986).

Although I will eventually resort to both kind of analyses, my intention in this paper is to examine how radical behaviorism —as operant conditioning theory— has addressed this issue, and to propose an alternative approach based on an already developed field theory about behavior (Ribes & López, 1985).

Rule-Governed Behavior: Limitations and confusions.

Skinner proposed rule-governed behavior as the analytic tool to deal with thinking and related problems in *Contingencies of Reinforcement* (1969), although the approach may be traced back to *Verbal Behavior* (1957) and *Science and Human Behavior* (1953). Un the earlier writings rule-governed behavior is implicit in the analysis of the tact and thinking. Some of the shortcomings in these concepts were conserved in the formulation of rule-governed behavior.

I will discuss three problems in relation to the concept of rule governed behavior:

    a) the operational nature of the term;

b) the logical inconsistencies in the definition with respect to operant theory; and

c) the difficulty of distinguishing rule-governed behavior from rule like contingency-shaped behavior.

Rule-governed behavior is distinguished from contingency-shaped behavior in terms of the direct effect on behavior of exposure to contingencies versus the antecedent or indirect control exerted by the verbal specification of contingencies in the form of a rule. Rules are conceived as descriptions of contingencies, and therefore are assumed to be *extracted* from contingency systems as *constructed* discriminative stimuli by the individual or by others Thus, rule-governed behavior is discriminative stimulus controlled behavior. Nevertheless, the rule as a discriminative stimulus is not the same as the discriminative stimulus forming part of the specified contingency. Because of this, although the topography of the behaviors involved in both cases may be similar, they are conceived to be functionally different. In any case, both types of behavior, to be maintained, must be followed by consequences specified in the contingency. The distinction lies *only* in the locus of control of the behavior.

Rule-governed behavior is related to tacting and thinking because rules as contingency-specifying stimuli normally consist in descriptions and injuctions, which *extract* complex contingencies in the environment. Rule constructing is similar to tacting since contingency specification requires verbal responses, and these responses must "reproduce", in the form of a rule, the properties of the stimulus conditions which define the contingency being extracted. Since most of the time these contingencies are extremely complex —they consist in stimulus properties in relation— tacting becomes thinking. Thinking is, to a certain extent, complex tacting (Skinner, 1957).

I will now go through the inadequacies of the concept of rule-governed behavior:

a) The definition of rule-governed behavior rests upon a logic very similar to that being used to formulate the distinction between operant and respondent behaviors.

An operant is identified in terms of an observational relation. If the response follows a discrete stimulus in time, it is called a respondent. If the observer is unable to identify the antecedent stimulus change, the response is called an emitted response, and the introduction of an imposed stimulus consequence allows the observer to identify this emitted response as an operant. Skinner (1935) stressed that an operant may be correlated with a prior stimulus change, but that this stimulus is usually out of the reach of the observer. Hence, the operant-respondent distinction is, in principle, an operational definition based on the observational properties of the relations being thus identified.

The distinction between rule-governed behavior and contingency-shaped behaviors runs along similar lines. If the prior stimulus is the observational referent to establish if a response is elicited or emitted, the consequent sti-

mulus is the observational referent to identity a response as rule-governed or contingency-shaped. If the behavior is directly controlled by consequences it is considered contingency-shaped. If the observer is unable to identify an explicit, inmmediate consequence, the behavior is defined as rule-governed. The distinction is again established according to the observational properties of the behavioral relation being classified.

Nevertheless, as happens with the operant-respondent distinction when the observer is unable to impose an *arbitrary* consequent stimulus relation to the response, difficulties also emerge with the operationally based definition of rule-governed behavior. First, an operant as an instance of a class, that is, as a response, it may not necessarily be followed by the consequence which defines its membership to such a class. Nevertheless, this definitional property of an operant that imposes restrictions on any observational criterion based upon the identification of a one-to-one correspondence between responses and consequences, does not allow one to distinguish these instances as contingency-shaped or rule-governed behavior. The history of any operant is not observable *per se* since it refers to a *tendency* of responding and not to single ocurrences. Therefore, the ocurrence of a response without exposure to a consequence is not a sufficient condition to identify it as rule-governed behavior. Second, it is assumed that the rule as a discriminative stimulus has a *particular* verbal form. Thus, rules are conceived as descriptions, injuctions or some varied forms of softened manding. Nevertheless, the form of the discriminative stimulus does not mean that the response occasioned by it is not under the functional control of present contingencies.

Two conditions do not fit with the assumption that the form of the rule-stimulus allows for the identification of rule-governed behavior:

a) when the rule-stimulus controls behavior in similar ways to non-rule stimuli, as does happen with most of instructions; and, b) when the rule itself forms part of a present contingency. These two cases among many others, point out the difficulty of distinguishing rules as *special kinds* of discriminative stimuli. It is not enough that the discriminative stimulus as a rule "*includes the discriminative stimulus* forming part of the contingency being specified. If this were the case, rule-governed behavior would consist only in a formal excercise of classifying stimulus conditions.

b) There are logical inconsistencies in the definition of rule-governed behavior.

By a logical inconsistency I will not refer to the formal properties of the definition, but to the correspondence between the conditions which are specified by the definition and the empirical circumstances in which the definition is used.

The first inconsistency is related to the very concept of a discriminative stimulus which controls behavior not exposed to direct conquences. I have already commented that the non-ocurrence of a consequence does not cancel the generic nature of a response as a member of an operant as a contingency-shaped class. Nevertheless, we face a serious problem when the non-

ocurrence is systematic and takes place during the *acquisition*. If a discriminative stimulus is defined as a stimulus prior to responding which is the occasion for the response to be reinforced, this means, *by definition*, that the concept of a discriminative stimulus only may be used when there is a contingency including a response being reinforced in its presence, at least during the acquisition state or period. In the analysis of the tact, Skinner (1957) proposed an argument similar to that used for rule-governed behavior.The non-verbal stimulus is assumed to exert control on the tacting response because the later is followed by a generalized reinforcer; since the consequence is not specific to a particular motivational state, the response control is asumed to be transfered to the antecedent stimulus. Nevertheless, the following question remains: how is developed a strong specific dicriminative control under generalized reinforcement? (Ribes, 1983). There is no empirical evidence to sustain such statement.

In rule-governed behavior the rule consists of a discriminative stimulus in the presence of which the response is not shaped by the consequence. Even in the case that the consequence is thought of as a delayed consequence, the issue remains the same: the use of the concept of the discriminative stimulus is inconsistent with and violates its fundamental definition. The rule can not be conceived as a discriminative stimulus. If it is so, then it would not be possible to distinguish between rule-governed and contingency-shaped behaviors, or the difference between them would refer to the nature of the stimulus and not to the contingency relation under which a response occurrs.

The problem lies in the fact that a concept such a rule-governed behavior is needed to describe complex behavior as that taking place when we usually talk about thinking. But, it is obvious that such a concept can not be built upon the logical structure of the discriminative stimulus relation. The theory must resort to new concepts distinguishing the complexity of the relations to which *they* have to be applied. This change in the theory must begin with the recognition of the difficulty in defining stimulus functions bound to the concept of reinforcement as a central device in the analysis of contingencies.

A second inconsistency has to do with the role of consequences in the definition of rule-governed behavior as different from contingency-shaped behavior. The basic element in both types of behavior is a contingency system, which is conceived as a system of relations between stimuli, vehavior and consequences. In rule-governed behavior an additional element is included: the stimulus condition specifying contingencies. This makes a double distinction regarding the response: there is a response prescribed by the contingency and a response which follows the rule, responses which may not be necessarily the same. The rule, anyhow, becomes funcțional to the extent that the response under its control is effective in regard to the contingency being specified. And effectiveness only means that the rule-governed response must be followed by similar consequences to those defining

contingency-shaped behavior. If this is the case, and both types of behavior share the same consequences, how is it possible to distinghish among them?

c) Rule-governed behavior as a concept does not allow distinguishing actual rule-governed behavior from rule-like controlled behavior.

The concept of rule-governed behavior entails the construction of discriminative stimuli by the individual, as well as the transmission of constructed stimuli to govern the behavior of other individuals. Both aspects are greatly facilitated by verbal behavior, since this allows for differential responding to stimuli in constructing new discriminative cues and for the social transmission of these discriminative stimuli in the form of instructions, advice, orders, etc. Nevertheless, some problems arise from the definition of rule-governed behavior as constructing and transmiting discriminative stimuli controlled behaviors. One relates to the nature of the process of construction and transmission of discriminative stimuli. Another, to the assessment of the variables controlling the behavior under rule-like stimuli.

When Skinner talks about rule-governed behaviors as a process of constructing discriminative stimuli, he is undoubtedly pointing to the fact that the individual is not responding exclusively to the external stimulus conditions but also to his own behavior or behavior-produced stimuli in relation to them. And, although thinking while behaving[2] necessarily requires that the individual changes external conditions by responding to its own behavior under these conditions, the proposal of a mechanistic-like process supplementing cues to the environment contingencies seems to fall short as a descriptive and explanatory device.

Why so? Because it does not distinguish between responding to *vestigial* cues from *anticipating* forthcoming stimuli. By anticipation I do not mean any kind of fractional response to future stimuli under conditional cues, but responding according to contingencies not present in the situation as physical stimulus elements, and responding to present contingencies *as if* they had changed following the "constructing" response by the individual. The central problem is not the fact of constructing so-called discriminative stimuli, but the nature of the "construction" response.

Verbal responses not only facilitate this process of construction, they are necessary for the construction of new rule stimuli, to take place. The conventional nature of verbal responses[3] allows for their dettachment from particular objects, events and situations. They may be emitted in new and different conditions without having to appeal to imagery or memory "processes". To

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[2] I use thinking when talking about behavior as an adverbial category following Ryle (1979). Adverbial categories are supraordinated to modal categories and do not entail an extra-episodic event or occurrence. On the other hand, to talk about thinking behavior entails the danger of assuming that thinking is a special kind of behavior, and therefore it may be recognized through its morphology as action.

[3] Verbal responses are not restricted to phonetic or textual dimensions, but refer to conventional behaviors publicly shared, which allow for responding to non-apparent, not-present contingencies and even relations. It this respect, Skinner's (1969, p. 136) example of marking suitcases with a chalk would be an instance of verbal or linguistic behavior, quite contrary to his rationale about the example.

the extent that events are events reacted to verbally, the environmental contingencies are always contingencies mediated by the verbal behavior of the individual (as speaker, listener, reader, writer, marker, signaler or observer). Rule-governed behavior, if the term has any useful meaning, must be analized in terms of the process that takes place when the individual learns and applies verbal responses that modify present contingencies in terms of the conventional function that these responses have.

It is important to point out another weakness in the traditional analysis of rule-governed behavior: the transmission of new discriminative stimuli is not a consequence of changing the private status of constructed stimuli into public, but by their very nature as conventional stimuli and response functions, these new stimuli are always *acquired as consequence of public stimuli-constructing responses*. The difference between "trial and error" behavior and rule-governed behavior lies in the public and conventional provenance of the later. In fact, the only way to demonstrate that a rule-like governed behavior is not a pseudo-type is to show that its acquisition is socially designed to respond to and construct conventional detachable stimuli, and that these relations so established are transmissible through the same behavior governed by externally-induced rules. Obviously, this does not mean that all rule-governed behavior is externally induced. This induction, anyhow, is a necessary condition for its initial acquisition as a non-contingency-shaped behavior.[4]

This argument is connected with the second problem I previously mentioned: the assessment of truly-rule control of a specific behavior. As I have already discussed, the formal features of the constructed discriminative stimuli are not sufficient to warrant that a particular behavior is rule-governed. There are many instances of rule-like stimulus conditions which do not exert truly rule-control on the behavior that follows them. People learn to repeat maxims, to follow and give instructions and commands, to provide examples and models, and so on, and many times the behavior that takes place does not fit to the concept of rule-governed behavior.

Rule-like stimuli normally form part of contingencies that do not require any other participation from the individual besides adjusting to the signalled contingency.

As I have before pointed out, even in Skinner's analysis, rule-governed behavior has to share an effective contingency. In fact, rule-like stimuli come with consequences in most of all the cases of so-called operant behavior. The absence of effective consequences makes an operant analysis of behavior difficult, since rules actually become surrogate stimuli for effective contingencies. How are rules to be detected if they do not substitute for

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[4] See J. Bennetts' (1971) analysis of rationality and the criteria to attribute rationality to behavior, he concludes that "only linguistic behavior can be appropiate or inappropiate to that which is not particular and present" (p. 87). Obviously, this refers to the situational detachability of behavior necessary for the construction and transmission of "rules".

effective contingencies? Although many thinking behaviors are problem solving and, therefore, relate with effective contingencies, many others do not entail *instrumentally* effective behaviors, but only linguistic effective behaviors, and sometimes, there are no specific criteria for effectiveness. Effectiveness in these cases is dependent upon the behavioral relations themselves. This is why the transmission of so-called constructed discriminative stimuli is a test of the true ocurrence of rule-governed behavior. Later on I shall examine this topic again from a different perspective.

Thinkings as behavior: how is it related to rules and linguistic conventions?

To begin with, I shall discuss very briefly what I consider thinking *not* to be, in order to propose a tentative definition that may be useful for progress in the analysis of this topic.

Unfortunately, the history of the term "thinking" in psychology is plagued of formal fallacies. These consist in identifying products, procedures and conditions with psychological processes or entities such as mental acts or structures. From this historical use, psychology has been conmmitted to deal with formal fictions such as analysis, synthesis, induction, deduction, transitivity, judgment, reasoning and many other similar concepts.

A careful examination of the ordinary use (or the language games) of· these terms shows that they do not "refer" to mental entities, acts of conciousness or extraepisodic hidden activities. They are normally used to talk about features of behavior or to relations in which behavior becomes involved as an essential component. When we talk about thinking we do not talk about a special kind of behavior like talking, for instance, *an* something else. Thinking is not an additional activity, content or entity different from the behavior we are describing through this term. Therefore, thinking is not occurring autonomously from the behavior itself, although it is not identical to one or another component of this behavior. What is thinking about then?

Thinking, as a concept, does not refer to a special kind of behavior, but rather to a special kind of relation in which behavior becomes involved. As such, thinking is not a process. Thinking shares many processes with behavior in general. To identify thinking is not to identify a special kind of relations in which behavior participates. Wittgenstein (1979) said that ". . .who *thinks* during his work, frequently incorporates *auxiliary activities*. The words *to think* do not designate in this case those auxiliary activities, as well as thinking is not equivalent to talking. . . Such auxiliary activities are not thinking, but oneself represents thinking as the stream that must flow beneath the surface of these auxiliary resources if they are not to be just mechanical actions" (p. 23). Because of this, it is meaningless to talk

about thinking independently behavior, but it is equally absurd to identify thinking as *self-substitutional behavior.* [5]

How is thinking to be characterized as a special relation in which behavior is involved? I will define thinking as *self-substitutionalbehavior.* [6]

How is self-substitutional behavior to be understood? First, I will discuss the concept of substitutional behavior.

By substitutional behavior I do not refer to implicit and covert or non-apparent responses, although substitutional behavior, under certain circumstances, may consist of implicit and non-apparent responses. Nevertheless, non-observability or lack of explicit correspondence with stimulus conditions are not the essential features that define substitutional behavior. By substitutional behavior I refer to interactions between the individual and events —normally including the behavior of other individuals— in which functional contingencies do not depend on the presently acting physical circumstances. Because of this, substitutional behavior is tantamount to substitutional contingencies (Ribes, 1986).

Substitutional behavior consists of *conventional* behaviors (responses or response-produced stimuli) which *transform* the situational contingencies under which one or more individuals are responding. This transformation may operate in two ways. One, in which the individual responds to present situational contingencies in terms of contingencies pertaining to a different situation. This substitutional behavior may be characterized as *extrasituational* substitution. Another, in which the individual responds to present situational contingencies in terms of the linguistic properties of the behavior, and thus the contingency becomes dependent on the behavior itself and independent of any specific situation. This substitutional behavior may be characterized as *transituational.*

According to these definitions, in order to identify behavior as thinking the behavior must consist of substitutional behavior, extrasituational or transituational. It is important to stress that substitutional refers to a functional property regarding the transformation of present physical situational contingencies, and the concept has nothing to do with surrogation, replacement or standing for events. However not every substitutional behavior qualifies as thinking. What is the additional restriction? Substitutional behavior must transform the contingencies themselves to which the behaving individual is responding. In other words, the behavior must be self-substitutional.

Let me examine how it is possible to identify these various instances of substitutional behavior and how they differ from non-substitutional behavior.

[5] This would be in fact possible if behavior is defined as a relation: interbehavior. Then thinking could be identified with certain forms of interbehavior, independently of the *actions* involved in.

[6] Peter Harzem (personal communication) has called the attention on me about the fact that the term *substitution* does not convey the specific meaning I propose. As I have already stressed it is equivalent to transformation and not to replacement or standing for contingencies.

To substitute for contingencies means the ability to detach particular behaviors from from their functional correspondence with present acting physical contingencies in a situation, and accordingly, to be able to attach those behaviors to circumstances not present in the acting situation. This "transference" of functioning contingencies is possible only by means of linguistic responses. Their conventional character allows for detaching them from any situational contingency defined as a perceptual relation, that is, as behaving to the here-and-now apparent physicochemical properties of events and their relations.

Non-substitutional behavior may be covert and implicit to the extent that the responses are under the functional regulation of present physically acting contingencies. The responses may also be linguistic (conventional) without qualifying as substituional. Substitutional behavior is a matter of functional detachment regarding contingencies, and it is not restricted by the morphological characteristics of the behavior involved in the interaction.

Non-substitutional behavior, therefore, may be identified as behavior that only occurs to specific (variable or invariant) contingencies being present during the interaction. It may consist in apparently "abstract" behavior, but to the extent that it is undetachable to situations in which the functional contingencies to which is related are working, it does not qualify as substitutional. It is situationally-bound behavior, irrespectively of being linguistic or not, covert or observable, concrete or abstract regarding the stimulus properties regulating the relation.

Substitutional behavior is self-substitutional under two distinctive conditions:

a) When the behavior of the individual affects his/her own behavior to present conditions, according to previous or future confronted situations. It is not implicit behavior to present contingencies, but implicit behavior to non-present contingencies;

b) When the behavior of the individual consists in interacting with linguistic behavior as the contingency events in such a way that linguistic events are independent of any specific situation. Writing up a paper, examing a manuscript, talking to oneself regarding an argument, are instances of this second kind of self-substitutional behavior. To the extent that linguistic relations *as such* are transituational, the linguistic behavior to these relations is the only way to transform them into new relations or contingencies. Linguistic behavior becomes instrumental in creating and transforming linguistic contingencies as functional acting events.

There is a third kind of substitutional behavior that does not qualify as self-substitutional. This occurs when behavior transforming contingencies is directed toward changing the circumstances of a different individual, as does happen in communication episodes or many of the phenomena traditionally studied by social psychologists under the label of prejudice, rumor, social perception, etc.

On different types of thinking

Thinking, as with other kinds of behavioral relations, may be directed or non-directed (Berlyne, 1965). By directed I mean outcome-directed behavior as takes place with any intelligent behavior (Ryle, 1979; Ribes, in press). Intelligent behavior consists in effective behavior. Directed thinking, in this perspective, could be called intelligent thinking and has to do with the general issue of problem-solving. On the other hand, non-directed thinking consists in non-effective self-substitutional behavior.

How are effectiveness and non-effectiveness related with extrasituational and transituational behavior? Only part of extrasituational behaviors are directed, to the extent that allow the individual to respond as being in a different situation without being situationally affected by it. Other extrasituational substitutional behaviors mediate effects *on* the individual and not *by* the individual, and therefore, do not qualify as directed thinking. Transituational substitutional behavior, on the other hand, always seems to satisfy the requirement of directedness or effectiveness. Conventional behavior transforming conventional behavioral contingencies is effective and directed due to the very nature of linguistic contingencies, irrespectively of what Wittgenstein (1953) called the language game being played. In our perspective, linguistic contingencies are related to any conventional reactive system which defines arbitrary dependences among its elements. Therefore, transituational substitutional behavior is not restricted to "natural" languages, but includes also any kind of formal and arbitrary language created by convention, eg., painting, music, mathematics, etc.

Which behaviors take place in extrasituational non-directed contingency substitution? They consist in behaviors which do not *adjust* to episodes in which the individual "talks" to himself. As Ryle (1979) has pointed out, many of the linguistic behaviors by individuals when alone consist in actions that are not self-directed, but that rather represent adjustments to past or future situations. In this regard, such behaviors affect the present condition of the individual. These non-effective substitutional behaviors might be metaphorically described as "reproductive" and "as. . .if" actions. I might mention the following behaviors as instances of extrasituational self-substitutions, which do not qualify as directed thinking: to repeat what has been said or done, to "recall" an event or situation, to react as. . . , to rehearse what is going to be said or done, to anticipate circumstances, to recognize an event as being from. . . , to feel as in, with or as doing. . . The common feature of these behaviors is that, although they substitute for contingencies not present in the situation, they affect the individual as being present in such situation. Needless to say, these behaviors are not strictly verbal, but involve general changes in the activity of the individual. Nevertheless, they may not be characterized as true "soliloquies" (or as Skinner would say: episodes in which the speaker is its own listener).

Extrasituational self-substitution may be conceived as effective or directed

when the individual, in a non figurative sense, talks to himself. When talking to himself, the individual does not behave as being in a different situation, but rather substitutes for the acting situation without actually being affected by the substituted contingencies. Some instances of this kind of behavior are: to comment to oneself, to prepare oneself for something, to self instruct, etc. All these behaviors may include some of the episodes which characterize non-effective extrasituational substitution, but to the extent that the latter become component activities of a substituted contingency which does not actually affect the individual, they may become part of effective thinking. True self-talking is the condition which allows for such an adjustment to effective self-substitutional behavior.

As previously mentioned, transituational self-substitution seems to adjust always to the criterion of effectiveness of directed thinking. This is so because "talking about talking" —in order to simplify any language game about language— is transituational by definition, and unspecific regarding particular events or behaviors. Accordingly, excepting "loose" talk, the relation in which behavior becomes involved in, is always framed by a conventional effect to be searched for or produced. This is the reason why Aristotle in *About the Soul* referred to the intellectual soul as "the place of forms. . . and not of acting forms, but forms in potence". Because of this ". . .the intellect is also able to be self-intelligible" (p. 231 —Spanish translation, Third Book, 429b).

To think, in this sense, is to be able to behave in regard to one's own conventional behavior, in order to identify, describe, and apply the relations embedded in the language game as a behavior episode. Ryle's (1979) analysis of thinking as self-teaching is a useful model to follow in order to clarify the process of transituational self-substitutional behavior.

To know something instrumental to solving a problem means that the individual performs effectively in relation to a set of conditions which demand a particular outcome or achievement. Nevertheless, the exercise of such a performance does not warrant that the individual is aware or able to describe the contingencies and behavior relations that took place during such a process. To know something as performance does not entail to know the description of such a performance, and even less, how to formulate a rule, maxim or prescription about that performance. Accordingly, the ability to teach such knowledge is related to the availability of the two latter kinds of knowledge.

Performing effectively is intelligent behavior but does not satisfy the criterion of thinking or "thoughtful" behavior. It becomes thinking when the individual is able to describe the contingencies under which he performed. This description as self-substitutional behavior is an instance of extrasituational substitution. Nevertheless, the behavior is to be conceived as transituational self-substitution when the individual formulates a rule or prescription about the described contingencies, and accordingly, he/she may later apply the rule in a different situation or may transmit it to a different individual as didactic speech (Ryle, 1949). Briefly, transituational thinking as directed

behavior consists in searching for and performing linguistic behavior func-
tionally related to a variety of situational contingencies and the corresponding
reference to such circumstances, behavior that must not be attached to any
of the involved specific performances and situational contingencies.

Which are the behavioral components covered by this process of perfor-
mance description and rule formulation? Among others, it involves describ-
ing, formulating, recognizing, identifying, applying, comparing, distinguish-
ing, relating, fractioning, composing and course following. These components
are not different actions from those occuring as thinking. They actually
describe what Ryle (1979) calls adverbial categories, that is, manners of
behaving and not types of action.

The actions taking place during performance description and rule formu-
lation may have the most varied morphological features, but they must share
their functional integration to linguistic actions relevant to the contingencies
embedded in linguistic and non-linguistic effective performances. Formulating
a rule is not constructing discriminative stimuli. It is substituting contingen-
cies. As has been previously pointed out (Ribes and López, 1985) to think as
transituational substitution is tantamount to *translate* independent con-
ventional contingencies as equivalent.

Some preliminary data about rules and thinking behavior

I shall discuss a series of experiments (Martinez, Gonzalez, Gutierrez and
Ribes, in preparation) which deal with the analysis of the influence of rules
on behavior, and the distinction between substitutional and non-substitu-
tional behavior.

The three experiments consisted in a matching-to-sample situation in
which subjects had to learn a first-order conditional discrimination. The
matching task consisted either in a *difference* or a *similarity* relation. In
difference, the subject had to choose among three comparison stimuli a
stimulus different in shape and color from that in the sample. In *similarity*
the choice could be made according to color or shape; the correct stimulus
could share one of the two modalities with the sample stimulus and be dif-
ferent in the second one. Comparison stimuli were ordered in three blocks
of distinctive difficulty, according to their familiarity or novelty regard-
ing the particular shapes and colors of the sample stimuli being used in each
trial.

In the first study, three conditions were evaluated in all the subjects,
although the conditions were presented according to different sequences.
The experimental manipulation consisted in the instructions given to the
subjects regarding the rules to be observed in order to solve the matching
task. Three types of instructions were given: a) instructions which correctly
informed the subjects about the task, and the correct matching choice among
the comparison stimuli; b) instructions which informed incorrectly about the

task: subjects were instructed to match according to similarity; and, c) ins-
tructions formulated by the subjects themselves during base-line sessions,
when they were asked to write down what they thought the rule was in
order to respond correctly in the matching situation. This instruction re-
sulted in a different rule from every subject. Subjects were informed at the
end of every session regarding the number of correct responses during that
session, and they were asked also to write down what they thought was the
rule to be followed in order to respond correctly to the matching task.

The type of instruction seemed to be an effective variable controlling per-
formance on the matching task, although some sequential effects were obser-
ved. The highest percentage of correct responses was found in the condition
where the correct instruction was presented. Responding under self-generated
and incorrect instructions generally resulted in poor performance although in
some subjects a significative percentage of correct responses was observed in
both conditions. Two sequential effects are worthwhile mentioning. First,
that the highest correct responding under false instructions was observed
after the condition of true instructions. Second, that more incorrect res-
ponding under correct rules took place when the false instruction condition
preceded the former.

These results suggest some tentative conclusions. Experimental subjects
tended to adjust to the task instructions. This may be observed in the
initial performance under each condition, the sequential effects of the
various conditions, and the irregular performance in the test sessions (trans-
ference sessions). Nevertheless, in spite of the fact that information about ·
performance in the task was given at the end of every session, this feedback
seemed to exert some influence, since during the true-instruction condition
the performance was maintained, from the very beginning, at a high level
of precision; and in the conditions with false and self-generated instructions,
correct performance was observed at unexpected levels of success in some
cases. This means that instructions were effective to the extent that they
were correlated with performance, even when feedback was not immediate
or regularly following every trial. The performance of experimental subjects
was higher with low difficulty stimulus arrangements and very poor with
high difficulty ones. This suggests that in spite of having responded correctly
the true-instruction condition, the subjects did not really formulate a "rule"
or apply it. Moreover it is possible that they could not describe their perfor-
mance. They just performed the instruction. Otherwise, they would also
have been successful with non-perceptually obvious arrangements in the
other two conditions, as well as in their response to the *transference tests.*
The descriptions they gave, about the rules being "followed" during the
task were, in general too nonspecific to consider them descriptions of their
performance.

In a second study, the performance of experimental subjects under
changing stimulus relations was evaluated in a matching task. Three condi-
tions were presented in different orders: a matching task based on the *dif-*

ference between stimuli; b) a matching task based on the *similarity* between stimuli; and, c) a matching task alternating *similarity* and *difference* relations among stimuli between sessions. The instruction given was that subjects should choose a comparison stimulus having a relation with the sample, and the relation might change in different sessions. As in the first study, information about their performance was given at the end of the session, at which time they were asked to write down the "rule" they thought might describe the correct relation between stimuli. Subjects performed under the alternation condition when this was the initial one in the experiment. Otherwise, they responded in terms of a similarity or of a mixed similarity-identity relation, which, were the dominant self-descriptions of the rules being "applied" by the subjects. The highest performance tended to be in the similarity-matching condition, with the exception when the alternation condition preceded the difference-matching situation. In these cases, although in not all the subjects, correct responding increased.

These results showed again how instructions, in this case self-generated by the experimental subjects according to the easier perceptual relations to be formulated (identity and similarity), did influence the performance in the matching-to-sample task. Nevertheless, information provided at the end of the sessions also exerted an influence on the performance.

It was observed that a significant percentage of correct responding occurred in the difference-matching condition, in spite of the fact that this instruction was not self-formulated by the experimental subjects. The exposure to differential relations and information, as provided by the alternation condition, facilitated this effect in the following sessions. It is likely that the formulation of similarity "rules" by the experimental subjects reflected the effect of information about their performance in the easiest perceptual arrangement during the experiment. If this were the case, the instructions would be, in fact, "pseudo-rules", since they would be the outcome of a true self-description of the performance during the task. If the experimental subjects had been able to self-describe their performance, they would also have had formulated adequate descriptions about the difference-matching situation when they had performed correctly and even incorrectly.

In the third experiment, the effects of different "schedules" of information regarding performance outcome were studied. Three conditions were presented, in a different order for all subjects: a) information after every trial; b) information in alternate trials; and, c) information at the end of every session. The task consisted in a matching-to-sample situation in which stimuli were arranged according to a difference relation. As in the previous study, the subjects sere instructed that they had to choose among one of the comparison stimuli, and they were asked at the end of every session to report the rule they assumed might describe the correct responding to be performed.

The lowest percentage of correct responding was observed in the subjects

who were initially exposed to the "every trial" information. In contrast, the best performance was observed in those subjects who began under the "end of session" information. The best performance was always located in the "every trial" condition, with the exception of the group which began with this condition. This group showed a very poor performance along the whole experiment. Incorrect self descriptive rules related performance to identity or similarity-matching relations. When correct responding was obtained in the two groups that showed better performance, the self-descriptive rules corresponded to the actual task matching relation.

The results of the study show that the function of consequences, as information about outcomes, is twofold. A consequence seems to be a highly powerful variable once the subject has been able to identify, describe or formulate the "rule" that fits with his/her successful performance in non-initial conditions. This was the effect of every trial information for the two groups of subjects that did not begin with every-trial information. But when outcome-information is provided to the subjects for every trial without their having been exposed to an imposed description of the task-solution, it seems to work against a successful performance, id est, it interferes with the acquisition of effective behavior regarding different options of matching relations. On the other hand, the end of session information seemed to facilitate the process of searching for an adequate performance, and accordingly, for a self-description of the performance when successful. This may be due to the fact that information provided at the end of the session facilitates the subject being detached from moment-to-moment contingen- . cies, and accordingly, helps in promoting extrasituational substitutional behavior.

These studies, in general terms, show, contrary to those looking for rule- governed behavior in schedule-like performance, that behavior under the regulation of instructions or prescriptions is sensitive to consequences. Nevertheless, the effect is measured not in regard to rate or patterning of rate of responding, but rather in regard to precision, which is the feature which satisfies effectiveness criteria essential to thinking behavior. Interactions between instructions and consequences also seem to be more complex than generally assumed by the simplified interpretation of rules as discriminative stimuli: sequential exposure, stimulus arrangements, and stimulus relations modulate their interaction, among other factors. These studies also suggest that the formal presentation of instructions thought of as rules and the occurence of behavior adjusted to their prescriptions is not sufficient to assume that it is taking place a process similar to "rule-governed behavior". It is obvious, moreover, that in order to deal with the complexity of thinking behavior, behavior analysts have to move from animal rate-oriented preparations to experimental restrictions sensitive to substitutional interactions characteristic of human behavior. Otherwise, experimental efforts will be devoted to the analysis of animal preparations with human subjects.

Some final remarks on the motivation of thinking

Traditional rationalistic formulations conceived of thinking as a process or entity completely isolated from passions and affection. In any case, if any relation included the latter with thinking, it was as a disturbing factor. Skinner's conception is at least paradoxical or ambiguous. Rule-governed behavior is not shaped by consequences but it consists of constructed discriminative stimuli which functionally depend upon consequences.

How is the relation between thinking and motivation to be framed. Let me advance some tentative suggestions.

I shall refer to the theoretical proposal by Ribes and López (1985) following Kantor (1924-1926). Behavior is conceived in terms of contingency fields, which involve the interaction between the individual organism and particular objects and events. These interactions may be qualitatively distinctive according to the particular form adopted by the relation between actions and events. The different interactions, conceived as hierarchical and progressively inclusive, are to be identified in terms of the organization of the relation and the functional detachment entailed by such a relational structure. The structure of the interaction depends upon the mediation process involved, that is, the critical factor over which rests the relation as a whole. For instance, in typical operant behavior, the interaction is centered around the responding of the organism regarding the operandum, while in conditional discrimination the relation depends upon the "instructional" or "selective" properties of the stimulus event. On the other hand, functional detachment refers to the control exerted on the behavior by invariant, particular physicochemical properties of objects and events present in the situation when the individual organism is behaving. For instance, in classical conditioning the effective interval between the CS and the UCS is short, compared with the intervals that control operant behavior in second-order schedules.

These criteria allow for distinguishing among five different kinds of behavior interactions, each of which involves a progressively higher degree of detachment from physicochemical situational variables. Motivation has to do with the setting conditions that facilitate or interfere with the quantitative properties of interactions. Two groups of variables may be described as setting conditions:

a) the events and objects present in the situation that do not directly participate in the interaction; they include biological states and environmental conditions; and

b) the interactive history of the individual, which contacts with relevant behavior and stimuli participating in the interaction.

To the extent that the behavior of the organism detaches progressively from the invariant and concrete physicochemical properties of acting objects in the situation, I assume that there are corresponding changes in the nature of the motivational factors, from conditions linked to objects and biologi-

cal states, to circumstances related to substituted contingencies. This means that as behavioral interactions become progressively complex, motivation changes from being an environment-dependent condition to a behavior-dependent condition.

From this point of view, there is a radical change in motivational factors when individuals move from non-substitutional to substitutional interactions. To the extent that substitutional relations take place as conventional interactions, setting factors become also dependent of conventional dimensions of the field. This is to mean that setting factors become less dependent on the biological and physical properties of the acting situation and become progressively dependent on the interactive history of the individual, as well as in the conventional dimensions of interactions as they are set by linguistic contexts and exchanges.

Although in non-substitutional behavior one may observe a progressive continuum of parallel detachment of setting factors regarding biological and physicochemical environmental conditions, I would stress the two kinds of substitutional interactions previously described. Nevertheless, it is important to underline that acting consequences as well as physicochemical and biological circumstances loose their functional influence when individuals are involved in substitutional interactions. This may help to understand why "rule-governed behavior" as described in experimental conditions using schedules of reinforcement, seems to be insensitive to acting contingencies. Additionally, it suggest that consequences become functional in terms of the conventional properties of the interaction themselves, and therefore, they are embedded in the relations in the form of what has been ambiguously called "intrinsic" or "natural" reinforcers.

The motivational factors in thinking may be distinguished in terms of the kind of substitutional behavior being involved. In extrasituational substitution the individual is set up by conditions made present through his/her own behavior, and accordingly, functional factors relate to behavior-produced events dealing with "substitutively being as. . .". Nevertheless, when extrasituational substitution is directed as in the cases of self-instruction or self-talking, motivational factors deal with "substitutively acting for. . .". In the case of transituational substitution, interactions are completely dependent upon the language context and use. In this regard, as Aristotle stated. ". . .the intellect is intelligible exactly as its objects are. . ." to the extent "that intellecting and that being intellected are the same" (About the Soul, Spanish translation, p. 233, 430). This means that in transituational substitution, behavior as language and objects as language are the same. They are not amenable of distinction, and accordingly, motivational conditions are built-in the linguistic convention under exercise. In this case, motivational factors work both as "substitutively acting for. . ." and as "substitutively responding to. . .". Thinking is its own motivation when dealing with transituational substitution (7).

REFERENCES

Aristotle. (1978-Spanish translation). *Acerca del Alma*. Madrid: Gredos.

Bennett, J. (1971). *Rationality: An essay towards an analysis*. London: Routledge & Kegan Paul.

Berlyne, D.E. *Structure and Direction of Thinking*. N.Y.: Wiley.

Kantor, J.R. (1924-1926). *Principles of Psychology*. Granville: Principia Press.

Kantor, J.R. (1963). *The Scientific Evolution of Psychology* (volume 1). Chicago: Principia Press.

Ribes, E. (1983). Has behavior analysis actually dealt with language? In N. Smith, P. Mountjouy and D. Ruben (eds.), *Reassessment in Psychology: the interbehavioral alternative*. Washington: University Press of America.

Ribes, E. (1984). En busca del alma perdida: un comentario a "Causa, función y el análisis de la Conducta" de Jerry Hogan. *Mexican Journal of Behavior Analysis, 10*, 73-79.

Ribes, E. (1986). Language as behavior: functional mediation vs. morphological descrption. In H. Reese & L. Parrott (eds.), *Behavior Science: Philosophical, Methodological and Empirical Advances*. Hillsdale: Erlbaum.

Ribes, E. (in press). Aptitudes Substitutivas y la Planeación del Comportamiento Inteligente. Organization of the American States. Washington, D.C.

Ribes, E. & López, F. (1985). *Teoría de la Conducta: Un Análisis de Campo y Paramétrico*. México: Trillas.

Ryle, G. (1949). *The Concept of Mind*. N.Y.: Barnes & Noble.

Ryle, G. (1979). *On thinking*. Oxford: Basil Blackwell.

Skinner, B.F. (1935). Two types of conditional reflex and a pseudo-type. *The Journal of General Psychology, 12*, 66-77.

Skinner, B.F. (1953). *Science and Human Behavior*. N.Y.: The Free Press.

Skinner, B.F. (1957). *Verbal Behavior*. N.Y.: Appleton Century Crofts.

Skinner, B.F. (1969). *Contingencies of Reinforcement: A Theoretical Analysis*. N.Y.: Appleton Century Crofts.

Wittgenstein, L. (1953). *Philosophical Investigations*. Oxford: Basil Blackwell.

Wittgenstein, L. (1979-Spanish translation). *Zettel*. México: Universidad Nacional Autónoma de México.