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UMA ANÁLISE FUNCIONAL DA AQUISIÇÃO DE LINGUAGEM COMO COMPORTAMENTO

A FUNCTIONAL ANALYSIS OF THE ACQUISITION OF LANGUAGE AS BEHAVIOR[1]

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RESUMO

Uma análise funcional da linguagem deve levar em consideração a diferença entre as interações entre indivíduos e os produtos ou vestígios dessa interação. Embora as características morfológicas da linguagem como comportamento convencional sejam importantes, elas não são suficientes para distinguir o comportamento lingüístico do comportamento não lingüístico. Analisamos vários aspectos envolvidos na análise funcional da linguagem como comportamento: a) a aquisição de sistemas de reação convencionais; b) o despreendimento funcional de respostas; c) o comportamento lingüístico como interações contingenciais substitutivas; d) a identificação de estágios funcionais no desenvolvimento do comportamento convencional como comportamento lingüístico; e e) a análise da linguagem como processo interativo.

Palavras-chave: linguagem, comportamento convencional, despreendimento funcional, contingência substitutiva, interações diádicas

ABSTRACT

A functional analysis of language must take into account the difference between interactions among individuals and the products or vestiges of these interactions. Although morphological features of language as conventional behavior are important, they are not sufficient to distinguish between linguistic and non-linguistic behavior. This paper examines several aspects involved in the functional analysis of language as behaviour: a) the acquisition of conventional reactional systems, b) the functional detachment of responses, c) linguistic behavior as substitutional contingency interactions, d) the identification of functional stages in the development of conventional behaviour as language behavior, and, e) the analysis of language as an interactive process.

Key words: language, conventional behavior, functional detachment, substitutional contingency, dyadic interactions

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"And to imagine a language means
to imagine a form of life"
L. Wittgenstein
Philosophical Investigations (1953, p. 80)

In a functional analysis of language as behavior two aspects must be taken into account: a) not to confound problems of individuals interacting while speaking, writing, reading or gesturing, with those that derive from morphological or structural analysis of behavior products, e.g., written materials, text composition, phonetic patterns in taped speech, etc.; b) to spell-out the functional properties of interactions which are to be identified as qualitatively different from those not considered as linguistic, if the distinction between language and non-language behaviors is to have any value at all. We will refer to language or linguistic behavior (Kantor, 1977)

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instead of the usual reference to verbal behavior, since the term 'verbal' applies only to locutions and not to the different behavior modalities encompassed by language.

Several problems arise in this context, some of them conceptual, and, some others methodological in nature. Two are outstanding among the conceptual issues: (i) the definition of language as behavior in terms accurate enough to distinguish it from behavioral processes shared with pre-linguistic events; and (ii) the need to conceive language behavior as a developmental process embracing transitions in the qualitative complexity of interactions among the individual and its environment (Ribes, 1996). Among the methodological issues, the following seem to be the most relevant: (i) the development of functional categories that allow for the identification of interactive units which include both linguistic and non-linguistic response morphologies (Ribes & Quintana, 2002); and (ii) the comparability of data obtained under experimentally contrived, longitudinal and comparative methods

Three are the basic assumptions which provide the rationale for our approach to language behavior:

a) Morphology or topography is not sufficient to distinguish among language behavior and simpler behavior;

b) Present categories in behavior theory, based upon the operant-respondent distinction, are inadequate in order to formulate a taxonomy of behavior including language behavior[2] (Ribes, 1999); and,

c) The explanation of language behavior must take into account the functional specificity of conventional properties of stimulus and response events as compared to those deploying physicochemical dimensions only (Ribes, 2006).

Although language as behavior shares many of the morphological features of language products as things (Kantor, 1936), it deserves a special treatment to the extent that it consists of an episodic relation involving always variables additional to the utterance or writing by a speaker or writer. Language as behavior represents a particular class of interaction, which is possible because of its conventional morphology, but that is not restricted to the morphological features of the actions themselves. We shall examine the concepts necessary to provide an adequate definition of language as behavior: a) conventional reactions systems; b) functional detachment of responses; and, c) substitutional contingencies.

Language and Conventional Reactional Systems

Human language is social in nature. Its social character does not mean only that language appears in individuals living in group, but that the morphological and functional features of language do not depend upon biological individual or species-specific conditions. On the contrary, human language as qualitatively different from animal paralanguages has evolutioned as a conventional system of relations among individual and the environment events (Ribes, 2001). The conventional character of human language is reflected both in its morphology and functionality; the conventional character of human language although implying regularities

2. We have previously examined the limitations of conditioning paradigm as developed in Skinner's *Verbal Behavior* (1957): Ribes (1982), Ribes (1985), Ribes (1999) and Ribes and L6pez (1985).

among individuals does not necessarily require explicit rules or norms regulating uniformities in the conventional action of individuals. Conventions represent social agreement, but nonetheless, the establishment of social agreements does not follow from supraordinated explicitly formulated rules framing them. The formulation of these rules or norms is a step further in the evolution of conventions, but it is not its initial and-or necessary condition to develop. Conventions grow out as tacit practices among individuals, and rules describing (but never regulating as autonomous entities) these practices are sometimes formally expressed by society as laws or norms. Nevertheless, as the history of grammar, law, religion and morals shows, rules are changed from time to time to adjust them to practices of individuals in society.

We want to stress that conventional behavior and actions do not imply any rule-following process, since this is one of the basic assumptions of dualistic thinking: the postulation of existing ideal entities, in the form of rules, laws or similar stuff, inferred from invariance in conventional practices. Not only the existence of these ideal devices is claimed, but also that conventions as events, that is, as interactions among individual and the environment, are regulated or determined by such rules. Although this argument underlies discussions in most fields of human endeavor, it has been naturalized as a psychological doctrine under the influence of Cartesian dogma. Ryle (1949) has convincingly argued against the two-world or sceneries conception of the ghost-in-the-machine dogma. To know or to say something does not mean a two-stage process in which first what is known or is going to be said takes place or is rehearsed and then it is done or uttered. To know and to say, even when there are non-apparent or silent actions involved, is a single process or occurrence. To speak or to know about one's actions is an occurrence, and although descriptive of self-deeds, it is a separate action on itself. In this regard, to know or to speak in advance about what it is going to be done or said is a consequence of previous actions or doing and not the proof of these being caused or ruled by separate knowing or internal speaking episodes (Ribes, 2000).

This becomes especially relevant in the analysis of language as behavior. Since mankind developed writing, linguistic practices could be transcribed and perpetuated from generation to generation. These transcriptions are not identical to actual linguistic interactions. Transcriptions are linguistic products as things but not actions themselves. Thus, the various grammars developed as the description of transcribed and written practices, and rules were abstracted as ideal, universal invariance of these, most of the time, heterogeneous, constant changing individual and social practices. Since grammar represents a formal description of speaking and writing practices, it cannot be postulated as a property of the same behavior of speaking and writing, and even less in those cases in which language involves gestural and arbitrary movements which are not "verbal". When individuals speaks, writes or engage in some other kind of language as interactive episode, they are not following rules of grammar, even when their behavior may adjust to what grammarians would describe as "correct language use". Most people cannot identify the rules of grammar that describe their own behavior when speaking or writing, and even in individuals able to do so, they do not identify first the rules to be followed and then speak or write. To do this

or to "edit" speech or writing at the same time that the language action is *impossible*.

Conventional behavior, therefore, does not entail any prior social or individual process of rule-following. It consists in socially functional interactions with arbitrary morphologies in regard to the physicochemical and biological dimensions of events and responses. To the extent that these interactions are shared by individuals in a group they remain conventional. The conventional character of language actions is not restricted to its morphology but is synonymous of its functionality. Language behavior is conventional to the extent that it is functionally shared by individuals in a group interacting among them and with events in the environment. Because of this, we may find as many sets of conventions as functional uses of arbitrary morphologies are practiced (this argument is close to L. Wittgenstein (1953) conception of language as a game). The important feature of language as conventional behavior is that it is difficult to identify a single human interaction in which a linguistic component is not present as an essential functional dimension of the situation, and it would be proper to add that we refer to linguistic components that are not necessarily equated with utterances or graphisms, but with socially transmitted conventional properties of events, actions and relations. Human environment as the outcome of social history is mainly a cultural environment, that is, it is formed by objects and practices built up during the evolution of mankind, and because of this, even things and nature are in a sense humanized. Nature and things are not simply there. They have been created or transformed by mankind in the course of history and become meaningful to the extent that we individually interact with them in terms of *social practices* or *conventions* (Wittgenstein, 1953).

Language, either as gestures, speech or writing, originated as conventions, or has been the medium of production, reproduction and transformation of conventions. If man and woman are to be identified, in an Aristotelian sense, as intelligent beings, this is due, as Ryle (1943) keenly describes, to didactic speech, that is, to the capacity to transform into social the individual experience, and vice versa. This is possible only because of language as conventional behavior.

Human individuals, from the very moment they are born become part of a field of interactions functionally mediated and contextualized by linguistic events. Objects, actions and relations in the environment are not only contacted always trough the interaction with people, but their functional properties as meaningful social events depends upon conventions made possible by linguistic exchange and transmission. Because of this, we may propose that human environment is a linguistic environment, even when dealing with objects and things that are not linguistic in morphology.

Along the same reasoning, linguistic behavior as conventional interaction includes not only actions with a verbal morphology, but also any action being part of interactions mediated by linguistic events. Because of this, we consider that distinguishing verbal from non-verbal behavior, as based on morphological grounds, is not a sound distinction. Behavior has to be viewed as part of interactional episodes, and in this context although episodes always involve linguistic components on the part of some of the participating individuals, only under special circumstances *the action of*

the speaker, gesturer or writer may be considered as truly linguistic.

Linguistic dimension of behavior includes verbal as well as non-verbal morphologies. The behavior of the speaker, gesturer or writer becomes linguistic in a functional sense, only when allows for particular kinds of mediation among the individuals and events interacting in a given situation. We shall define as linguistic, not the isolated actions of an individual, but the particular forms of organization of interactive episodes between the individual, other individuals and objects and events in the environment.

We may summarize our position as follows:

1) Human environment is conventional, and this is possible only because of the interactive and reproductive character of language(s);

2) Both, environmental events and individuals' actions, have a linguistic character even when they are integrated by non-verbal morphologies;

3) Linguistic dimensions may be identified only in reference to interactions among individuals and events. Thus, it is not possible to describe as linguistic any behavior isolated from the interactive episode, even if the action is verbal according to morphological criteria.

The acquisition of conventional reactional systems must be distinguished from the acquisition of the aptitude to engage in linguistic interactions, although, as we shall see below, the former may be a necessary condition for the later to develop. We prefer to use Kantor's (1924-1926) term instead of that of response class, which has some conceptual weakness intrinsic to assumptions based on the reflex paradigm.

Three seem to be the basic issues in the acquisition of conventional reactional systems: (i) the acquisition of "listening" responses, which include integrated sensory or perceptual reactions to linguistic stimuli and events; (ii) the acquisition of response units adjusted to linguistic morphology; and (iii) the acquisition of response styles or modes matching interactive patterning in the linguistic environment. Although the analysis of the acquisition of conventional responding may be undertaken through the identification of "cumulative" expansion of the morphology and extension of response units availability, this endeavor becomes meaningless unless it is related to the functional circumstances and relations under which responses are acquired and performed. The process of acquiring response morphologies is in fact a process of continuous differentiation and expansion of sensory, phonetic and graphic-producing responses. Stimulus discrimination, stimulus generalization, imitation, response shaping, and other known techniques are the procedural devices informally used in this process. Since there is a vast literature on the topic (Alcaraz, 2000, 2002; Bijou, 1990; Bijou and Baer, 1961; Hart & Risley, 1995, 1999; Moerk, 1990; Sloane and Mac Auley, 1968; Staats and Staats, 1964), we shall not review it again. Nevertheless, we should mention that when describing the mother strategies in teaching language to the child, these procedures become intermingled in a complex process of setting conventional responses as functional behavior in situational episodes.

Language and Functional Detachment of Responses

We previously remarked that although language as behavior consists in conventional responding, the availability of conventional reactional systems is not sufficient.

Conventional responses, as different from strictly biological -or ecological- responding, have a wider range of functional detachment in regard to the physicochemical properties of situational events. Non-conventional behavior consists in the individual responding to events according to their physicochemical properties. The morphology and function of the responses is adjusted to the morphology and physicochemical conditions of objects and events interacted with. In order to turn a knot there are few ways of handling it that are successful. The form, weight, resistance and texture of the knot restrict the range of possible morphologies. The same can be said about any other type of movement or sensory response: physicochemical conditions of events shape-up the morphological features of responding, and therefore, the functional range of the behavior involved. On the contrary conventional responses are arbitrary in form, and hence, they do not keep any necessary biological relation with the morphology of physicochemical properties of events interacted with. The particular morphology of an action related to events depends upon the contingency defined by social convention, although the convention itself is always to be identified upon criteria based in the physicochemical properties of the events involved. Conventional responses are not only arbitrary responses in regard to their morphology, but also in regard to their morphological correspondence with physicochemical properties of objects and events. The way we call an object is not only arbitrary in terms of our biological reactivity, but also is arbitrary in relation to the particular properties of that object or the situational contingencies in which the action is performed. There is not any physicochemical property in a "chair" nor in the condition in which a chair is located that obliges an individual to biologically respond with the utterance "chair".

The utterance and the actions performed in relation to the chair might change without any corresponding change in the referred object. The arbitrariness of the relation between conventional responses and the morphologies of objects and situational contingencies in which are performed is the dimension that allows for detaching the functions of such responses from particular physicochemical environmental conditions. To functionally detach a response means several things. It means that:

a) Several conventional responses may be performed to the very same object or stimulus condition;

b) The same response may be performed to objects differing in physicochemical properties;

c) Responding is not necessary in presence of the object or stimulus physicochemical dimensions;

d) Responding is performed to an object or event not present, but as responding to its previous or future occurrence;

e) Responding is performed to an object or event taking place in a different environment;

f) Responding consists in acting in regard to objects and events properties that are not apparent in terms of sensory interactions, e.g., beauty, radioactivity, etc., and

g) The response may be performed in situations in which events and objects are related as part of a contingency different to that being present.

The first three forms of detachment of conventional responses are shared with non-conventional responses, but the last four are exclusive of conventional actions. The arbitrary

character of conventional responses makes possible to respond to events not present, events occurring in a different place, events not apparent to sensory responding, or events under changing contingency relations.

It might be anticipated that even in the three former cases, conventional responses will be easier to detach than situational-bound responses. This means that if we compare human and non-human subjects in their performance under situations involving the three former cases of functional detachment as would be a conditional discrimination task, we might predict that human subjects, when matched in behavioral development with non-human subjects, would show faster acquisition and higher asymptotic levels (e.g., Hayes, 1985, 1989; Hayes & cols., 2001; Sidman & Tailby, 1982).

Nevertheless, this is not an automatic process. Conventionality per se, although necessary, is not a sufficient condition for functional detachment to occur. Since human environment is conventional from the very beginning for any individual, conventional responses are acquired as "if they were natural" forms of behavior to "natural conditions and events". Linguistic responses as well as events become related in particular situations as if the contingencies relating them were to be universal. That is why young children respond to linguistic events as if they were specific to the situation where they were initially presented or performed. This happens also with retarded children, chronic psychotic patients, or sometimes with illiterate people. Linguistic actions are performed as situational-bound responses, that is, as the only and necessary form of responding to a particular event relation. For functional detachment to occur it is needed a history of interactions promoting substitutional contingencies mediated by the individual conventional responding. The taxonomy of verbal behavior proposed by Skinner (1957) is exemplary of the case of linguistic morphology that enters into functional relations identical to those involving non-conventional responses, e.g. discriminated and non-discriminated operants.

Language Behavior as Substitutional Contingency Interaction

If language as behavior is to be defined in order to distinguish it from linguistic morphologies that share functional properties with non-conventional forms of responding, we might say that language is contingency-substitutional behavior (Ribes, 1991).

Contingency-substitutional behavior as a form of interaction has two defining functional characteristics. First, to the extent that the interaction involves at least two distinctive *conventional* responses, individuals participating in such a relation respond to each other and to the events in terms that are not restricted to current contingencies as represented by the physicochemical situational dependencies. The current interaction is expanded because of contingencies introduced by conventional responding, which are not-only added to situational circumstances, but transformed as *substitutional relations*. Second, these substitutional relations may consist of relations regarding a particular event or object, but detached from the temporal, spatial and apparent properties of such an event *(referential substitution*), or of relations regarding conventional response-produced events, without attachment to any particular physicochemical events *(non-referential substitution)*. In both cases, interactions are

regulated by contingencies depending upon the conventional responses involved as relation.

Such an arrangement allows for the detachment of non-conventional and conventional reactivity regarding any particular physicochemical property or dimension in the current situation.

Non-substitutional contingencies refer to reciprocal dependencies among events and the individuals' behavior established by the *now – here - apparent* properties of the situation. The individual interacts with events in terms of present and observable functional dimensions. This kind of interaction, even when performed relative to linguistic-morphologies both in stimuli and responses, remains as prelinguistic in regard to the level of organization of behavior. This is tantamount to say that, although involving verbal or linguistic morphologies, the interaction is attached to the current dimension of the situation contingencies. Conventional behavior functions *as if* it were biological situational-bound behavior. It is important to point out that substitutional contingencies do not refer to a process of stimulus or response substitution, but to a process of contingency transformation regarding original and current events.

In order to exemplify the difference between conventional interactions under substitutional and non-substitutional contingencies, let us examine some of the verbal operants proposed by Skinner (1957) in his analysis of language. We shall discuss only two of them, which seem to be basic to his taxonomy: the mand and the tact.

In the mand relation, a speaker utters a verbal response (or performs a gesture or indication) that is followed by the response of a listener (normally a non-verbal response) reinforcing the speaker according to the motivational state and reinforcer specified by the utterance. The mand is a pure instance of the non-discriminated operant; there is no available discriminative stimulus (although the listener as audience is sometimes described as a sort of "generalized" *SD*); there is a response emitted under particular motivational conditions (the lack or presence of some stimulus or object whit positive or negative reinforcing properties); and there is a listener (which works as a surrogate of a mechanical device) providing the reinforcer specified by the mand. Asking for a glass of water and demanding a loud noise to be set-off are classical examples of the mand relation.

The tact relation deals with the "epistemic" or "semantic" aspects of language. In the tact, there is an antecedent non-verbal stimulus (since verbal stimuli can not be tacted), whose physical properties develop stimulus control over the verbal response which is reinforced by generalized reinforcement when occurring in their presence. The tact consists in a discriminated operant, where a non-verbal, physical stimulus is the *SD* controlling a verbal operant, the tact, which is followed by generalized reinforcement provided by a listener. Description, identification, narration of events, and similar behavior exemplify the tact relation.

We shall not go into the discussion of some conceptual problems present in these categories. We shall limit ourselves to show that both, the mand and the tact relations, describe situational-bound interactions, and that in consequence there is no need of a special treatment different from that provided to "non-verbal" operants. The inclusion of conventional responses on the side of the speaker does not modify the basic interaction holding in animal behavior, where no conventional responses intervene. When logically extended, Skinner's definition of verbal behavior

(1957, p.224-225) considers the behavior of any experimental animal as a special case of manding or tacting (p.108). In both cases, the individual is responding not to transform contingencies prescribed by situational events, but under the particular contingencies that those events establish, e.g., the deprivation conditions, the physical properties of prior stimulus events, the history of reinforcement under a particular listener when some verbal responses are emitted, etc. On the side of the speaker it does not seem to be any functional difference between asking for water, looking for a glass of water, or physically obliging a "listener" to handle him a glass of water. The difference lies only in the effort exerted and the morphology of the emitted response. There are differences, nevertheless, on the side of *the listener*. The listener response in handling a glass or water to the speaker is linguistic to the extent that the relation between the petition and the behavior for looking for serving and passing a glass of water does not keep any biological or physical necessity with the speaker's behavior. Comparing the mand with an animal analogue, the behaviors of pressing a lever by a food-deprived rat and pulling a chain when water-deprived in order to be reinforced by a priory-programmed equipment, are not different from uttering "food" or "water" by an individual "asking" for such stimulus consequences. The linguistic behavior is displayed by the experimenter who programmed the equipment in such a way that the animal gets differential reinforcement for each type of response. The tact relation shows similar problems to the discussed above, but centered on the response to the antecedent stimulus. The treatment given to the tact (as well as to the echoic of textual relations) does not allow-for distinguishing verbal behavior from animal analogues using, even sometimes, conventional stimuli or responses.

Substitutional contingencies always involve conventional responses, but under a form of interaction in which the speaker (or reader, writer and gesturer) introduces functional dimensions not present in the situation, which change the way a second individual (or the speaker himself under special conditions) interacts both with the speaker and the events which the speaker is mediating through his conventional response. Both, the behaviors of the listener and the speaker are linguistic since both participate in a contingency which substitutes those prevailing as a function of the physicochemical conditions of situational events. Substitutional contingencies do operate only when the behavior of individuals becomes functionally detached from present physicochemical based contingencies. Examples of linguistic behavior under substitutional contingencies are those describing how the speaker sets differential reactions of a listener to events not present or not apparent according to what he says about them or about his behavior to them. Rumor, prejudice, persuasion, planning, and similar social phenomena illustrate the effect of substitutional contingencies. Although issues related with communication and thinking are central to substitutional contingency behavior, there may be similar phenomena as pre-linguistic and paralinguistic communication and thinking (Epstein, Lanza & Skinner 1980) which are non-substitutional.

Functional Stages in the Development of Conventional Behavior as Language Behavior

In this section we shall introduce several concepts useful to understand the development of conventional behavior as language behavior.

If our interest is not in behavior as a mere action but in behavior conceived as interaction, any account of language as behavior must consider not only the behavior of individuals as an event in sequential relation with other events in time and space, but on the particular form in which behavior participates in the organization of the interactive field. Individual behavior is not merely an effect to be looked for. It is a functional component intervening in the organization of contingencies in any situation. The function performed by the behavior of the individual will change in quality depending on how critical or relevant becomes in the configuration of the ongoing contingencies. This qualitative character of behavior in shaping up contingencies shall be called *functional aptitude*. Then, a functional aptitude is a concept describing the quality of the organization of behavioral interactions in contingency fields. Therefore, we assume that behavioral interactions may be classified along a qualitative continuum, in which the taxonomic criterion is based on the role performed by behavior in the organization of contingency fields (Ribes, 1990a). On the same token, the recognition of different functional aptitudes imposes the need to analyze language behavior processes in developmental terms.

The development of functional aptitudes regarding language behavior is conceived as a continuously *inclusive* process, in which each aptitude becomes the necessary condition to achieve the next developmental stage. The new aptitude level achieved, nonetheless, does not exclude previous ones. These are incorporated as components of the new form in which the individual's behavior enters into the organization of contingencies. But since functional aptitudes refer to general dispositions about modes of interaction, the achievement of a particular developmental stage does not preclude that the individual may engage in less complex forms of interactions regarding particular sets of responses and situational events (this process is similar to Piaget's (1947) concept of *décalage*). Because of this, we must distinguish between functional aptitudes and functional competences. The last ones consist in sets of response morphologies (or skills) which are functional in regard to certain conditions in the environment, conditions involving particular sets of objects, events and relations, or particular arrangements of contingencies. Response morphologies are always relevant to objects' properties and morphologies, e.g., the movement for opening a door depends upon the door's mechanism and the form of the knob.

Competences, then, are formed by responses which share functional properties because of their morphological correspondence or equivalence in regard to environmental objects, events and contingencies. Although morphological features may be prominent in the grouping of responses as competences, this depends upon their functional equivalence regarding environmental conditions. So, competences may consist both in responses with similar morphology and/or with different morphology. Because of this, and depending on the morphological range of competences, the achievement of functional aptitudes in regard to a competence or group of competences does not produce necessarily a similar effect on the rest of available competences. Anyhow, it might happen that, when competences share common morphologies this effect could take place. But, as a general rule, we should expect that development, defined in terms of competences,

must evolve as an asymmetrical process. Therefore, the availability of a particular competence is restricted to a level of functional aptitude, and it never may be considered as performable in every-type of contingency field.

We may propose five general stages of functional development, even when each aptitude level itself may comprise differentiated modes of interaction (we have described these differentiated modes as developmental *momentos* in Ribes (1986) and in Ribes and López (1985)). The general stages are the following:

1) Behavior does not change contingencies in the environment. Contingencies among events act on the individual, and the behavior evolves as differential reactivity to these contingencies. In the case of human behavior, it consists not only in orienting and displacement responses which allow for a differential effect of contingencies, but on the development of conventional morphologies integrated to those actions. This stage has to do, among other things, with the modulation of phonetic, sensory and motor behavior, the recognition of stimuli, its patterning and "meaning" relations with objects and actions, the functional orientation to events in terms of the linguistic stimuli which form them, the emergence of imitative verbal and non-verbal behavior as regulated by verbal stimuli, and so on. Since the individual is reactive only to contingencies that depend upon proximal temporal and spatial relations, this functional stage of development may be considered a *contextual* mode of interaction.

2) To the extent that particular forms of conventional behavior are modulated by environment contingencies, the individual develops dispositions or tendencies to respond in such a way even in the absence of the particular conditions in which such behavior is relevant. The occurrence of conventional behavior under circumstances consisting in partial ongoing contingencies is followed by the completion of those contingencies when the behavior takes place within the temporal and spatial boundaries in which events relate each other and when other individuals may mediate them through their behavior (linguistic or not) according to standard social practices. Being so the case, the individual behavior performs a new role. Behavior is not limited to a reactive process, but becomes functional in the production of contextual relations, that is, the behavior acts on the environment affecting contingencies to which the individual is already differentially reactive. What Skinner (1957) describes as effective "manding" and "intraverbal" behavior develops in this stage (these terms are used only as examples because of their standard use in the field). Since the individual alters the occurrence of contextual contingencies acting on and changing the temporal and spatial conditions in which they take place, this functional stage of development may be considered as a *supplementary* mode of interaction.

3) As development proceeds according to social conventions and standards, contingencies become increasingly complex. Individuals must learn to interact with situations consisting in contingencies conditional to multiple and relational factors. These relational contingencies require that individuals instead of interacting with particular properties of contextual and supplementary fields become responsive to *classes of functional events* established according to relational proportion of events. In human behavior, the events which

regulate functional properties of varying physicochemical dimensions of actions and events are linguistic. Most of the concrete operation stage behaviors described by Piaget (1978) and followers are characteristic of this stage, as well as many apparently non-linguistic actions which are the "content" of moral and social development (Bijou, 1976). Anyhow, these interactions are still bound to the situational restrictions of contingencies, in such a way that they are not detachable from the temporal, spatial and apparent properties of the involved events. The individual is still interacting with events which are functionally independent of linguistic conventions. These act as *selector* factors over situational contingencies and behavior.

4) Conventional contingencies take over the regulation of interactions only when the individual is able to condition the behavior of other individuals to events in terms of his linguistic interaction with both. The individual is not mediated by linguistic conventions, but *mediates* through linguistic conventions the behavior of others in regard to events in the environment. The linguistic actions to both, events and other individuals, introduces new contingencies based on the conventional properties of the action as response and as stimulus, that substitute for those prevailing in terms of the physicochemical properties of events framed by current situational conditions. In order to introduce or transform new contingencies into a situation which do not depend on current physicochemical dimensions it is required to respond to and generate stimuli which are detached from such dimensions.

The new functional contingencies, thus introduced are identifiable in physicochemical terms, but are present only as the response by an individual to them in different temporal, spatial and observable dimensions.

This is only possible because conventional behavior (both by the referrer an referee)[3] does not keep any necessary biological relation with contingencies framing the substitutional interaction. Talking about past events, describing abstracted properties of things, or reacting to events taking place in a different situation, are examples of new contingencies mediated by the conventional responding of an individual as the stimulus condition under which another individual responds to the mediated events. This stage may be described in terms of the process of *referential substitution*.

5) When the individuals are able to produce and respond to conventional stimuli with conventional behavior, contingencies do not affect any more the interaction of another individual with substituted events. Contingencies as interdependent relations among events and behavior become restricted to conventional relations between conventional events. In this stage conventional behaviors become the relevant stimuli, consisting the contingencies in the functional and structural relationships among them.

To the extent that mediation takes place within conventional actions and their products, this stage may be characterized by a process of *non-referential substitution*. Examples of this level of interaction are conceptual problem solving, musical and literary composition, mathematical and logical behavior, and similar linguistic interactions.

3. We prefer to use Kantor's (1977) conception of a bi-estimulational relation among referor, referrer and referee, than the more restricted and ambiguous description in terms of a speaker and a listener.

The Analysis of Language Acquisition as an Interactional Process

Since the acquisition of conventional morphologies and functions consists in a developmental process, it must be analyzed in terms of the continuous transition of behavioral competences as taking place in a social interactive situation. In early stages this situation is defined by the mother-child interaction. Since in early stages this situation is centered on the mother-child interaction, our analysis will emphasize the dyadic unit, although in natural development linguistic interactions build-up as complex relations including more than two individuals,

As Rodríguez and Rondal (1985) have pointed out, in spite that language acquisition has been conceived as a process dealing with necessary interactions between the individual and the social environment, most studies have focused development as a one-sided process looking only for changes in the vocal behavior of the speaker. Taking language as an interactive process, which develops in time according to progressively complex social standards, requires of a methodology stressing longitudinal changes in both basic elements of the dyadic unit. Hence, the analysis of language acquisition has to be dealt with in terms of reciprocal changes in mother and child behaviors, changes which become structured as a developmental process in time (Moerk, 1983, 1985; Ribes & Quintana, 2002; Rondal, 1990; Tomasello, 2005). The use of a longitudinal approach to language acquisition does not exclude experimental or comparative strategies. In fact, they become necessary to the extent that controlled replication of longitudinal observations is essential for an empirical validation of developmental concepts.

Because of this, we propose that the analysis of language acquisition and development must be based on three methodological strategies, which may be combined in order to provide for stronger empirical foundations upon which to construct a theory of language as behavior:

a) Longitudinal studies looking at changes in the classes of interactions between the mother and the child, as well as for quantitative and qualitative changes in the separate behaviors of mother and child comprising such interactions;

b) Experimental studies synthesizing classes of interactions through the manipulation of situational and reactional variables; and

c) Comparative studies looking for similarities and differences in developmental stages between dyads according to processes identified both in longitudinal and experimental studies.

This multiple strategy assumes the need for a common conceptual frame describing language processes as situational interactions and as developmental transitions. Observational categories, therefore, although descriptive of reactional dimensions of behavior must be relevant to interaction processes taking place among the mother, the child, and environmental events. Being so, they allow for reconstructing such processes under experimentally contrived conditions, both as terminal stages or as transitional stages. Additionally, they provide for the necessary cues to select or sample stages in development in order to carry over comparative observations among individuals with different histories or individuals under different contextual variables.

In order to proceed in the analysis of interactions between the mother and the child

it is necessary to specify the dimensions of language interactions which may be functional to the identification of developmental conditions, elements and processes. According to the theoretical considerations previously exposed, these dimensions involve the following factors:

a) The variation and range in vocal and non-vocal responses performed;

b) The conventional patterning of these response elements to become formal components of linguistic actions;

c) The appearance of stylistic stereotypes characteristic of types of contingencies and situational interactions;

d) The identification of types of situational contingencies involving the exercise of linguistic competences as particular deployment of functional adjustments;

e) The identification of classes of linguistic interactions as competences dealing with situational arrangements of events, and social and linguistic relations; and

f) The identification of functional stages and *momentos* of linguistic aptitude according to the role performed by the individual in the mediation of contingencies involving linguistic actions regarding linguistic and non-linguistic events.

The first three factors involve dimensions of the reactional aspects of language as conventional behavior, that is, the morphologies, conventional units and style of oral, gestural and graphic language. The last three factors are related to the functional dimensions of language as interactive behavior. Reactive dimensions described in terms of grammatical units are taken into account for two reasons: a) grammatical units represent formal conventions about the description of morphological and stylistic features of language as social practice; and b) as Kantor (1936) pointed out, grammatical descriptions to the extent that emerge from individual and social practices, partially convey some of the functional conditions under, which speech and written actions take place. We do not assume that grammatical descriptions are necessary for the explanation of language behavior, but that they depict to some degree behavioral dimensions of the situation in which they are uttered as actions.

We may reduce to three the basic dimensions along which language acquisition and development is to be analyzed: a) morphological characteristics descriptive of the physical properties of vocal and non-vocal responses (sounds, movements, and elementary phonetic emissions); b) formal characteristics describing conventional components and style according to social practices as abstracted by grammarians (sentence components and grammatical modes among others); and c) functional characteristics of types of interactions involving linguistic behavior by the mother, the child or both in relation to events and contingencies in the environment. Development of language as behavior may be analyzed according to some theoretical relations expected to emerge among the three basic dimensions just outlined. These theoretical relations may be framed into different groups of assumptions depending upon the dimensions involved in the relation and the specificity of such relations.

We shall enumerate some of these assumed relations in order to provide for a theoretical outline accounting for the particular methodological concerns in the approach being described. Many of the relations and observational categories to be

described, have been identified and conceptually designed as part of a research project analyzing linguistic development with mother-child couples. These relations may be grouped in six classes:

a) Within morphological relations including changes in child behavior as a time sequential process and changes in child behavior depending upon mother behavior;

b) Within formal relations including both time sequential and mother behavior-dependent changes in the child behavior;

c) Within functional relations involving also time sequential and mother behavior-dependent changes in child behavior;

d) Morphological-formal relations including within child dependencies, and dependencies between the mother and the child some of which may be determined by the mother's behavior and others by the child behavior;

e) Morphological-functional relations involving the same type of dependencies formerly described; and

f) Formal-functional relations including the same three types of dependencies just mentioned.

We shall describe the kind of specific dependencies that may be expected to occur within each group of relations. The relations outlined consider the functional influence of morphological and formal dimensions of language in the development of interactive repertoires. This aspect has been traditionally neglected by behavioral-approaches. At best morphological description of language patterning has been considered isomorphic to a functional account (Catania, 1972; Moerk, 1977, 1980; Segal, 1977). Nevertheless, the relations to be enumerated are not exhaustive. Rather, they exemplify the nature of the research hypotheses that may be meaningful for a behaviorist theory of language development. Hence, we shall advance only one tentative relation for each of the dependencies in the six general groups;

a) The appearance of vocal, articulated behavior is faster to the extent that the child develops first a differentiated gesture repertoire;

b) The variety of vocal and gesture behaviors by the child will depend on the variety in mother's behavior while interacting with him or her;

c) Verbs and nouns emerge as syncretic responses describable as verb or nouns. Depending of the differentiation of these primitive functional formal responses distinctive syntactic styles may be expected to develop;

d) If a mother having a complex stylistic repertoire simplifies its patterning in the interaction with the child, she will promote a faster and diversified style patterning than if she maintains her "adult-type" speech;

e) The vocal identification (naming) of objects by the child depends upon the prior orientation to pairings of naming and object presentation by the mother (Lowe, Horne, Harris, & Randle, 2002)

f) The appearance of speech related to absent events and objects depends upon the frequency of the mother ascribing "symbolic" properties to present objects, that is, talking about an object as if it were a different one;

g) The range of variation in conventional and non-conventional vocal behaviors will correlate with an earlier emergence of differentiated formal speech as defined by stylistic patterns;

h) The range of variation and complexity in the mother's speech style will correlate with an increased repertoire of non-conventional manipulative and other physical contacts of the child with environmental objects;

i) The differentiation in articulated vocal behavior by the child will increase the length of speech patterns by the mother;

j) The range of differentiated conventional vocal responses in the child will correlate with the length, in time and number of successive child-mother interactions, of linguistic episodes;

k) The functional correspondence of vocal and non-vocal behaviors in the mother will affect the integration of vocal and non-vocal morphologies in the child;

1) The beginning of articulated-vocal utterances by the child will increase the number of linguistic interactions with the mother:

m) The complexity in speech style by the child will correlate with the possibility of modifying the contingencies involved in mother-child interactions initiated by the former;

n) The variation in functional uses of vocal responses in different situations and contexts by the mother will influence the differentiation and diversification of speech style in the child; and

o) The changes in functional performances of the child through linguistic actions -in relation to situations, objects, effects and so on- will produce changes in the stylistic patterning of the mother vocal behavior interacting with them and fostering new ways of responding.

The study of the type of relations mentioned must be undertaken as a double process including both analytic and synthetic strategies.

Analytic methodology is addressed to the identification of reactive components varying in molarity, whereas synthetic methodology consists in the integration of reactive components to the episodic situations in which they occur as functional interactions involving extended relations. We created an observational system including both, analytical and synthetical elements. The system actually is composed by 7 dimensions of mother-child interaction amounting more than 100 categories. All dimensions can be synthesized in terms of the type and content of the interactive episode. Besides, developmental classes may be constructed from the crossing over of the various analytic and synthetic dimensions according to the evolutive *momento* and functional aptitudes previously proposed.

From an analytic standpoint, three sets of components may be identified, according to their molarity patterning: a) morphological elements in linguistic interactions which include both vocal and non-vocal responses; b) formal units of conventional graphic and vocal actions adjusting to normative functional roles; and c) extended patterns of vocal and graphic actions conforming to speech style relevant to conventional classes of interactions.

Morphological elements may be classified according to the characteristics of the factional system and their correspondence with conventional forms of communicative responding. In such a way, we may describe conventional vocal and non-vocal responses as well as non-conventional vocal and non-vocal responses. Among the later ones we may identify cries, babbling, whining, and smiling as well as orienting, manipulative motion, and body-contact responses. In regard to the former ones, we may observe unitary, repeated and complex utterances as well as pin-pointing, functional manipulation, gestures, and facial expressions (Ribes & Quintana, 2002).

Formal units may be differentiated as being emitted as graphic or vocal actions, but they are always conventional forms of

responding. They include substantives, adjectives, verbs, adverbs, pronouns, articles, prepositions, conjunctions, and interjections.

Finally, stylistic patterns may be structured as one-member and two-member statements[4]. They may in turn be classified as declarative, interrogative, negative and exclamative, among other language-games to be learned through social practice (Wittgenstein, 1953).

Elementary components may be synthesized according to three interactive criteria: a) situational exercise of linguistic competences; b) functional correspondence of conventional and non-conventional responding; and, c) two events or multi-event episodes, conceiving the speaker and listener as events of the relation.

The situational exercise of linguistic competences involves the role of the mother and the child as mediators of or mediated in an interaction demanding the functional integration of non-conventional actions and events to conventional responses by the mother and the child. Thus, linguistic competences as the disposition to engage in conventionally integrated episodes with objects and persons may take place in various forms, according to the contingency prevailing in the situation, e.g., naming, asking for, prohibiting, allowing, repeating, simulating, describing, reproducing, asking about, comparing, etc. On the other hand, functional correspondence of conventional and non-conventional responding may be analyzed between individuals or within a single individual providing for an assessment of the integration of non-conventional behaviors to linguistic actions and contingencies. Finally, episodes may occur as straight relations between the mother and the child or may take place intermediated by a third or nth event, e.g., an object, a happening or the action of another individual. This analysis may help to observe if the interaction is didactic, situation-related or situation-detached.

A developmental analysis of linguistic behavior is not complete without taking into account the various functional levels of conventional morphologies.

Language functions must be understood as the organization of interactions through the mediation of linguistic actions. These actions involve the different roles assumed by the participating individuals in such mediation. Thus, the synthetic dimensions just outlined must be complemented by the identification of the functional role of mother and child in the organization of the linguistic field. This organization, referred to the previously described functional aptitudes and developmental *momentos*, consists in the identification -regarding the child in our case- of how the behavior structures the contingencies relating objects and individuals.

Therefore, a complete account of language acquisition as different classes of functional behavior has to be based upon the analysis of episodes as contingency fields (Ribes, 1990b). Contingencies, in such an account, are not consequences, although include them.

Contingencies are to be understood as the concrete way individuals and objects interact with each other in terms of the setting conditions procured by the conventional reactive history of the child. We may assume a developmental process that begins with the

4. This classification, taken from H. Beristain, *Gramatica Estructural de la Lengua Española*. Mexico: UNAM, (1981), is based upon the identification of conjugated verbs in the statements.

modulation, of interactive regularities and new behavior morphologies, and that proceeds through enriched and transformed contingencies due to the mediating role of conventional behaviors and the new roles set for other individuals by this fact. Although in early stages the acquisition of conventional behavior as meaningful responding and potential mediator may be the central focus of a developmental analysis, posteriorly becomes self-evident how linguistic aptitudes coordinate any kind of interactions of the child with his-her environment. Socialization, moral behavior, cognitive evolution and many other issues of traditional theory of development are to be approached as the emergence of new conventional competences through the mediation of continuously enlarged functional aptitudes, which would not appear without the influential role of linguistic factors. The same reasoning may be applied to the possibility of building up a developmental technology based in the identification of dyadic teaching strategies and the critical role of early mother intervention to promote a diversified, linguistic evolution.

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