ISSN 1982-3541
Belo Horizonte-MG, Brazil
2007, Vol. IX, nº 2, 115-124

Brazilian Journal of Behavioral and Cognitive Therapy

Effects of differential reinforcement of choosing phrases about reading upon the duration of reading behavior[1]

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Abstract
In the scope of studies that investigate the effects of manipulation in verbal antecedents upon the related non verbal behavior, the present study evaluated the effect of differential reinforcement of one response class (choice of phrases about positive aspects about reading, interpreted as tacts with positive qualifying autoclitics) upon another class (the choice of reading behavior), reinforcing choices of phrases about positive aspects of reading and observing its effects upon the emission of reading behavior. It were registered activities and photographs chosen before and after the training. During training, four phrases appeared in a computer screen and just the choice of one of them (related to reading) was reinforced with points. The results indicated an augment of the choices in reading behavior as well as in the time of reading for the majority of the participants and an augment of the choices of choosing photographs related to reading, when compared to the results of the baseline. The results are interpreted according to behavior verbally governed.

Key-words: Verbal behavior; Rules; Relations between verbal behavior and non verbal behavior; Tact; Autoclitics.

Introduction

Through verbal behavior man establishes a new relation with the environment: describes what occurs in it and analyzes contingencies, going beyond the direct and mechanic way of changing it and by it being changed (Skinner, 1974). This change is upon other men, defining it, therefore, as an operant maintained by the practices of the verbal communities. Its most basic consequence is that, through it, the speaker changes the behavior of the listener (Catania, 2003).

If a speaker describes contingencies, this describing behavior can exert control over the behavior of the listener. If the speaker and the listener are the same person (when someone "speaks to him/herself", for example), changes can be found in the behavior of a person from changes in its own verbal behavior.

But Skinner (1974) alerts to the fact that the descriptions of contingencies will only generate responses if those descriptions have been established as discriminative stimuli, what implies in a history of differentiated reinforcement, in which, coherent responses upon descriptions had been reinforced.

Description of contingencies have been defined in literature as *rules* (Matos, 2002). Catania (2003), however, due to the ambiguity in the use of the term, sometimes based in functional criteria and other times in structural criteria, proposes the term *verbally*

1 Este trabalho foi parte da dissertação de mestrado da primeira autora, sob orientação da segunda autora e contou como apoio da CAPES e do projeto FAPESP/PRONEX , 2003/09928-4, 479436/2003-7.
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controlled behavior.

The verbally controlled behavior can be verbal or nonverbal, controlled by verbal antecedents, that can involve or not a whole description of contingencies. Such behavior is maintained by social consequences. (Matos, 2002).

Descriptions of objects or events or of the properties of both can be interpreted as tacts, as they are controlled by the object, event or properties of both (to say "*I read*", for example). Evaluations, qualifications of objects, of events or of their properties can be interpreted as autoclitics, as they change the part which they refer to (to say, for example "*I read and like it very much*").

The autoclitics are verbal operants that have as their main consequence the changing of the listener's behavior in respect to the verbal response emitted (Skinner, 1957; Hübner, 1998, Bandini and De Rose, 2006). According to Skinner (1957), one of the functions of the autoclitics is to increase the precision of the control upon the listener's behavior. If the speaker is the own listener, it could be expected that the emission of tacts with positive qualifying autoclitics increased the precision of the verbal control upon the nonverbal behavior of the speaker. If the qualification is positive, the reinforcing value of the action to which the qualification refers to could be increased (Hübner, Austin and Miguel, to be published).

Dias and Hübner (2003) achieved an increase in the time dedicated to reading from the differentiated reinforcement of tacts with qualifying autoclitics over reading, in the speeches of children with a history of low interest in reading. The differentiated reinforcement occurred through praises and head nods that followed each sentence that the child emitted giving value to reading. In a design of a pre and post-test (A-B-A-B), returning to the base line, five of six participants increased the reading time after the training that reinforced differentially speeches about reading. The results are instigating in respect to the "motivation" for reading. Many studies in Behavior Analysis, by the equivalence paradigm and teaching procedures of general reading, investigated procedures to create a competence in reading, in other words, reading with precision and comprehension. The studies indicate that in little time and with procedures that minimize errors, several populations, including children with a history of school failure, can acquire repertoire of competent readers (De Souza & De Rose, 2006, Hübner, 2006, Sidman, 2000, among others). The study of Dias and Hübner (2003) follows in a complementing direction: for the ones that already know how to read, how to increase the time dedicated to reading, checking to see if the verbal responses change the nonverbal related.

By means of checking if a history of differential reinforcement of a determined class of behavior could make emerge another class of response, Simonassi, Borges and Loja (2000), made an investigation with children to see if the touching of animal names on a computer screen, would generate the response of writing animal names after the mand of the experimenter for them to write words. All the participants presented the response of writing animal names, after the training with differential reinforcement of the response of touching animal names on the computer screen.

This study evaluated if the differential reinforcement of verbal descriptions that qualify the activity of reading (that can be interpreted as tacts with positive qualifying autoclitics) can exert an effect upon the emission and duration of the behavior of actually reading and upon the choice of the photography that refers to reading.

Method

Participants

Six children that were coursing the second year of elementary school of the public education, all of them with eight years of age and from the same class, participated in the studies.

Table I: Composition of the Phases of the procedure.

Base Line I	Base Line II	Training	Test I	Test II
3 sessions of Activity Choice 20 minutes	3 sessions of Picture Choice	3 sessions of differential reinforcement of pro-reading sentences	3 sessions of Activity Choice 20 minutes	3 sessions of Picture Choice

Material

A lap top computer was used, equipped with *mouse and* a *software* especially built for the research, programmed in Delphi language by Andrade, Barros and Carnevale[4].

In the sessions to choose the activities were used colored pencils, sulfite paper, children's books, playdough and memory game.

Procedure

The procedure was divided in five steps: Base Line I, Base Line II, Training, Test I and Test II.

Table I: Presentation of the steps in which the procedure was divided.

Base Line I – Choice of Activities.

In the first step of the procedure, the participants chose activities, within the ones predetermined by the researcher. The objective of this phase was to check the type of activity that the child chose, if there was any preference among the activities available and how long they stayed in each of them.

Three sessions were done, each one lasting 20 minutes. The sessions were done in an interval of 24 hours between them, totaling four days, one per day. The objects available for the choice were: children's books, colored pencils, sulfite paper, play dough and memory game.

Base Line II: Choice of Pictures without Reinforcement.

This step was composed of three sessions in which the child chose one picture among four different ones that appeared on the screen. The pictures showed activities such as: reading, drawing, playing, and modeling. There was a group of pictures for the female participants (with a girl doing the activities) and a group for the male participants (with a boy doing the activities.

The objective of this phase was to check if the child showed any preference in the choice of pictures. Besides this, the choices of the pictures in this phase were compared with the choices after the training, to check if there was any change in the frequency of choices done by the participants.

Three sessions of Base Line II were done in sequence, totaling 36 attempts throughout the three sessions.

Training: Differential Reinforcement of Choices of Phrases about *Reading*.

On the computer screen appeared four different phrases made up of verb in the infinitive, verb to be in the present and adjective.

The training constituted by three sessions, totaling in the minimum, 36 attempts. Only the attempts with phrases containing the verb *Read* resulted in points. Upon each successful result, ten points were added to the counter and a sound was produced to warn the participant that points were being added. The counter was located at the top and center of the screen. The points were counted at the end of the session and the participant could exchange them for prizes that varied according to the points obtained.

The objective of the training was to check if the differential reinforcement (points), used for the choices of phrases containing the verb *READ* with the positive qualifying autoclitics, would be efficient to select these responses and not others until the criteria of 100% of success in the choices of phrases containing

4 Professors of Computing at Universidade Presbiteriana Mackenzie, authors of the computing program under the supervision of professor Ubirajara Carnevale.

Table II: Sentences presented in each one of the three experimental sessions.

Verb	Session 1	Session 2	Session 3
Reading	is nice	is fun	is important
Playing	is nice	is fun	is important
Painting	is nice	is fun	is important
Modeling	is nice	is fun	is important

the verb *READ* with the positive qualifying autoclitics was achieved.

The criteria to pass to the next phase was of 100% success, in other words, the participant had to achieve the maximum points, which were 360 points. Therefore, the training was repeated until the criteria was achieved.

Test I: Effects of the Differential Reinforcement Training in the Choices of Phrases upon the Choice of Activities.

This step was done after the Training of Phrase Choices and was identical to Base Line I. It had the function of checking the possible effect of the differential reinforcement training of phrase choices about the choices of activities. Three sessions were done, one each day.

Test II: Effects of the Differential Reinforcement Training in the Choices of Phrases upon the Choice of Pictures.

The Test II done was identical to the one done in Base Line II and had the function of checking if the Differential Reinforcement Training in the Choices of Phrases exerted any effect upon the choice of pictures that showed the four activities (reading, drawing, playing and modeling).

Results

When the data obtained in the sessions of Base Line I (the first columns of each activity) were compared with the data obtained in Test I (the second columns of each activity), represented in Illustration 1, changes can be observed for the majority of the participants. All the participants showed an increase in the choice of the reading activity and in the time spent in this activity.

In Base Line I, the participant LV chose the activity of reading in the three sessions, staying 20 minutes in the first session, 10 minutes in the second and 13 minutes in the third. But during Test I, the participant stayed in this activity for 20 minutes during the three sessions of choice, which showed an increase in the time spent in the reading activity.

The participant IC showed, in the sessions of Base Line I, varied choices from one session to the other. However, the reading activity was present in the three sessions of Base Line I, represented by the first columns of each activity. In the sessions of Test I, represented by the second part of the illustration, on the right, the activity of reading was chosen in the three sessions of Test I and the time spent in this activity increased to 20 minutes in the three sessions.

The participant LA chose the activity of reading only on the second session of Base Line I, staying nine minutes in the activity. In the other sessions he chose the painting activity. However, in the sessions of Test I, the reading activity was chosen in the three sessions; but the time spent was 20 minutes in the first session, and 15 minutes in the other sessions.

The participant JS, chose the activity of reading in the first two sessions of Base Line I and with a time varying from 15 minutes in the first session, to five minutes in the second session. On the third session she did not choose the reading activity. On the first session of Test I, the time spent in the reading activity was of 15 minutes, but on the second this time decreased to two minutes. On the third session the reading time was of six minutes. The time spent in the activity was high

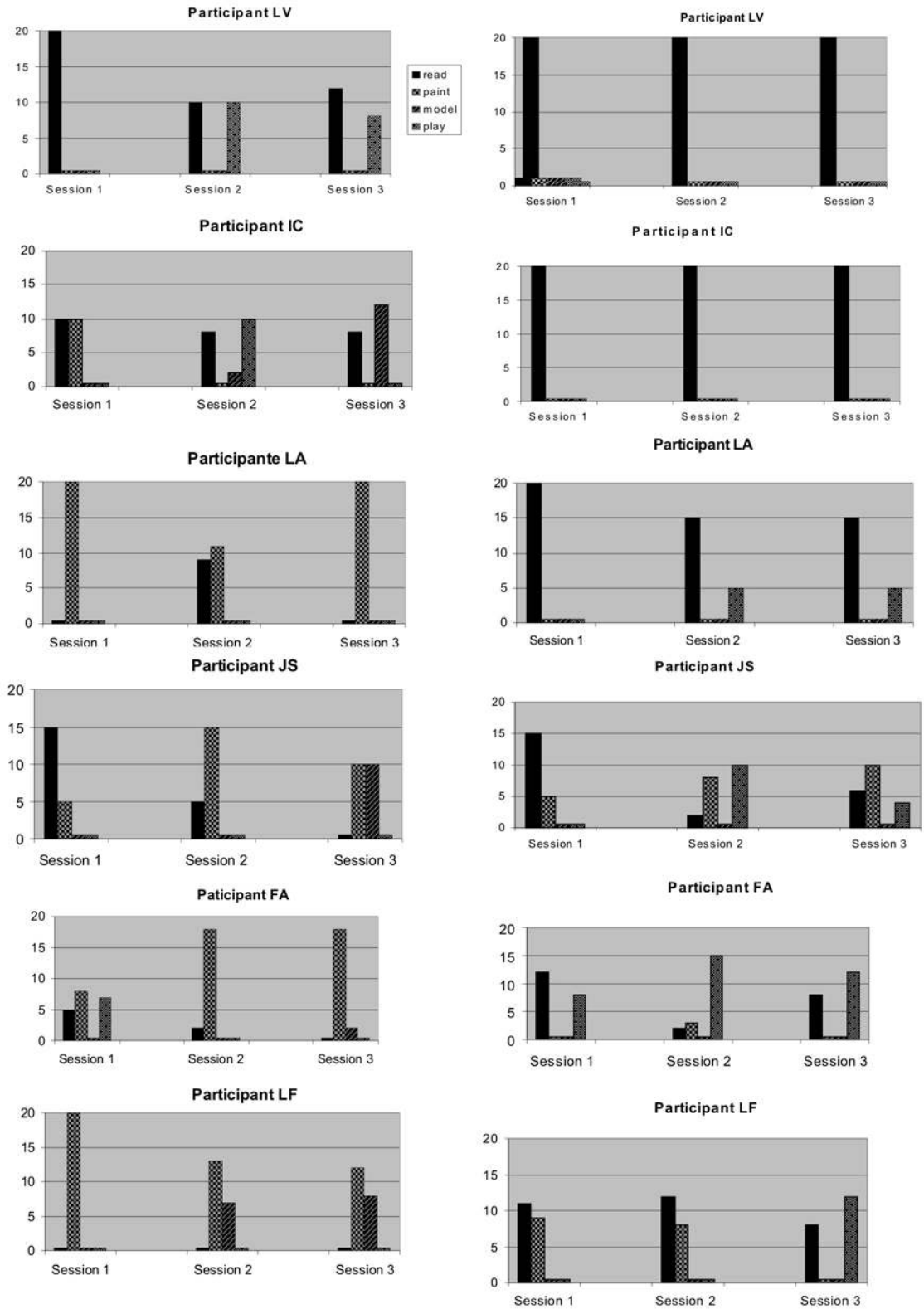


Illustration 1: Chosen Activity and time spent in the activity for each session of Base Line I and of Test I.

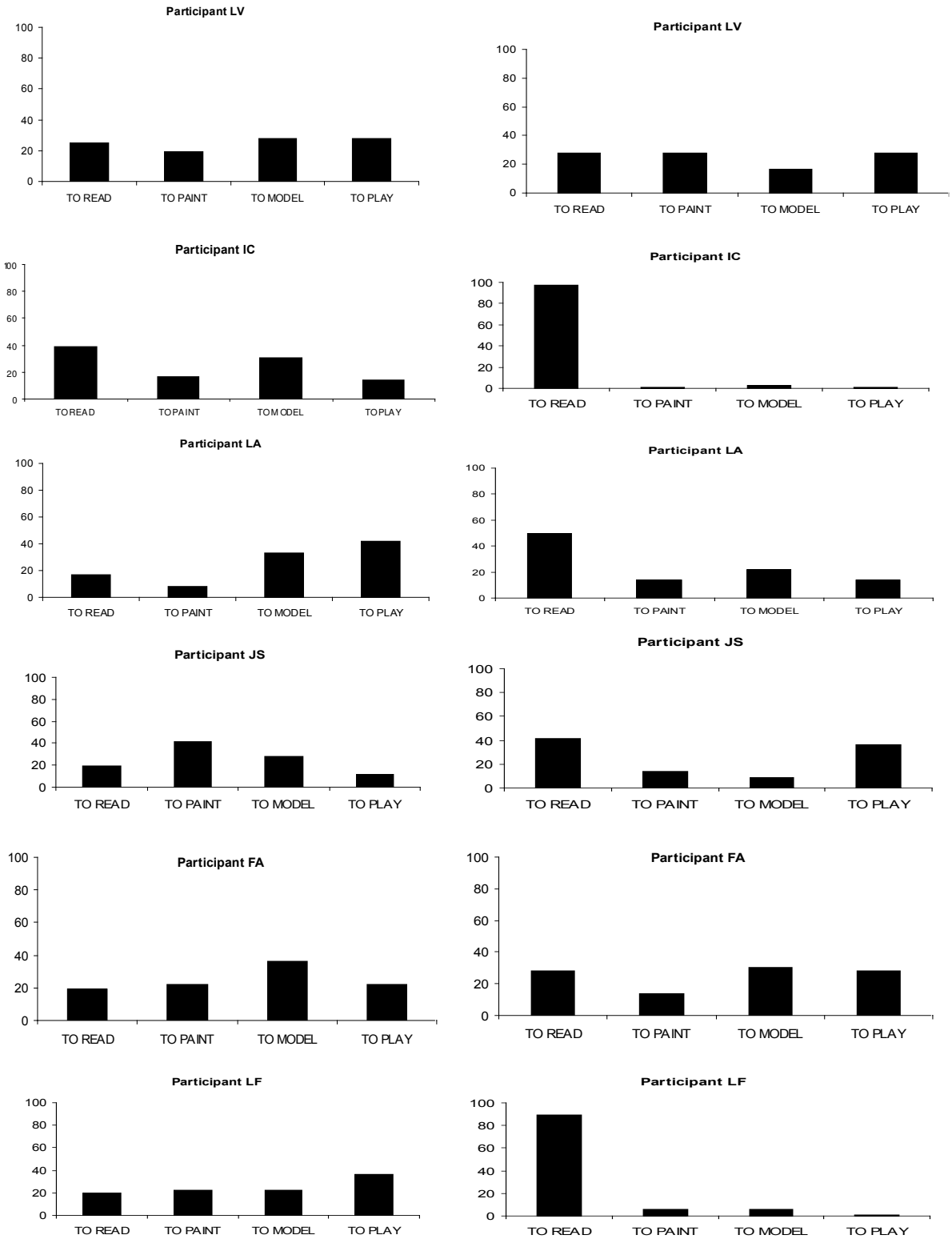


Illustration 2: Percentage of picture choices, without reinforcement, presented on the computer screen during the session of Phase VI.

on the first session, but did not continue in this way on the other sessions of Test I.

The participant FA chose the activity of reading only on the first session of Base Line I, staying in this activity for only five minutes. On the other sessions of Base Line I, he did not chose the reading activity. In the three sessions of Test I, however, FA choise the reading activity. But the time spent in the activity was of 12 minutes in the first session, two minutes in the second and eight minutes in the third session. The activity of playing was the favorite in the sessions of Test I.

The participant LF did not chose the reading activity in any of the three sessions of Base Line I for her favorite activity was painting. However, in the three sessions of Test I, LF chose the reading activity, although the time spent varied from 11 minutes in the first session, to 12 in the second and eight minutes in the third session. Again the time spent in the reading activity began to vary starting with the first session of Test I, not continuing during the sessions.

In general, what is observed is that the reading activity was the most chosen activity in Test I and the time spent in this activity increased for all the participants.

Illustration 2 presents the data of Base Line II and of the sessions of Test II, together with the data obtained in Base Line II. Comparing the Base Line II with Test II, the percentage of choice of the picture with the reading activity increased, in relation to Base Line II, for four of the six participants (IC, LA, JS and LF), although the percentage of increase was varied; for example: while for LA the increase was of 18% to 50%, for JS, the increase was of 20% to 40% and for LF the increase was of 20% to 90%. For two of them (FA and LF) it was not observed an increase in the percentage of choice for the pictures related to reading in Test II.

Discussion

The objective proposed for this research was achieved: to check if the differential sequencing of verbal descriptions about reading would have effect upon the emission of the behavior of reading and upon the choice of related pictures.

However, to identify the behavioral processes responsible for the increase of frequency in the choice of the reading activity and in the time spent in this activity, as well as the increase in the choices of pictures that showed reading is a more audacious objective and difficult to be completely achieved. Considering this, the present discussion presents possibilities of data interpretation.

The increase in the frequency of the choice of the reading activity, observed in Illustration 1, as well as the choices of pictures related to the reading activity (Illustration 2), can be because not only of the differential reinforcement of the verbal descriptions, but of the actual verbal description "To read is nice (important, fun)", what could have been a conditional precedent stimulus for the activity of reading.

On the first moment, the differential reinforcement of this class of response (to touch phrases qualifying the activity of reading, which can be interpreted as tacts with positive qualifying autoclitics), in the Training Sessions, could have been important, since, as Skinner (1957) states, any procedure that clarifies or improves the quality of a stimulus has an important discriminative function and enables the production of a response. In this case, the giving out points for each correct choice could have increased the discriminative effect of the verbal stimulus involved.

Another process that could have clarified and improved the quality of the verbal stimulus is the qualifying autoclitic "is nice", "is important", "is fun", present in the phrases. As already pointed out, the autoclitics are verbal operants that has as its main consequence the changing of the behavior of the listener in relation to the verbal response emitted (Skinner, 1957; Hübner,1997, Bandini and De Rose, 2006).

However, for us to affirm with more certainty that the autoclitics exerted effects,

we would have needed to measure such variable in a more specific way: maybe having two procedures, one using phrases with autoclitics and another using just the word "Read", for example. Since this measure was not done, we can only suppose an influence of the qualifying autoclitics in the emission of the behavior of reading and in the behavior of choosing pictures related to reading. On the other hand, data from literature were reapplied here (Dia and Hübner, 2003), indicating that the autoclitic can contribute to make the description of the contingency more "attractive" or "motivating" and, in this way, make the behavior occur.

Another way to describe this process is to conclude that the verbal description, product of the textual behavior of "Reading is nice", worked as a antecedent verbal stimulus of the reading response, characterizing it as a verbally governed behavior. Such function of the verbal description can be because of a possible history of reinforcement in which facing the verbal descriptions of this sort, coherent responses were reinforced.

Schingler (1993) determines rules such as environmental changing operations of function, that is, they change the behavioral function of other stimuli. The function changing stimuli do not evoke the discriminative stimuli; they only change the function of other events, including the discriminative stimuli. They are antecedent events that change another event, the discriminative stimuli that evoke certain answers. This means to say, in other words, that the verbal stimulus "Reading is nice" changed the function of the discriminative stimulus "book".

Besides that, the presence of the experimenter in the sessions of Activity Choice, soon after the Training Sessions, can have influenced in the choice of the reading activity, since the experimenter was the same person that took the children to the computer and applied the sessions of differential reinforcement. The presence of the experimenter in both sessions can have acquired the discriminative function for the emission of the reading behavior.

Children usually have a reinforcement history of obeying their parents, and teachers in a classroom. The similarity between these situations and the experimental situation can have favored the verbal control. Therefore, the presence of the experimenter is a point to be manipulated in future experiments, to have more evidence in respect to this variable.

Another possibility in the analysis of the results involves explaining why reading the text "Reading is nice" and not just choosing this text, among others with similar functions, might have had the effect observed in the response of actually reading. In other words, it can be inferred that the children in this study, because of the school age they have, understood what they read and after that, emitted a response related to what was read. The process of reading with comprehension relates to the concept of equivalent relations of stimuli. (Sidman, 2000, Hübner, 2006)

If we consider that both the sentence "Reading is nice" and the book became discriminative stimuli, we can say that both caused or the actual reading response, or the response of choosing pictures that showed the reading activity (a child with a book).

The relationship between the words and the events are, as says Catania (1999), established by the verbal community in both directions; we name things we see and locate what we name, as well as, under determined conditions, besides naming and locating we do what we say and say what we do.

Through the history already established from the verbal community, the children, when they discriminate the sentence "Reading is nice", start to respond differentially to the relation involved between the book and the reading activity. Therefore, they select pictures containing a child reading a book, even if not reinforced by this choice. And also, in the presence of a book, they express the actual behavior of reading, indicated in the sentence.

The sentence "reading is nice", the

pictures and the book can have become, during the child's life, members of the same class of stimuli, and responses to them can also have been part of the class (Sidman, 2000). However, such explanation does not invalidate the previous one about the discriminative control that the current procedure may have installed, since the base line reveals that the response of reading did not occur in such a high frequency as that one observed after the trainings.

The creation of equivalent class of stimuli maybe contributes to understand why such types of stimuli (text, pictures, objects and actions) were able to be related in such little time. The life history of the classes' creation, plus the one of behaving under verbal control can, together, explain the velocity of the training effect.

New researches are important to increase generality, isolate variables (such as the autoclitics, the presence of the experimenter, the previous creation of equivalent classes, the previous behavior of responding under verbal control, among others) as well as elaborate experimental strategies that can allow more conclusive analysis and more secure interpretations.

Finally, this study, through the experimental manipulations it made, did not intend to propose a teaching procedure (or "motivational") that was limited to the verbal behavior; the intention was to demonstrate through experiences that the verbal and non-verbal stimuli and the responses consequentiated positively in their presence, can make emerge, in an economical and fast way, a relevant behavior – reading. What is fundamental, however, is that after it has appeared, it is maintained by the contingencies of reinforcement in the classroom and in life.

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Received in: 11/08/2007
First editorial decision in: 01/21/2008
Final version in: 03/26/2008
Accepted for publication in: 03/26/2008