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## VERBAL REGULATION OF MOTIVATIONAL STATES

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The motivational function exerted by verbal antecedents has been extensively approached from a theoretical perspective and within the direct conditioning paradigm. However, there is little research concerning the alteration of the motivational function via verbal means. The current study presents 2 consecutive experiments in which the role of the verbal context in the alteration of different motivational states was examined. In the first experiment, a protocol consisting of a story about feeling hot and thirsty was administered individually to 5 children, 6 to 7 years old. After the implementation of the protocol, all children reported feeling thirstier than before the implementation and behaved in accordance with this report. In the second experiment with 5 other children, this effect was replicated with a different motivational state (physical restriction). More importantly, in a second phase with the same children, the effect was prevented when the thirst protocol was presented in a verbal context that was incoherent with feeling thirsty. Several verbal contexts in altering motivational functions, as well as some clinical implications, are discussed.

The role of motivational conditions in selecting human behavior is a phenomenon widely accepted although poorly understood. Besides the basic nonverbal conditions of deprivation, satiation, and aversive stimulation, with motivational properties made explicit by Skinner (1953) and systematically defined by Michael (1982), there are millions of

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examples in which human beings' behavior is selected by "motivational conditions" without specific deprivation or the presence of unconditioned or conditioned aversive stimulation. For example, sometimes a particular sport that we always considered extremely boring suddenly becomes interesting because we find out that a loved one plays it (although it does not mean that we will eventually play it). In addition, sometimes after we hear or see something, we change from feeling happy to feeling sad and do not feel like doing anything.

These examples have traditionally been considered in terms of the influence of mood on behavior, and have been extensively studied within the cognitive perspective. Typically, the research on mood induction involves the presentation of a series of self-referencing statements designed to produce a happy, sad, or neutral mood, and the subsequent presentation of different tasks testing for memory, attention, perception, and so forth (Bower, 1981; Dalgleish & Watts, 1990; Seibert & Ellis, 1991; Velten, 1968). Although the results are controversial, in general a mood-congruent effect is observed (Larsen & Sinnott, 1991). The mood induction literature shows that verbal statements can influence behavior as if the events they stand for were actually happening. It is at this point that we consider the study of motivation induced by verbal means a key issue.

Within the behavioral approach, there are important contributions on the role of verbal antecedents in the motivational control of behavior. One example is the autoclitic function proposed by Skinner (1957). Autoclitics are defined as verbal stimuli by the speaker, that affect the function of other verbal stimuli they accompany (strengthening, softening, emphasizing, etc.), thus altering the response of the listener to the speaker's formulation. Michael (1982) then proposed the concept of Establishing Operations (EO), recently replaced by the more general Motivating Operations (Laraway, Snydersky, Michael, & Poling, 2003). Establishing operations are defined as any operation momentarily altering the function of certain events as effective consequences and the probability of the behavior followed by such consequences in the past. Deprivation, satiation, and aversive stimulation could function as EO based on unconditioned reinforcement. Along with the EO, Establishing Stimuli are defined as the conditions establishing conditioned stimuli as effective reinforcers (Cravens & Renner, 1970, for a review of empirical research with nonhuman organisms; Michael, 1982, 1993a, 1993b).

The concept of establishing stimuli has been further elaborated within the derived conditioning approach and, more generally, exposed in the Relational Frame Theory (RFT) (Hayes, Barnes-Holmes, & Roche, 2001). According to this approach, events that have acquired their functions not by direct conditioning but by means of their participation in a relational network with other stimuli can also exert an establishing function, termed verbal establishing stimuli function or augmental (Hayes, Gifford, & Hayes, 1998; Hayes & Hayes, 1989; Zettle & Hayes, 1982). The term augmental describes derived transformation of functions that establish, or momentarily alter, the effectiveness of particular consequential functions

(Greenway, Dougher, & Wulfert, 1996; Hayes, Kohlenberg, & Hayes, 1991; Whelan & Barnes-Holmes, 2004). By means of the transformation of functions, an augmental can regulate behavior although the established consequence has never been experienced (Ju, 2001; Whelan & Barnes-Holmes, 2004). Thus, a person can behave in a certain way to avoid going to hell or with the aspiration of going to heaven, although these consequences (hell and heaven) have never been directly experienced. Furthermore, the same word can have different meanings and lead to different transformation of functions depending on the verbal context within which it is presented. Consequently, the analysis of the verbal contexts in which words have particular functions will help us to understand the conditions necessary for those particular functions to be actualized or altered. This is generally attempted in social interventions (Biglan, 1995) and clinical approaches like Acceptance and Commitment Therapy (ACT) (Hayes, Stroschal, & Wilson, 1999), Motivational Interviewing (Miller & Rollnick, 2002) and Mindfulness-Based Cognitive Therapy (Segal, Williams, & Teasdale, 2001).

To our knowledge, the current study is the first attempt to analyze *some* of the verbal contexts in which particular words can alter several motivational state measures. Our main concern was the alteration of the report of the motivational state, but we also collected measures of actual behavior corresponding to such reports (Luciano, Herruzo, & Barnes-Holmes, 2001). In the first experiment, we implemented a protocol presented within a verbal context coherent with the thirst motivation. In the second experiment, two goals were pursued. The first was to replicate the induction effect with a different motivational state (physical restriction). The second goal was to test for the prevention of the thirst-induction effect obtained in the first experiment by introducing some variations in the protocol aimed at altering the verbal context coherent with thirst motivation.

## Experiment 1

### *Method*

#### *Participants*

A primary school teacher selected 2 boys and 3 girls, 6 years old, as the participants because these children had not shown disruptive behaviors that could interfere with the implementation of the treatment. Parental consent was obtained for the children to participate and be videotaped.

#### *Experimental Setting and Materials*

Two experimenters conducted the study at the school the participants were attending. Children were selected as participants because they have less extensive verbal histories. A room was arranged for the study by placing a table and two chairs, and by hanging a mural (41 x 39 in., made of packing paper) on one of the walls. The mural called *quantities scale* was constructed for the assessment of the report of the motivational state. It contained four rectangles (9 x 12 in.) made of black vinyl tape and aligned vertically. Each rectangle was filled with a different amount of

paper. From bottom to top, the first rectangle did not contain any paper (for the report of “nothing”); the second one contained a 3- x 4.5-in. sheet (for the report of “a bit”); the third one, contained a 9- x 12-in. sheet (for the report of “quite”), and the rectangle at the top was filled with a 12- x 18-in. sheet (for the report of “a lot”). The materials used to train the use of the quantities scale were: (a) four 2.5- x 4- x 1-in. boxes containing different amounts of small pieces of paper, (b) four balloons of the same color inflated each with different amounts of air, and (c) four drawings of buildings differing in the number of floors. A Sony camera-recorder was used to videotape the whole procedure.

### *Design and Experimental Condition*

A pre-post within-subjects design with replications across subjects was employed. The experimental protocol consisted of a set of statements that were deemed, by cultural consensus, to relate to feeling hot and thirsty. The protocol was implemented individually to the subjects in the context of a narrative that was as follows (in parentheses are the gestures as well as the voice and flow modulations by the experimenter to accompany the content of the protocol):

Imagine that you are in a desert, a huge desert (voice modulation) in which the only thing you see is sand. All around you there is nothing but mountains and mountains of sand (voice and flow modulation). You have to reach a place very far away from where you are, so you take your backpack (taking backpack gesture) and start walking.

As you walk the sun gets stronger, you feel how it shines on your face (experimenter touches own face)... on your arms (exp touches own arms)... on your legs (exp touches own legs)... on your whole body (flow modulation); so you feel how your mouth becomes dry... and you have to walk and walk (flow modulation)... without stopping.

You touch your head (exp touches own head) and it feels so hot! (voice modulation)... you can also feel the sweat drops sliding down your forehead (touching forehead)... your eyebrows... your neck...; you did not know it was going to be so sunny, so you are wearing winter clothes, wool pants... a turtle-neck sweater ... a coat... (flow modulation). You cannot take them off because if you do, you will get sun burned, so you have to keep going on your walk with all those clothes on... sweating... (flow modulation).

It is time to eat, so you take some food from the bag, a piece of pizza... chips... pretzels... You eat all this, and you start feeling your mouth getting dry, very dry (flow modulation).

Three measures of thirst and one measure of the protocol understanding were collected. (a) *Report of feeling thirsty*. In the presence of the quantities scale, the experimenter asked “how thirsty are you right now?” and the subject answered either *nothing*, *a bit*, *quite*, or *a lot* by naming and pointing to one rectangle in the scale. This was

measured prior to and right after the implementation of the protocol. (b) *Drinking behavior*. It was measured at the beginning of the procedure and after the protocol implementation, as will be described in the procedure section. (c) *Rate of responses related and not related to feeling hot and/or thirsty*. This additional measure was incorporated after a systematic observation of children's behavior during the protocol implementation in pilot studies (Valdivia, Luciano, Molina, Cabello, & Hernández, 2002), in which a number of responses emitted by the children during the protocol implementation seemed to correspond to the meaning of the words in the protocol. For instance, when the experimenter said "you feel your mouth getting dry" the participants usually displayed some mouth gestures and licked their lips. These responses were systematically defined and incorporated in the current study as responses *related* to feeling hot/thirsty. Specifically, they were: lip licking and mouth movements, facial and eyes' expressions, head and neck movements, and shoulder shrugging. Other topographies not displayed in relation to any component of the protocol in pilot studies, were defined in the current study as responses *not related* to feeling hot/thirsty. They consisted of leg and foot swinging, arm and hand movements, body rocking, and stretching. In the current study, two blind observers previously trained in recording the responses listed above, watched individually each videotaped session turning off the volume. They were trained to say aloud the appearance of any of these responses as soon as they identified them in the videotape. The observer's loud responses were recorded by two different observers who categorized the type of response (related and nonrelated) and the moment in which it occurred. These observers also recorded the other measures (report of thirst and drinking behavior). The observation period, including 1 minute prior to the implementation of the protocol and the protocol time, was partitioned into 10-s intervals. The rates of related and nonrelated responses were calculated by dividing the total frequency of each type of responses by the number of intervals constituting the target period (either the minute prior to the protocol or the protocol time).

#### *Interobserver Agreement*

Interobserver agreement for reports of thirst and drinking behavior was 100%. Interobserver agreement for rate of related and nonrelated behaviors was calculated by comparing observers' records on an interval-by-interval basis. The smaller number of responses in each interval was divided by the larger number. These fractions were then averaged across intervals and multiplied by 100% to obtain the agreement score. The mean agreement for related and nonrelated responses were, respectively, 97.2% and 96%.

#### *Procedure*

Two children were escorted from their classroom to the experimental setting. The children ran the study sequentially so that one of them was taking a break with one experimenter while the other participated in the

experiment. In the experimental room, the experimenter said: "We will be working for some minutes without stopping, so if you want to go to the toilet or drink water, you should do it now. Do you want to go to the toilet? Do you want to drink water?" (measure of pretreatment drinking behavior). This preceded the following sequence: quantities scale training, pretreatment report measures, implementation of the protocol, posttreatment measures, and protocol understanding.

*Quantities scale training.* The subjects learned to name the four rectangles in the mural from bottom to top as *nothing*, *a bit*, *quite*, and *a lot*, respectively, in order to answer questions regarding quantities. A multiple exemplars training was implemented in three stages: (a) The subject was first taught to name the rectangles, at the beginning by using prompted questions ("in this rectangle there is *nothing*. How much paper is there in this rectangle?"), and then presenting the questions without the prompt ("how much paper is there in this rectangle?"). For each trial format, four consecutive correct responses (one per rectangle) were required. Then, the subject was trained to point to the proper rectangle given a particular name. For instance, the experimenter asked "in which rectangle is there *nothing*?" and the participant pointed to the rectangle at the bottom. Eight consecutive correct responses (two per rectangle) were required. (b) Then, three tasks (the boxes task, the balloons task, and the buildings task) were presented sequentially as follows. While pointing to the target object, the experimenter asked in each task, respectively: "How many pieces of paper are there in this box," "how much air does this balloon contain?," and "how many floors does this building have?." The participant had to emit four correct responses (one per rectangle) in each task. Finally, (c) the trials were mixed among tasks, establishing a total of 10 consecutive correct responses as mastery criterion. Throughout the training, correct responses were followed by social approval (good!, great!, clever boy/girl!) and incorrect responses were followed by the repetition of the trial.

*Pretreatment report measures.* Following the previous phase, the child was asked "how thirsty are you right now?" (report of feeling thirsty). The participant answered by naming and pointing to one rectangle in the scale. Then, the participant and the experimenter sat facing each other and talked about casual topics for about 1 minute (pretreatment period for the observation of related and nonrelated responses).

*Experimental treatment.* After that minute, the experimenter requested the subject to pay attention to him, and then started implementing the induction protocol for thirst (see design and experimental condition). In case the subject made any comment during the protocol implementation, she or he was asked to pay attention without interrupting the flow of the protocol (for example, in response to "in the desert there are many camels" by the child, the experimenter said "yes, in the desert there are camels, and listen, you have to keep walking and walking..." and continued with the protocol).

*Posttreatment measures.* The experimenter asked "do you feel

thirsty? How much?" This question was presented as part of the protocol, that is, there was no lapse between this and the last sentence in the protocol, and it was presented using the same tone of voice. Usually, the children answered this question by saying *nothing*, *a bit*, *quite*, or *a lot*, but they were also requested to point to the scale in the wall. The experimenter then said "here I have some water just in case you want a drink," and placed a glass of water in a reachable location for the child while saying "wait a minute, I'll be right back." The experimenter left his seat pretending to organize the room and after approximately 30 s went back to his seat and told the subject he or she was finished.

*Protocol understanding.* The participant was escorted to the waiting room with the other experimenter, who asked, when alone with the child, "what have you been doing?" If the participant did not mention the protocol at all, the experimenter insisted: "What have you been talking about in the room with—the experimenter's name?"

### Results

All subjects passed the quantities scale training, achieving the mastery criteria within the minimum number of trials in every stage. Figure 1 shows (top graph) that all subjects reported feeling more thirsty after the implementation of the protocol. Especially relevant were the reports of Subjects 1, 4, and 5, which changed from *nothing* to *a lot*. As also shown in the top graph, none of the subjects drank water at the very beginning; however, 4 out of 5 subjects drank after the protocol implementation. The bottom graph shows the increment in the rate of responses related and not related to feeling hot and/or thirsty. The pretreatment rate was calculated on the basis of six 10-s intervals of observation, whereas the rate during the implementation was calculated for each subject on the basis of the number of intervals the protocol lasted for him/her (mean 20.4; range 19-24). The rate of related responses showed a positive increment (respectively for S1 to S5: 1.7, 1.3, 1.1, 0.5, and 1.9). That is, it was higher for all participants during the protocol implementation than during the time prior to it (respectively for S1 to S5: 2.3-0.6; 1.6-0.3; 1.3-0.2; 1.3-0.8; and 2.4-0.5). In addition, the rate of nonrelated responses showed a negative increment (respectively for S1 to S5: -0.5, -1.3, -1.3, -0.4, and -0.1), meaning a decrease in all cases during the protocol time as compared to the rate during the time prior to (respectively for S1 to S5: 1.1-1.6; 1.2-2.5; 0.7-2; 1.4-1.8; and 1.4-1.5). These results indicate that the subjects displayed mostly exclusively responses related to feeling hot and/or thirsty during the protocol implementation.

Finally, all participants showed understanding of the protocol when they responded to the open question at the end of the procedure. All children remembered three or more out of the six components of the protocol (being in a desert, long walk, intense sun, heavy clothes, salty food, unavailability of water). For example, S2 described the story saying: "I was in a desert, wearing heavy clothes, all sweating, and did not have

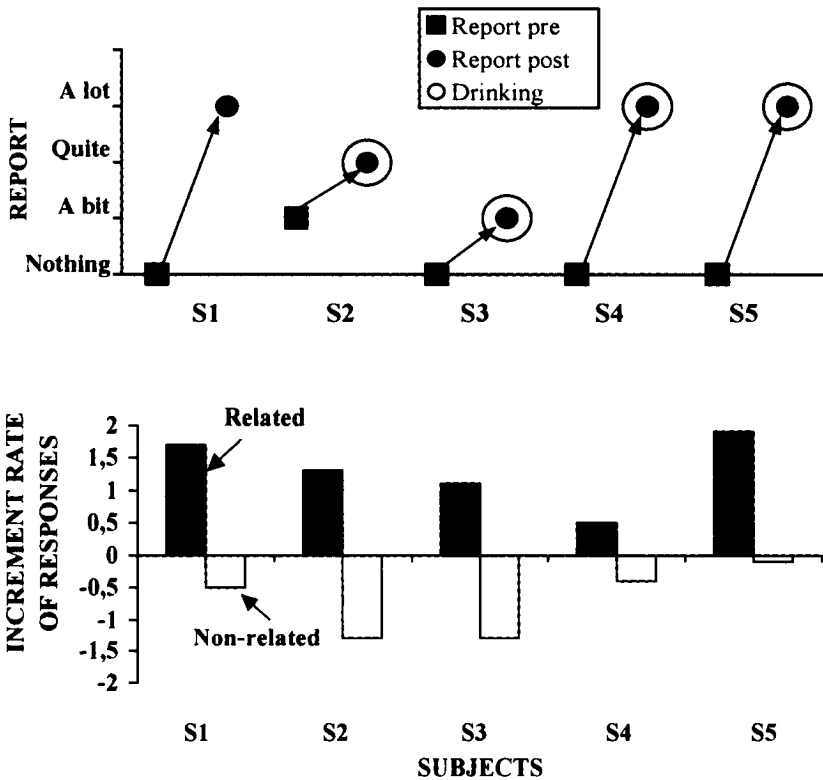


Figure 1. At the top, effect of the experimental protocol in two measures of thirst (report and drinking). At the bottom, increment (positive and negative) in the rate of responses related and not related to feeling thirsty.

water to drink." And S5 said: "I was in a desert, with the sun shining, eating chips and I was very thirsty."

### Discussion

All subjects reported feeling more thirsty after the implementation of the protocol, and 4 out of 5 participants drank water in such conditions. Furthermore, during the protocol implementation, the rate of topographies related to feeling hot/thirsty increased in all cases, whereas the rate of nonrelated responses did not change significantly or even decreased.

The induction protocol involved two critical verbal contexts, which were functional because of the children's verbal history. On one hand, it was presented in the context of the child itself, instead of others, and in the *here* and *now* (by using deictic frames like "imagine that *you*," "*you* wear...", "*your* mouth..."). On the other hand, all the words in the protocol were articulated in a coherent narrative. That is, according to a cultural



consensus, the words were directly or indirectly related to each other, and some of them had the function of being thirsty. It may be concluded that the presentation of a series of words, coordinated with the function of thirst and presented in the context of the child himself or herself in the *here and now*, is likely responsible for the *derived or verbal changes* observed in the children's reports of being thirsty.

However, several aspects could be argued. First is that the change in the report and the actual drinking behavior were the result of direct conditions like a change in the environmental temperature, the ingestion of salty food, or the mere passing of time. However, no change in temperature occurred, no food was available, and the protocol, lasting at most 4 minutes, was implemented during work hours, when water is not usually available to the children at the school. Moreover, and regarding the environmental temperature, this experiment was developed in December, to replicate the favorable results already obtained in a pilot study developed during summertime, when the temperature could have actually been a key factor. It could also be argued that the increment in the rate of responses related to feeling thirsty was strongly influenced by the experimenter's gestures. However, a closer look at the children's responses led to the clear differentiation between the experimenter's gestures (for instance, illustrating with the hands the sweating drops sliding down the neck) and the subjects' corresponding responses (neck movements and shoulder shrugging).

Another argument might be that rather than a derived history effect of the words, the results are due to the direct conditioning history of the words to both thirst and drinking water. We will discuss this argument in greater detail later on.

A third argument implies that words could exert control regardless of the context within which they are presented. For example, it could be argued that the presentation of the words criteria alone (desert, long walk, heavy clothes, salty food, no water) could have led to the same results. However, the normal development of language involves the establishment of different meanings for the same word according to different socio-verbal contexts, as widely stated in language literature (e.g., Wittgenstein, 1953/1988), or more specifically according to several relational frames, as recently analyzed in terms of the RFT (Hayes et al., 2001). Certainly, none of the contexts assumed to be functionally relevant in the induction protocol have been isolated in the present experiment, because the words in the protocol were presented within a sole verbal context consistent with feeling thirsty. A second experiment was conducted to address part of this argument, as well as to replicate the effect observed in the first experiment.

## Experiment 2

Previous research on mood induction has shown that particular words related to particular mood states can elicit such moods and alter the behavior of the subjects accordingly (Isen & Gorgoglione, 1983; Martin,

1990). However, no study can be found in this area that manipulates the context within which the mood-related words are presented. In other areas, relevant research is also scarce. Cangas, Luciano, & Pérez-Álvarez (1998) showed how hypnotic behavior is disrupted by changing the verbal context within which the hypnotic suggestions are presented. In an analogue of one of the deliteralization clinical method used in ACT (Hayes et al., 1999), Masuda, Hayes, Sackett, and Twohig (2004) showed that rapidly repeating a single word reduced the discomfort and believability of self-relevant negative thoughts. The applied implications of this kind of research are relevant for several reasons. The first is for the improvement of preventive strategies directed to reduce the literal context of words, which could interfere with the engagement in valued actions, as observed in Experiential Avoidance Disorder (EAD) (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996; Luciano & Hayes, 2001). Another reason relates to the improvement of the deliteralization clinical methods used in ACT (Hayes et al., 1999).

One of the goals of this study was to test for the prevention of the thirst induction effect by introducing some variations in the protocol directed towards weakening part of the verbal contexts assumed to be responsible for this effect in Experiment 1. The second goal of the study was the replication of the induction effect with a different motivational state, specifically, physical restriction or movement motivation.

### *Method*

#### *Subjects, Setting, and Materials*

Five subjects, ages 6 and 7, were recruited (4 boys and 1 girl) using the same selection criteria as in Experiment 1. The study was developed in the same school as Experiment 1, setting up the experimental room in the same way, and using the same materials.

#### *Variables and Design*

Two protocols (the induction protocol and the decontextualized protocol) were tested in a within-subject design with replications across subjects.

The induction protocol, tested for its effect on physical restriction, was equivalent to the experimental protocol implemented in the first experiment. It included statements that according to a cultural consensus, related to feeling physically restricted and feeling like moving or stretching. The protocol was presented as follows (parentheses describe the gestures as well as the voice and flow modulations by the experimenter):

Imagine that there is a box, a very small box, and you go inside that small box.

It is so small that you have to shrink your body to fit in (the experimenter closes him/herself up), and once you finally get inside, you cannot move a single part of your body (flow and voice modulation), not your back... nor your neck... nor your arms... nor your legs... (flow modulation).

Time goes by, you got inside the box in the morning, it is now time for lunch and you are still there! (voice modulation and facial expressions).

You try to stretch your legs but it's completely impossible, because of the super-small size of the box, so you have to stay with your legs as they have been since you got inside in the morning.

Think about your head. You try to move it but you cannot (experimenter all closed up and voice modulation). And your neck, you try to turn it to the right, but ... it is impossible. You try to turn it left, but... you can't do that either, you scrape the box every time you try to move to feel more comfortable.

And what about your arms? (voice modulation) Imagine spending all evening with your arms folded on your chest, and your hands holding your shoulders (experimenter illustrates that position) for all this time (flow modulation).

Now it's time for dinner and you are still there, exactly in the same position that you took in the morning, all-day-long-without-moving-at-all, can you imagine?" (voice and flow modulation).

The decontextualized protocol was tested for its effect on thirst as in the first experiment, but here it was designed to undermine the motivational functions of some sentences determined by cultural consensus to relate to thirst, by introducing other functions to the same words, as it is shown:

Imagine that you are in a desert.

Which syllables is the word desert composed of? First *de* and then *sert*. And what about backwards, it would be first *sert* and then *de*. *De-sert, sert-de*.

You have to do a long walk, so you start walking.

Which are the first sounds in the word walking? *Wa*, any other word with the sound *wa*? For instance, water, or wall, or wallet. And which are the last sounds in the word walking?: *ing*. Do you know some other words with that sound? I know playing, painting, running, laughing.

And the sun gets stronger and stronger.

Do you know that song about the sun? It says something like... (the experimenter reproduced the lyrics of a Spanish popular song).

You touch your head and it's very hot.

Let's say the letters that the word hot is composed of. First h, then o, then t. And backwards first goes t, then goes the o and finally the h. Now let's say it forward fast, h-o-t. Now let's say it backwards slowly, t---o---h.

You are wearing winter clothes.

Do you know what happens if you say winter many times and very fast? Let's try, winterwinterwinterwinterwinterwinterwinter, what am I saying, winter?, or am I saying terwin?. And listen, what am

I saying now? Terwinterwinterwinterwinterwin, winter?, or is it terwin?

You start eating Preztlies,

p-p-p-p-p- r-r-r-r-r- e-e-e-e-e- z-z-z-z-z- t-t-t-t- l-l-l-l- e-e-e-e- s-s-s-s-s.

The same three measures of the motivational state as in Experiment 1 were collected, for both thirst and physical restriction, as well as the measure of the protocol understanding. Thus, only the aspects strictly specific to the measure of physical restriction motivation are described now. In order to measure the *report of feeling like stretching*, the experimenter asked "how much do you feel like stretching right now?" *Stretching behavior* was defined as the actual legs and arms stretching. At the beginning of the procedure, the experimenter asked "are you comfortable now, or do you feel like stretching your legs, your arms...? How much?" After the implementation of the protocol and subsequent to the measure of the report of feeling like stretching, the experimenter said: "feel free to do whatever you want, there is plenty of room here," and left the seat pretending to organize the room. The *related responses* in this case were body rocking, stretching, shoulders shrugging, head and neck movements, and facial and eyes' expressions. The *nonrelated responses* were leg and foot swinging, arm and hand movements, mouth gestures, and lip licking.

#### *Interobserver Agreement*

Interobserver agreement was calculated as in Experiment 1. Interobserver agreement for report of thirst/restriction and drinking/stretching behavior was 100%. Mean interobserver agreement for responses related and nonrelated to thirst were, each, 98%. Mean agreement for responses related and nonrelated to movement restriction were, respectively, 94.3% and 97.2%.

#### *Procedure*

Two protocols were administered to each participant, following the procedure described in the first experiment. First, we trained the subject to use the quantity scale. Then, the decontextualized protocol for thirst was implemented and after approximately a 10-min break, the subject went through the induction protocol for physical restriction. Both experimenters implemented the protocols to the children, who were randomly assigned to the experimenters.

#### *Results*

All subjects passed the quantities scale training within the minimum number of trials required. Figure 2 shows the results of the implementation of both protocols on the three measures of the motivational state. The upper left graph in Figure 2 shows the effect of the decontextualized protocol on

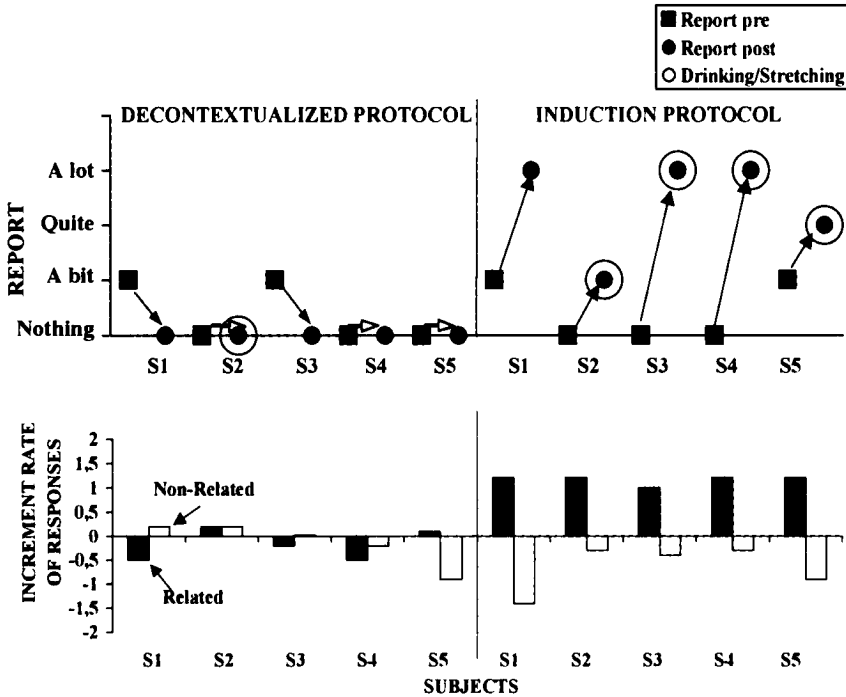


Figure 2. On the left, the effect of the decontextualized protocol on the report of thirst and drinking behavior (at the top) and increment (positive and negative) in the rate of responses related and not related to feeling thirsty (at the bottom). On the right, the effect of the induction protocol on the report of feeling like stretching and stretching behavior (at the top), and increment (positive and negative) in the rate of responses related and not related to feeling restricted (at the bottom).

the report of thirst and drinking behavior for each subject. Subject 1 and Subject 3 changed their report from a *bit* to *nothing*. Subjects 2, 4, and 5 did not change their report, indicating not feeling thirsty either before or after the treatment. Only 1 (S2) out of 5 participants drank after the treatment, although he did not report being thirsty. The bottom left graph shows the increment in the rate of related and nonrelated behaviors for each subject. The rates during the time prior to the treatment (six 10-s intervals) and during treatment time (mean 21.6, 10-s intervals; range 19-26) were calculated as indicated in Experiment 1 (see variables section). The increment in the rate of related responses was negligible (respectively for S1 to S5: -0.5, 0.2, -0.2, -0.5, and 0.1). In fact, the rate prior to and during the protocol time was almost the same (respectively for S1 to S5: 1.3-1.8; 0.9-0.7; 0.8-1; 0.7-1.2; and 0.4-0.3). A similar pattern was observed with the nonrelated responses. The increment was small in all cases, except for S5 (respectively for S1 to S5: 0.2, 0.2, 0, -1.2, and -0.9), indicating no significant differences between the rate prior to and during the protocol time (respectively for S1 to S5: 2.0-1.8; 1.8-1.6; 1.3-1.3; 1.5-1.7; and 1.4-2.3).

The implementation of the induction protocol on physical restriction produced noticeably different results. The upper right graph in Figure 2 shows that all subjects reported "feeling like stretching" more after than before the protocol implementation. Especially noteworthy is the change in the report from *a bit* (S1) or *nothing* (S3 and S4) to *a lot*; S2 and S5 changed from *nothing* to *a bit* and from *a bit* to *quite*, respectively. Furthermore, all subjects except S1 stretched legs and arms right after the implementation of the protocol. The bottom right graph in Figure 2 shows the increment in the rate of related and nonrelated responses, which were calculated as described in Experiment 1 (observation period prior to the protocol: six 10-s intervals. Observation period during the protocol time: mean 10.8, range 10-12). All participants showed a positive increment in the rate of related responses, ranging from 1.0 to 1.2 (respectively, for S1 to S5: 1.2, 1.2, 1.0, 1.2, and 1.2). That is, the rate of related responses during the protocol time was higher than prior to the protocol (respectively, for S1 to S5: 1.8-0.6; 1.4-0.2; 2.2-1.2; 1.2-0; and 1.4-0.2). In contrast, the nonrelated responses suffered a negative increment in all cases, ranging from -1.4 to -1.3 (respectively, for S1 to S5: -1.4, -0.3, -0.4, -0.3, and -0.9). Actually, the rate during the protocol time was smaller than the rate during the time prior to the protocol (respectively, for S1 to S5: 1.4-2.8; 1.9-2.2; 0.8-1.2; 2.4-2.7; and 1.4-2.3).

Finally, all participants showed understanding of the induction protocol, with answers like "I was inside a very small box, and had to stay with the arms like this (displaying the position), and I try to move but I can not" (by S1), or "it was about me all closed up in a very small box, staying like that from early in the morning to late at night" (by S3). However, no subject described the decontextualized protocol as a story about themselves feeling thirsty. For instance, "I don't remember, it was a story about letters" (by S1) or "it was about the syllables of *desert* and *walking*, about Christmas and Santa Claus, things like that" (by S3).

### Discussion

The effect of the induction protocol was replicated in this second experiment with respect to physical restriction. All the subjects changed their report of feeling like stretching after the treatment, and 4 out of 5 were actually behaving accordingly while reporting. In addition, the rate of related responses during the protocol time increased as compared with the prior rate, whereas the rate of nonrelated responses decreased or did not change in a significant way throughout the procedure. The participants behaved as if they had actually been physically restricted for hours. Regarding the decontextualized protocol, it did not alter either the report of thirst or the actual drinking behavior, and the subjects did not select any responses related to feeling thirsty.

Considering that the present conditions of deprivation and imitation are dismissed as in the first study, the effect of the induction protocol on physical restriction is analyzed in the same terms as before. The

presentation of a set of words articulated, according to the history of the subject, in coordination with feeling like stretching and within the perspective of the child himself/herself in the *here* and *now*, seemed to alter the actual need of movement, as reported by the children and shown by their reactions during and after the protocol implementation. We will return to this issue in the general discussion.

In the decontextualized protocol, implemented on thirst, we manipulated part of the verbal contexts that led to the coordination among words in the induction protocol, and no alteration was observed. The decontextualized protocol was also presented in the perspective of the child himself/herself and in the *here* and *now*, and contained some thirst-related words included in the induction protocol as well (desert, sun, winter clothes, salty food, etc.). However, these words were presented accompanied by other words in a relation other than coordination with thirst, creating a completely different verbal context and so preventing the thirst-related functions of those words from showing up. Along with this, the decontextualized protocol was also characterized by the absence of a number of contextual cues that were actually present in the induction protocol, like facial and body expressions by the experimenter, a particular tone of voice, and a larger number of words in relation to thirst. Consequently, all we can conclude is that the presentation of the same words surrounded by different contextual cues exerts different motivational functions. However, we cannot ascertain the role of each cue in the establishment of the relevant context. Further research is needed to isolate it. In the next section, we will center our discussion in the role of the child's perspective (McHugh, Barnes-Holmes, & Barnes-Holmes, 2004) and the coordination among words as key aspects.

Furthermore, within a formal approach, it could be said that the effect of the decontextualized protocol was the result of the presentation of odd formulae, or the utilization of a distraction content that prevented the children from paying attention to the connection among the key sentences. In the discussion below we will show that these arguments are not incompatible, but more extensively comprehended in the case of human organisms, within the verbal or relational approach.

### General Discussion

The current study illustrates the role of different verbal contexts in the alteration of motivational states. In the first experiment, the experimental protocol, consisting of a set of verbal formulations all coherent with feeling thirsty, altered the behavior related to thirst (the report of feeling thirsty, the drinking behavior, and the responses during the protocol implementation). In the second experiment, this effect was replicated with a different motivational state (physical restriction), and more importantly, the thirst induced in the first experiment was prevented when the verbal context was manipulated.

Firstly, we will discuss the induction effect, followed by the conditions

under which it might be prevented according to the experimental protocol implemented with this purpose. The direct conditioning of some of the words in the protocol cannot be ruled out because of our lack of control of the subjects' history with the words in the protocol. However, given the customs of the culture where those children are being raised (it is not likely that the children had been in a desert wearing heavy clothes and without water), derived functions built upon direct ones should be considered when accounting for the results obtained. For instance, the word *thirst* (and the report "I'm thirsty") can have been learned in the presence of actual water deprivation. In addition, that word can have been directly related to the word *sun*, and this one to the word *desert*. From here, myriad relations are usually established. For example, wool in relation to cold, and cold contrary to hot, and hot coordinated with sun, which derives functions among them. Consequently, it may be that although never directly related, *thirst* and *desert* become indirectly related and the function that any of those words could acquire gets transferred or alters the function of the rest of the words in that class (Dougher, 1994; Hayes et al., 2001). This means that given the proper verbal context, the word *desert* could also evoke the report "I'm thirsty" and similar ones, especially given that the protocol was presented within the child's perspective and without much differentiation between the story being told and what was actually happening right there (by introducing the expression "imagine" and "you are," "you wear," "your mouth gets dry," and the like). Perhaps this constituted the relevant verbal context within which the coordination of the words in the protocol exerted a motivational function instead of any other function, as it could have been the case if the context had been "he" or "this is not happening now."

It seems plausible to consider that these conditions (coordination among words in the protocol and presentation of the protocol within the child's perspective in the *here* and *now*) were enhancing or augmenting the motivational functions of the thirst/physical-restriction related words in the protocol (Hayes et al., 1998; Hayes & Hayes, 1989). Within a more applied perspective, the effect of the induction protocol is somehow similar to what is usually observed in EAD (Hayes et al., 1999; Luciano & Hayes, 2001). Here, particular verbal contexts enhance or augment the aversiveness and controlling functions of self-relevant negative private events like "I am not good," "that was my fault," "I can't stand this anymore" (Dougher & Hackbert, 1994; Luciano, Rodríguez, & Gutiérrez, 2004). So, the person behaves controlled by the aversiveness of these thoughts or feelings doing whatever it takes to get rid of them (giving up intimate relationships, giving up college, etc.).

In ACT, the called defusion techniques (Hayes et al., 1999; Wilson & Luciano, 2002) are employed to undermine this augmental effect by altering the contexts within which words are literally experienced. The defusion techniques have been widely used with clinical purposes, but efforts at empirical research are scarce. As presented earlier, Masuda et al. (2004) showed that the aversive functions of a word can be altered by



having the subject repeat it over and over again. With the same defusion purposes, Luciano et al. (2004) showed the effectiveness of training the ability to change from *I-my thoughts here/now* (fusion) to *I-here/now and my thoughts now but there* in altering the function of self-relevant thoughts.

In the present study, in the decontextualized protocol, the thirst-related words were presented in the context of "imagine you are," as in the induction protocol. However, as described previously, they were presented along with other contextual cues that prevented the induction effect. Thus, the thirst-related functions of the words were not actualized and the children could not even describe the protocol as a thirst-related story, which evidences the effectiveness of the decontextualized protocol as a procedure for the prevention of motivational functions. Further research should explore if this procedure is also effective for the defusion of self-relevant contents in clinical populations.

We conclude from our study that words need several contexts to produce alteration of functions. One context consists of the particular relations among words plus some particular motivational function provided to any of them. Another context consists of the differentiation between self and others ("imagine you"... *versus* "imagine you or he ..."), and between spatial and temporal relations with regard to the same content ("imagine you now"... *versus* "imagine this is not happening to you now..." or "this is happening here" *versus* "this is happening in the field or in your home"). Further research is needed to isolate these contexts as well as to replicate the present procedures in order to advance in the experimental analysis on the several ways in which motivational conditions can be brought to, or kept from, the present for therapeutic or other behavior alteration purposes.

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