



## **Manipulation and generalization of aversive functions in children: Implications for treatment.**

**María M. MONTOYA-RODRÍGUEZ\* & Francisco J. MOLINA-COBOS\*\***

(\* ) Universidad Católica del Uruguay. Uruguay (\*\* ) Universidad de Almería, España.

*(Received on February 3, 2017; Accepted on April 15, 2017)*

**ABSTRACT:** The study described below firstly analyzes the role of the generalization of functions in explaining childhood fears, and secondly, makes therapeutic proposals in accordance with this explanation. Utilizing videos to present the aversive stimuli, the formation of avoidance and approach responses was analyzed in 17 children aged 9-10. With three pre-existing stimulus classes (vowels, shapes, and colors), one element of each class was linked to a video with aversive, neutral, or reinforcing content respectively, according to the participant's assessment. After making sure that the functions were generalized to the rest of the elements of each class, three procedures for altering the functions of the aversive class were compared: 1) direct reinforcement of the aversive class, 2) coordination between the reinforcing and aversive classes, and 3) the inclusion of a value factor used in choosing the aversive class. The effect of each strategy was measured by the approach and avoidance responses of the participants. The results show the superiority of the third type of treatment in the alteration of participants' approach responses. The clinical implications and the characteristics of the procedures employed as alternatives to the traditional treatments in this field are discussed.

**Keywords:** Childhood fears, generalization, stimulus classes, values.

*Manipulación y generalización de funciones aversivas en niños: Implicaciones para el tratamiento.*

**RESUMEN:** El estudio que se presenta analiza, en primer lugar, el papel de la generalización de funciones en la explicación de los miedos infantiles, y en segundo, plantea propuestas terapéuticas acordes con esta explicación. Participaron 17 niños de 9-10 años de edad en los que se analizó la formación de conductas de evitación y aproximación mediante la utilización de vídeos para presentar los contenidos. Se utilizaron tres clases de estímulo preexistentes (vocales, formas y colores), que fueron relacionadas con un video de contenido aversivo, neutro y reforzante respectivamente, de acuerdo con la evaluación previa. Tras comprobar que las funciones se generalizaron al resto de los elementos de cada clase, se compararon tres procedimientos para alterar las funciones de la clase aversiva: 1) reforzamiento directo de la clase aversiva, 2) enmarque de coordinación entre las clases reforzante y aversiva, y 3) la inclusión de un componente de valor que guiara la elección de la clase aversiva. El efecto de cada estrategia se midió por las respuestas de aproximación y de evitación de los participantes. Los resultados muestran la superioridad del tercer tipo de tratamiento en la alteración de

las respuestas de aproximación de los participantes. Se discuten las implicaciones clínicas, así como las características de los procedimientos empleados como alternativas a los tratamientos tradicionales en este campo.

**Palabras clave:** miedos infantiles, generalización, clases de estímulo, valores.

*Correspondence:* Maria M. Montoya-Rodríguez . Depto. de Psicología del Desarrollo y Educativa Universidad Católica del Uruguay Av. 8 de Octubre 2801. C.P 11600. Montevideo (Uruguay) maria.montoya@ucu.edu.uy

Numerous theories have been proposed attempting to account for the origin and continuation of childhood and adolescent fears and phobias (Barrios & O'Dell, 1998; Bosquet & Egeland, 2006; Servera & Tortella-Feliu, 2002). Although psychodynamic theories of anxiety continue to be elaborated, the current therapies that have demonstrated experimental evidence of infantile fears and anxiety have been principally based on the behavioral and cognitive tradition (Chorpita & Southam-Gerow, 2006; McPhee & Andrews, 2003; Muris et al., 2002; Ollendick et al., 2009), even if various controversies and unanswered questions remain. Neither the matching of stimuli proposed by the conditioned emotional response model (Watson & Rayner, 1920), nor the direct reinforcement of avoidance behaviors (Mowrer, 1947), nor the observational learning proposed by Bandura (1977) explain stimulus generalization, with the corresponding avoidance of other situations and people to which the child has not been exposed in their history of punishment. A child can come to fear and avoid dangerous and other stimuli that are not objectively, nor have ever been, directly related to them. This all assumes that the stimuli have acquired this function through generalization. That is to say, this occurs in the absence of a history of directly conditioned contingencies (Catania, 1998; Cuvo, 2003; Eifert & Forsyth, 2007; Hayes, Barnes-Holmes, & Roche, 2001; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Besides the relationships among stimuli, the functions given to a stimulus can pass on a phenomenon known as the *transfer of functions* (Dougher, 1998; Perkins, Dougher, & Greenway, 2007) to others related to it, whether or not they share formal characteristics. Many studies have shown that stimulus functions that are assigned to one stimulus of a class transfer to other members of that class (e.g., Augustson & Dougher, 1997; Carvalho & Rose, 2014; Greenway, Dougher & Wulfert, 1996; Perkins, Dougher, & Greenway, 2007). In Grey and Barnes-Holmes (1996) the participants were trained to form three, three-member equivalence classes (A1, B1, C1; A2, B2, C2; A3, B3, C3) using nonsense syllables as stimuli. One example from each class (B1, B2, and B3) was placed on one of three video cassettes in the form of a label. Each video contained content of a loving sexual, religious, and violent sexual nature, respectively, which the subjects viewed. Subjects were then asked to categorize the remaining nonsense syllables that were used in the equivalence training (i.e., A1, C1, A2, C2, A3, C3) as "good" or "bad." In the second experiment of the study, the transfer of evaluation functions through equivalence was brought under contextual control via equivalence relations. To reach this, participants were asked to categorize the videos in the presence of arbitrary symbols which entered into equivalence classes with moral content and dramatic presentation. The results showed that the participants transferred the content of three videos (romantic, religious, and violent) to the rest of the components of the class, forming attitudes of acceptance or rejection towards the videos according to the relational network of which they form a part. Using children as subjects,

Smeets and Barnes-Holmes (2003) established two sets of match-to-sample tasks (A1, B1, C1; A2, B2, C2). Stimuli A1 and A2 were the pictures of a cartoon character and a crying child, respectively. The B and C stimuli were arbitrarily selected geometric shapes and symbols. Finally, the subjects were presented with two samples of the *same* soft drink, one with label C1 and one with label C2. When asked which drink they wanted to taste first, the majority of participants selected the one with the label that had been indirectly related to the preferred picture. After tasting both drinks, the participants indicated that they also preferred that drink. These results indicate that the behavior of the subjects was in accordance with the expected equivalence relations. Along this line, Relational Frame Theory (RFT; Hayes *et al.*, 2001) would explain how stimuli that are not directly used in punishment (or reinforced) acquire these functions as a result of their participation in relational networks with other stimuli that have been used in punishment (or reinforced). This would explain why an avoidance response to stimuli or events that have not had direct contact with an aversive experience is similar to the response given to other stimuli that have had this contact, even though some differ in their physical characteristics (Dymond, Roche, Forsyth, Whelan, & Rhoden, 2008).

With regards to treatments directed at this type of problem, McPhee and Andrews (2003) have pointed out that those that are most commonly utilized are based on a behavioral paradigm, with the utility of cognitive-behavioral treatments being proven as well. In general, the interventions directed towards the elimination of childhood fears incorporate a form of direct contingency control which, usually, consists of positive reinforcement of exposure to the feared stimulus, extinction (lack of reinforcement) of avoidance behaviors toward the feared stimulus, and the reinforcement of their improvement. That is to say, the basic idea assumes that the essential component of a treatment directed towards eliminating a fear is making contact with the stimulus that produces said fear.

Until now, there have been very few therapeutic approaches developed by considering the generalization/transfer of aversive functions through derivation or relational response, i.e. in the absence of a history of conditioning by direct contingency control. An analysis of relational behavior that could be the basis for avoidance patterns of behavior, such as that done by RFT (Hayes *et al.*, 2001), would help to design behavioral treatments that are affordable and efficient, and which could be used to tackle fears. Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999; Wilson & Luciano, 2002) is based on the theoretical and empirical approach that RFT provides, proposing that the derivation of thoughts and sensations with aversive functions of avoidance can end up limiting one's personal life. Going against the priority of those treatments directed towards reducing the frequency or intensity of emotional responses, ACT focuses on the clarification of personal values and the performance of the patient in the direction of their valued goals. The proposal would be to accept the personal events that one encounters when travelling down the path one chooses in life (Wilson & Luciano, 2002). That is, the treatment of fears would not focus on the control or eradication of anxious responses, but on the individual directing themselves and acting in accordance with what is important to them, independent of the state of their emotional activation. Now, the exposure is not to the anxiety-inducing stimuli or situation, but instead to the person's own feelings that control avoidance behavior. The motivation to do this assumes that they are striving for what they consider valuable, which is what gives meaning to the suffering caused by the treatment when conceptualized that way. This meaning and value cannot be found by

looking at the immediate contingencies. Just as Skinner (1974) proposed, behavior is directed towards the future, since a person acts with the purpose of making something happen. Therefore, although operant conditioning is connected to immediate contingencies, the remote consequences could be that the individual behaves as if he or she were made to come under their control. This conceptualization of the role of delayed contingencies is essential in ACT therapy in that values, defined as verbally-construed directions, play a central role in motivating behavioral change (Páez, Gutiérrez, Valdivia, & Luciano, 2006), and are therefore made explicit. Numerous studies support the efficacy of ACT with distinct psychological problems in adult populations (Ruiz, 2010), carrying out an incipient investigation of this therapy in the treatment of children and adolescents (see Greco & Hayes, 2008). The revision made by Murrell and Scherbarth (2011) brought together numerous theoretical articles and interventions with children, adolescents, and parents, which had been designed for several disorders, such as anorexia, anxiety, chronic pain, or autism, among others.

This research aims to extend previous findings about the role of the generalization of functions in explaining the development of escape-maintained behavior in children, and to propose to deal with its treatment in a manner coherent with previous ways. The present study tries to analyze the approach responses in children following the study by Grey and Barnes-Holmes (1996) mentioned above, which used procedures and videos for the presentation of the aversive stimulation. Following that, three procedures will be compared to alter the aversive functions and the approach responses towards the aversive stimuli: 1) direct reinforcement of the aversive class, 2) coordination training between the reinforcing and aversive classes, 3) the inclusion of a value factor in choosing a feared stimulus. In order to do this, we will attend to responses of approach and avoidance after using each one of the procedures.

## METHOD

### *Participants*

Seventeen typically developing children with no known disabilities, 10 to 11 years old, participated in this study (5 boys and 12 girls). All participants were recruited from a primary school from Almeria, Spain. Parents and teachers provided informed consent prior to each child's participation. The inclusion criterion was that neither their mainstream schoolteachers nor their parents had identified the children as displaying any learning difficulties.

### *Setting*

The study took place at the school which the participants attended. The first evaluation, in a group setting, took place in a classroom in which the children sat around large rectangular tables. The rest of the phases were completed individually in a smaller classroom. The setting was the same for all participants, with the experimenter seated on one side of the table and the child seated to their left. An observer was situated on the other side of the classroom to collect data.

### *Materials*

A paper questionnaire was administered to evaluate whether the content was considered pleasant or unpleasant by the children. In the first part of the questionnaire, the names of

animals, plants, foods, and various situations appeared (e.g. cat, snake, flower, hamburger, darkness). This section had fifteen questions in total. The children had to mark how much they liked each one with an X on a continuous line of non-graduated scale of extremes from *not at all* to *very much*. In the second part, the children were asked to imagine that they were watching TV and the fifteen previous elements appeared; they were then asked if they would continue watching or would change the channel (e.g. “Imagine that you are watching a report on TV in which spiders appear. Would you continue watching this channel, or would you change it?”). In the third part, the children were asked to indicate content that they would or would not like to see in a video (e.g. “Which animals would you not like to see in a video or film because they scare you or you find them unpleasant?”). There were eight different situations in this part (e.g. animals, cartoons, characters...) and two more that were of free choice (e.g. “What else would you not like to see in a video or film because it scares you or you find it unpleasant?”)

Twenty-five 1.5-minute videos were used to evaluate aversive and reinforcing content. Cockroaches, earthquakes, scenes from horror films and cartoons, and other content selected from the previous questionnaire appeared. Each video was recorded on a disc that was put away in a black case. They were reproduced on a laptop computer located at a table different from that which was used to perform the other tasks.

The children evaluated the content of the videos according to a non-graduated scale of preferences, from *not at all* to *very much*, with two dimensions: how unpleasant they found the video (Signal with an X on the line how unpleasant you find this video) and how much they liked it (Signal with an X on the line how much you liked the video).

We used 14 papercards that were 75 x 60 mm printed with the components of the four stimulus classes that were to be used (Figure 1). Class 1 (vowels) and Class 4 (pictures) had four different elements (A1, B1, C1, D1 and A4, B4, C4, D4), while Class 2 (geometric shapes) and Class 3 (colors) had three (A2, B2, C2 and A3, B3, C3).

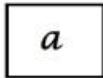
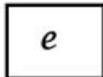
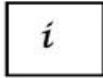
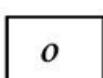
	Class1	Class2	Class3	Class4
A				
B				
C				
D				

Figure 1. Pre-existing stimulus classes.

In order to evaluate preferences for the stimulus classes (see the section on the procedure), a scale similar to that described above was used. For each stimulus, the children signaled on a non-graduated scale how unpleasant they found it (extremes *not at all-very much*) (“Mark with an X how unpleasant you would find watching the following videos”), and how much they would like to watch it (“Mark with an X how much you would like to watch the following videos”).

A laptop computer controlled the coordination training of the reinforcing and aversive classes (see the section on the procedure) using a Microsoft Office PowerPoint® presentation.

Finally, cardboard stars were used as direct reinforcement contingencies, interchangeable for school supplies or small toys.

Answers of interest were recorded on a piece of paper elaborated for the purpose.

### ***Procedure***

*Phase 1: Initial Evaluation.* All of the children authorized to participate in the study by their parents carried out the evaluation of pleasant and unpleasant situations. It was explained how to use the non-graduated scale to the whole group, and they then answered the paper questionnaires individually. The entire questionnaire was completed in a single session. From the information collected in the questionnaires, the experimenters arranged to show 25 videos found through internet searches.

In a single session on another day, the following phases, described below, were conducted (allowing for short three minute breaks whenever the participant requested them). The first stage was the individual evaluation of the videos. Eight videos were selected for each participant according to the information collected in the previously completed questionnaires: three videos with content considered aversive, three with pleasant content, and two with neutral content. After watching each video, the participants were asked to mark how much they had liked and how unpleasant they found each video on a scale of preferences. From this information, the most unpleasant video, the one they liked the most, and another one with an average score for each child were selected. These videos would be utilized later.

The pre-existing stimulus classes were also evaluated in a manner similar to that proposed by Visdómine and Luciano (2002), opting to use classes that were already established in the participants' repertoire. Class 1 was composed of vowels (A1, B1, C1), Class 2 of geometric shapes (A2, B2, C2), and Class 3 of colors (A3, B3, C3). Nine paper cards were used in the evaluation of the stimulus classes, and with them each participant would have to complete different tests on a tabletop: 1) the experimenter groups the members of one class together on the table and the child must do the same with the rest of the cards, 2) the experimenter arranges one element of each class on the table, and the child must form groups with the rest following the sample, 3) the experimenter mixes up all the cards on the table so that the child has to form groups according to the corresponding classes, 4) the experimenter mixes up all the cards (face-down) on the table so that the child groups them into their corresponding classes, 5) the child was given all 9 cards so that they could form three groups, and all of the cards were placed on the table (except for one from each class), unorganized and facedown so that the child would form groups, and was then asked which were missing, 6) one element of each class was put on the table, and the child had to say which ones completed the series, and finally, 7) the child had to give an identifying name to each of the classes. The participants did one trial for each test.

Feedback was not provided during testing. Passing from one test to the next required completion without errors. An exclusion criterion was set for those children who were missing any of the three classes in their repertoire.

*Phase 2: Video labeling.* Each participant re-watched the three videos selected from the previous phase as aversive, pleasant, and neutral. While they watched the video, they put a sticker with the letter “a” on the case of an aversive video (A1), a sticker with a circle on the case of a neutral video (A2), and a red-colored sticker on the case of a video that was labeled as pleasant or reinforcing (A3). After watching each video once, the experimenter ejected the disc from the computer, put it away in a case, and stuck the corresponding label on it while explaining what she was doing at the same time (e.g., the experimenter said, “we are going to put the letter *a* on the case of this video you have just watched”), making sure that the child understood the procedure. In order to do this, after watching the three videos and labeling each of them, the experimenter asked the children, “What was the video that has the sticker with a circle on it about? And this one with the red sticker? And this one with the letter *a*?” These questions were asked once. Following that, but before beginning the next task, the experimenter asked about the content of the labeled videos another time: “What was the video with the red sticker about? And this one with the letter *a*? And this one that has the circle?” These questions were asked as many times as necessary, since passing to the next task required completion without errors.

*Phase 3: Categorization of videos and generalization of functions.* In order to evaluate the generalization of the labeling function to the rest of the elements of the classes, we used nine of the cases used to put away the discs. Each case had a label showing one of the elements of the classes. First, the participants completed the eight tasks described above to group the cases into three different classes. After each trial, they were asked what they thought each group of videos was about. Also, in order to evaluate the generalization of labeling functions to the different elements of the classes, they were asked their preferences on seeing each one of the videos. The participants had to mark how much they had liked and how unpleasant they found each labeled video on the non-graduated scale of extremes from *not at all* and *very much* mentioned earlier. Lastly, the children were asked to choose the DVDs that they would like to watch (in order of preference), checking to see if their selections coincided with what they had marked on the scale.

*Phase 4: Alteration of aversive functions.* Three actions were completed directed towards altering the aversive function of the labeled videos in such a way that the children did not avoid watching them. The three strategies were applied sequentially with each participant. As soon as one was demonstrated to be effective, the procedure was stopped. In order to control the order effect, the presentation sequence was counter-balanced from one participant to the next. The three strategies are described below.

*Option 1. Direct reinforcement of the aversive class.* We followed altering the aversive function of the *vowels* class with reinforcing one of its components. Following a match-to-sample procedure (MTS), each child was presented with a card with one of the three vowels (*a*, *e*, *i*) as the sample, and two new cards as comparisons: an abstract shape (Class 4) that varied from one trial to the next, and the vowel “o” (D1). The participants had to choose the card that they related to the sample. After five consecutive correct trials of this type (choosing *o*), the selection of “o” given two other cards from Class 4 was reinforced. Points were given for each

selection of “o” which could later be exchanged for a gift at the end of this phase. The experimenter said, “I am going to show you three cards, and you can choose the one you want, but you can only win points with one of them. When you have 20 points you can exchange them for one of the toys I have set up for you.” As Class 4 was introduced only for assessing and reinforcing the new item (vocal *o*) as part of the pre-existing vocal class, it disappears in the following stages.

*Option 2. Aversive-reinforcing coordination.* A relationship of coordination was taught among the stimuli of Class 1 (with an aversive function) and the stimuli of Class 3 (with a reinforcing function) on a computer. Before beginning, the experimenter explained what the task consisted of:

The colored stickers that we saw on the cards will appear in the upper part of the computer screen. Do you remember what the colors were? What videos did they go with? (the participant responds) Other shapes will appear in the bottom part. Your task consists of using the mouse to click on the option that you believe is correct. In the beginning, you won’t know which it is, but the computer will tell you if the one you chose is correct or not.

Three available stimuli appeared on the screen in the match-to-sample form, with one colored box as the sample (Class 3), and three comparison stimuli: two from Class 2 (shapes) and one from Class 1 (vowels). Following a correct response (choosing the element from Class 1), the word “CORRECT” appeared on the screen accompanied by a sound. Following an incorrect response, the word “INCORRECT” appeared on the screen accompanied by a different sound. Eighteen trials were done, varying the stimuli used as the sample as well as the comparisons. The task was over when the percentage of correct responses reached 85% (or 15 consecutive trials). If the criterion was not met, the 18-block trial would be repeated.

*Option 3. Value of the action.* The aversive function of Class 1 was altered by giving value to the selection of an aversive stimulus. With the labeled cases of the three videos on the table, a valued action was described to the participants with the following instructions:

Here are the three videos with their corresponding labels. Imagine that it’s your friend’s birthday and she told you that she would really like to watch a video with you. Being a good friend and having a lot of friends are things very important to you. Since it’s her birthday and you really like her, you want to give her the gift of going to watch a video with her. You know your friend likes video “a” a lot. Imagine that it is her favorite, and if you bring it to her house she will be very happy and appreciate your friendship very much. Seeing video “a” with your friend means being a good friend. However, you can bring her whichever video you want. The video that you choose now is the one you will take. Also, you have to watch it to be able to tell her a little bit about what it is about. Which one are you going to choose knowing that it is the one you are going to bring your friend for her birthday?

*Phase 5: Post-evaluation.* After each of the three actions directed towards altering the aversive function of the videos, we evaluated how the participants responded when presented with the video labeled “a,” as well as with the rest of the videos. In order to do this, videos A1, A2, A3 were placed on the table so that they could choose which one they preferred to watch, and then they watched it. If a participant chose to watch video A1, after watching it they evaluated their level of discomfort as well as how much they liked it. When we worked on the

value of the selection, after evaluating them on a scale of preferences, the child was asked, “if you had to watch a video by yourself right now, which one would you watch?”

### ***Variables and Design***

The independent variables of this study were the assignation of the elements of the pre-established stimulus classes with aversive, neutral, and reinforcing content, at one moment, and treatment directed towards breaking these aversive class functions in the next. This treatment had three levels: direct reinforcement of the aversive class, establishing a reinforcing class-aversive class relationship of coordination, and promoting action in a valued direction.

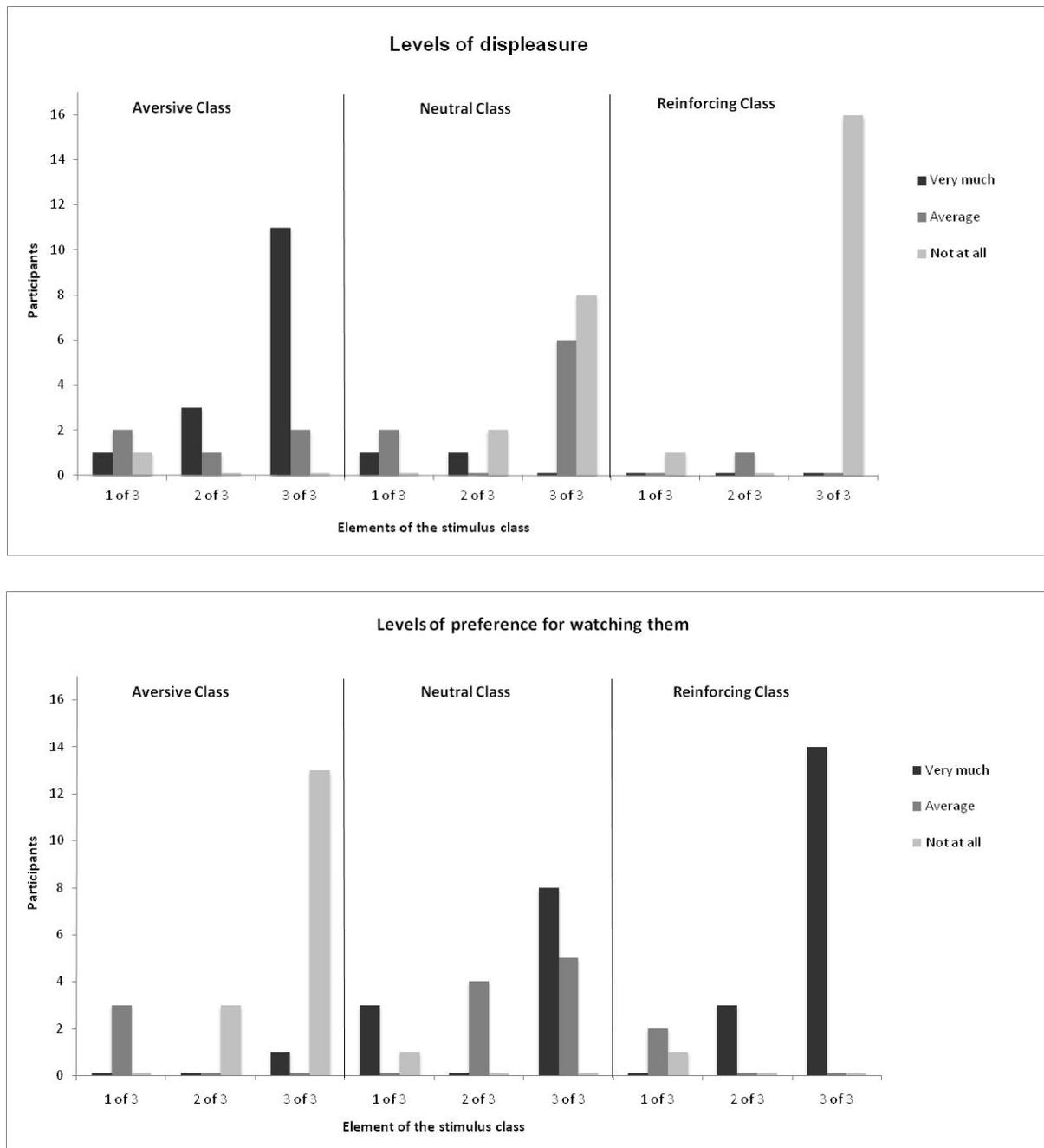
As measures of interest, the discomfort reported, the reporting of preferences and the selection of the elements of the classes to watch (through the videos) were considered. The relationships established among the elements of the stimulus classes and the generalization of functions were also measured.

The provision of variables gave way to an inter-subject design with ABACA replications between subjects, in which A refers to the *initial evaluation*, to the *categorization of videos and the generalization of functions*, and to the *post-evaluation*; B corresponds to the *labeling of the videos with the stimulus classes*; and C to the *rupture of aversive functions*.

## **RESULTS**

In the first place, the use of pre-existing stimulus classes forces us to evaluate the relationships among their elements. All participants reached the necessary criteria in the different tests. The same happens when they categorized the videos with the labels for the different classes. Also, as displayed in Table 1, in the *categorization of videos and generalization of functions* phase, 88% (15 of 17) of participants transferred the content of the videos to the different elements of each class. That is to say, they grouped them correctly according to the fact that they believed they were about the same thing. The exceptions to this were Participant 3 (who did not transfer the content of the videos to any of the classes) and Participant 5 (responding correctly with two classes), who said that the theme of Class 3 was “about colors,” attending to the card’s characteristics.

The generalization of functions is measured by two non-graduated scales on which the children had to mark how unpleasant they would find watching the video and how much they would like to re-watch it. For the quantification of the results, the scales are graduated *a posteriori*, being divided into three segments or equal intervals: *not at all*, *average*, *very much*. We then looked at which segment the mark was placed.



*Figure 2.* Generalization of functions. Number of participants that signaled one, two, or three videos of each stimulus class within the different levels of displeasure and levels of preference for watching them: *not at all*, *average*, or *very much*.

The results referring to the scale that measured how unpleasant they would find watching the video are displayed in Figure 2, showing that 76.5% (13 of 17) of the participants generalize the aversive functions to all the elements of Class 1, 82.3% (14 of 17) generalize the neutral functions to the three elements of Class 2, and 94% (16 of 17) generalize the reinforcing functions to all of the elements of Class 3. Referring to the measurement of how much they would like to re-watch the video (Figure 2), 82.3% (14 of 17) of the participants generalize the

© Psy, Soc, & Educ, 2017, Vol. 9(2)

aversive functions to the three members of Class 1, 76.5% (13 of 17) generalize the neutral functions to the three elements of Class 2, and 82.3% (14 of 17) do the same with the reinforcing functions to all the elements of Class 3.

When participants were asked to mark how much they would like to watch the videos, 82.35% of participants chose to watch those videos labeled within Class 3, the reinforcing class, first, followed by those labeled within Class 2, the neutral class, and finally, those in Class 1, the aversive class. Also, 17.65% of participants chose to watch the Class 3 (reinforcing class) videos first, followed by Class 1, the aversive class, and then Class 2, or neutral videos. Everyone selected the reinforcing class videos first, and 17.65% of the participants chose the aversive class before the neutral one.

Referring to the effects observed within the different strategies directed towards altering the aversive function of Class 1, only the treatment based on selection within a value context changes the approach response in the presence of the aversive video. Specifically, 12 of 17 participants chose the unpleasant video in this condition (Table 2).

Table 2. *Alteration of the aversive function of Class 1*

Participant	Direct reinforcement		Coordination		Value context	
1	1	NO			2	YES <sup>b</sup>
2	2	NO	1	NO	3	NO
3	3	NO	2	NO	1	NO
4					1	YES
5	1	NO	3	NO	2	NO
6			1	NO	2	YES <sup>c</sup>
7					1	YES
8	1	NO	3	NO	2	NO
9			1	NO	2	YES <sup>a</sup>
10					1	YES
11			1	NO	2	YES <sup>b</sup>
12					1	YES
13	1	NO	2	NO	3	YES
14					1	YES <sup>a</sup>
15			1	NO	2	YES
16	1	NO	2	NO	3	NO
17	2	NO	1	NO	3	YES

Notes. The ordinal numbers indicate the order of the application of each condition.

The selection of the aversive video was indicated by YES and NO.

<sup>a</sup> Change in the assessment on the discomfort scale.

<sup>b</sup> Change in the assessment on the pleasantness scale.

<sup>c</sup> Change in the assessment on both scales.

The last measurement obtained refers to the participant’s responses to the video labeled “a” (and the rest of the videos) following the three actions directed towards altering their aversive function. They were asked to choose whichever video they preferred: A1, A2, or A3, and then they watched it. When a participant chose video A1, after watching it they evaluated their degree of discomfort and how much they liked it. Additionally, when the value of the selection was altered, the child was asked, “If you had to watch a video by yourself now, which would you watch?” Figure 3 shows that 9 out of the 12 participants who chose the aversive video following the treatment which altered the value of the selection continued to evaluate that video with the same degree of discomfort as in the previous measurement. Along the same lines, with respect to the scale measuring how much they had liked the video, 9 out of the 12 children maintained the same as in the previous evaluation (Figure 3). That is, although the child chose the feared video, the value remained the same as when they avoided said video.

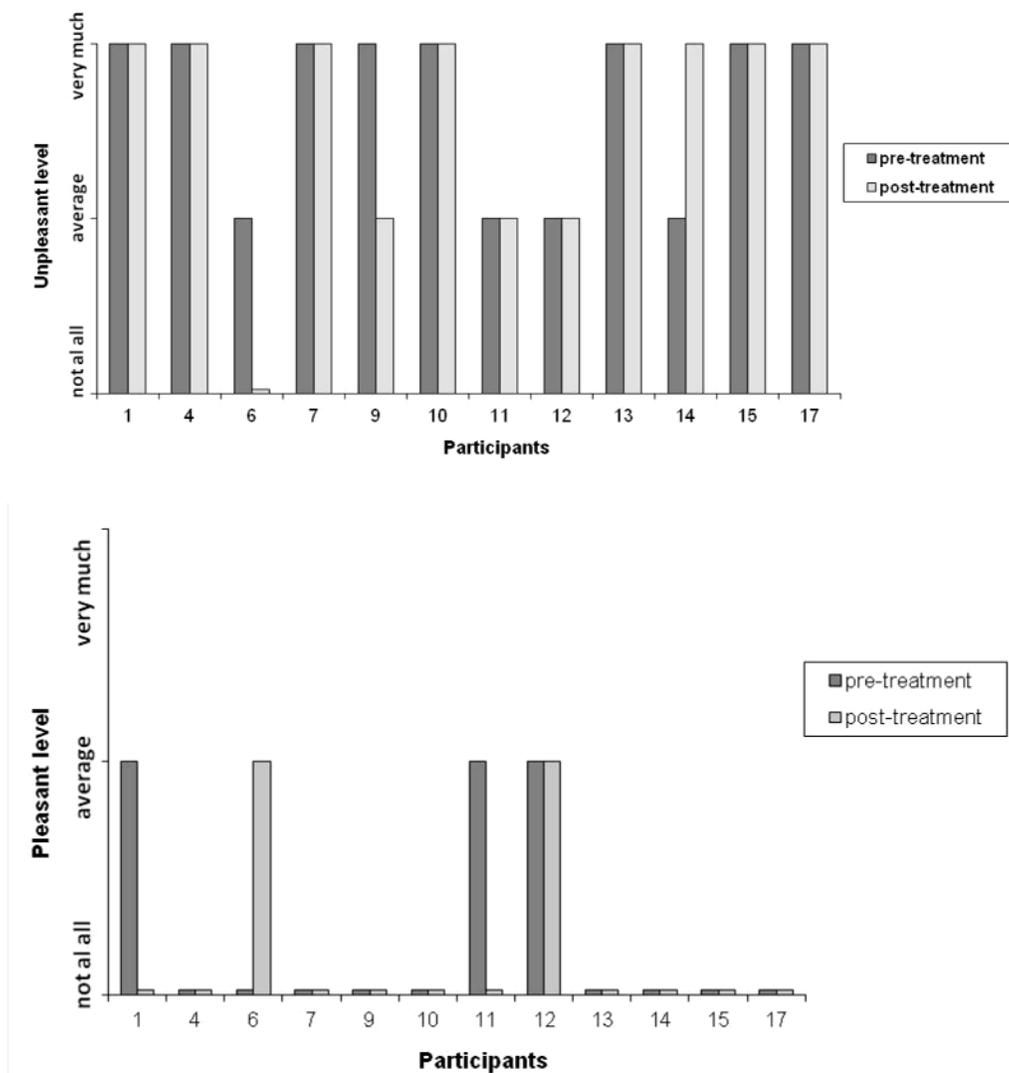


Figure 3. Report of the degree of discomfort provoked and how much they would like to watch the aversive video before and after altering the function of avoidance generating a value context for its selection.

Finally, as was previously mentioned, when the value of the selection was altered, and following the evaluation on a scale of preferences, the child was asked, "If you had to choose a video to watch by yourself now, which would you watch?" In this case, 11 of the 12 participants who had chosen to watch the aversive video went back to choose the pleasant video when the value component is not present. Participant 13 chose the neutral video.

## DISCUSSION

The fundamental objective of this study was to analyze the generalization of aversive, reinforcing, and neutral functions through stimulus classes, evaluating approach and avoidance responses. Additionally, we want to compare the efficacy of the three procedures (direct reinforcement of the aversive class, coordination training of the reinforcing class with the aversive one, and the inclusion of a value component in the selection of the feared stimulus) in altering the aversive function and the approach responses in the presence of feared stimuli.

In line with results obtained by Grey and Barnes-Holmes (1996), the participants demonstrated generalization not only of the content, but also of the functions of the different videos with reinforcing, aversive, and neutral content in all cases. In regards to the treatments utilized to alter the aversive functions (of avoidance), only one of them was able to alter the preference for re-watching the video which assumes giving value to actions directed towards the aversive video (choosing to watch it). Furthermore, 11 of the 12 children who chose to watch the aversive video went on to choose the pleasant video when the value component was taken away, therefore changing the context of selection. This shows the effectiveness of working with values at the time of confronting a feared situation, more so if we consider the fact that, in the absence of a value context that leads to accepting discomfort, the children go back to avoiding a feared situation.

As previously indicated, most of the explanations proposed for the development and maintenance of fears and escape-maintained behavior in children do not keep in mind the role of the generalization of a stimulus that was not in direct contact with the feared situation. In this sense, the first part of this study demonstrated how stimuli that do not directly participate in histories of punishment or reinforcement go on to have these functions as a result of participating in stimulus classes, through various examples, throughout the individual's history. The importance of having adjusted the procedure in an individual manner when it comes to selecting the content of the videos and their aversive or reinforcing functions must be pointed out. In this sense, the relevancy of the initial evaluation needs to be highlighted. This was the phase directed towards defining the pertinent information for the rest of the procedure, and therefore incorporated elements whose functions were valued in an individual way and adjusted for each of the participants. We rejected the utilization of standard materials whose functions could have been attributed by and agreed upon by the experimenters, or ones that were conventional from a social-cultural point of view. For example, we did not assume *per se* that the pre-existing stimulus classes- vowels, geometric figures, and colors- were really formed, but instead we confirmed this by explicitly evaluating the relationship among the corresponding elements. We proceeded in a similar way when it came time to selecting the content of the videos with aversive, reinforcing, and neutral functions, without assuming these functions *a priori*, aside from cultural considerations, for example. On the contrary, the

participants specifically select this content according to the information obtained in an individual manner from each one of them. Related to this, the pathological response of fear is usually considered to be based on three components (e.g., Davis & Ollendick, 2005): the *cognitive*, which refers to verbal reports of anxiety, the *behavioral*, which refers to avoidance behaviors and other obvious signs of discomfort, and the *physiological* which refers to the autonomic nervous system's displays of functioning (heart rate, breathing,...). We cannot claim to have worked with pathological fear responses in this study. In the analogy that is established, the functions of the elements utilized are evaluated in different ways at different moments of the study, although the physiological correlations were never measured. The reports about what they liked or disliked prevailed, without our having seen them, and after their exposure to them through film. They were also asked to report about a possible escape response in the case of watching them on television. Finally, in the last phase of the study, we directly measured approach responses when they were offered the option to choose which video they wanted to watch and watched it. From the conceptual framework within which we pose this study, this last measure is, without a doubt, the most relevant.

The results of this study demonstrate the efficacy of acting in a valued direction as an alternative to any form of avoidance in the presence of a feared stimulus, an aspect that proves to be an essential component of ACT (Hayes *et al*, 1999; Páez *et al*, 2006; Wilson & Luciano, 2002). That is, the function of the situation is altered, making useful conduct more probable (according to the value of the action), instead of controlling behaviors directed towards substituting one emotion for another. We also incorporated a simple and direct measure of the action in asking the child to pick a video that they are going to watch, and to take it to the computer on the other side of the room, to be able to watch it. This permits the reliable evaluation of the action component related to the value of the selection, more than from the mere indication by the child of the video they were willing to watch. It also shows that the children continue valuing the aversive video with the same degree of discomfort after treatment, data that is coherent with that postulated by ACT regarding the acceptance of thoughts and negative emotions as long as they lead to a valued end. That is, the individual is directing their action towards what is really important, instead of changing the content or form of these private events (Hayes *et al*, 1999; Wilson & Luciano, 2002). In the direction characteristically proposed by ACT and other so-called third-generation therapies (Hayes, 2004), an intervention whose focus is not on reducing discomfort or the search for an optimum state of action, but that instead means to clarify what is important to the person, putting what they really want or what is important to them before sensations of fear and their avoidance, has been shown to be effective in the treatment of patterns of avoidance in children.

Therefore, the applied repercussions of this study stand out. Firstly, an experimental task has allowed us to check how the generalization of the aversive functions that have not participated in any history of direct punishment or traumatic experience are produced. Secondly, the degree of discomfort produced by viewing certain content as well as the preference for re-watching it was measured in a simple and quick manner. The utilization of non-graduated scales facilitates the collection of *subjective* information from children, without the difficulties involved for them in adjusting this information to a graduated scale. Thirdly, the utilization of one of the essential components of ACT, putting that which is important to someone before reducing discomfort, provides the child with the option of learning to dedicate

neither time nor effort to controlling uncontrollable events (thoughts, emotions, feelings) and directing their actions towards valued goals that allow them to have a life in which they can achieve their goals. This form of treatment also costs less time and resources than the direct reinforcement of one element of the aversive class, or coordination training with the reinforcing class. If that is what we have achieved in this study in a limited form, then the treatment of infantile fears from what is presumed through ACT seems like a perfectly valid and very useful option. However, caution should be exercised when interpreting the ACT component used in this study as an "action in a valuable direction," since the participants' appetitive functions were not evaluated pre-experimentally regarding the value of friendship.

Finally, it is important to point out that this study has certain limitations which should be kept in mind when considering the findings reached and possible future revisions. We opted for using stimulus classes that were already established in the repertoires of the children at the time of valuing the generalization of functions of the contents of the videos. The alternative was to establish new classes within the framework of the study. Since the formation of classes was not figured into the objectives of the study, we valued the utilization of pre-established classes in order to expedite the overall process. However, at the time of evaluating the differential effect of the different procedures utilized to alter the aversive functions, it is important to consider that we made use of stimulus classes without pre-experimental personal histories, histories that are very particular to each one of the participants. If the classes had been taught directly, then the procedures that had to do with direct contingency management would have been adjustable according to the known history in order to increase efficacy. That not being the case, standard procedures were proposed that resulted ineffective. The study's procedure ended up being a more adequate analogy than what happens in a clinical setting, since the therapist usually does not know how the functional classes they must go up against are formed, and therefore cannot adjust direct contingency management according to the variables of origin and maintenance of said classes. On the other hand, in order to analyze the generalization of reinforcement functions, a fourth member of the vowel class (D1) was introduced in direct reinforcement of aversive class strategy. As in the previous phase (the categorization of videos and the generalization of functions) the participants had directly related elements of each class, and had directly assessed the aversive function on each of the elements. D1 was a new stimulus that had not been explicitly categorized. We wanted to assess the generalization function from a new member, which had only been explicitly related to reinforcement function, to a member of its class. However, it cannot be said that such a reinforcing function in the context of the MTS of treatment option 1 is thus transferred to the context of selecting the videos. That is, the reinforcing function may be contextualized to choose the D1 as opposed to the Class 4 stimuli, but it may not be present in the context of selecting videos. It is also important to mention that this study suffers from the act of not having evaluated the generalization of the new functions to the rest of the members of Class 1 following the application of a treatment which turned out to be effective. In the last phase, we used the Scale of Preferences to measure the degree of discomfort and pleasantness of video A1; however, we did not do the same with the rest of the members of the class. This makes it impossible to draw conclusions about the alteration of the functions of the entire stimulus class; an element that, without a doubt, would turn out to be relevant in drawing conclusions about the breadth of intervention efficacy. In line with this,

interobserver reliability was not calculated during the procedures. Futures research must take this into consideration in order to ensure the validity and reliability of the experiments.

### References

- Augustson, E. M., & Dougher, M.J. (1997) The transfer of avoidance evoking functions through stimulus equivalence classes. *Journal of Behavior Therapy and Experimental Psychiatry*, 28 (3), 181–191
- Bandura, A. (1977). *Social learning theory*. New York: General Learning Press.
- Barrios, B. A. & O'Dell, S. L. (1998). Fears and anxieties. In E. J. Mash & R. A. Barkley (Eds.), *Treatment of childhood disorders* (pp. 167-221). New York: Guilford.
- Bosquet, M. & Egeland, B. (2006). The development and maintenance of anxiety symptoms from infancy through adolescence in a longitudinal sample. *Development and Psychopathology*, 18, 517-550.
- Carvalho, M.P., & Rose, J.C. (2014) Understanding racial attitudes through the stimulus equivalence paradigm. *The Psychological Record*, 64 (3), 527-536.
- Catania, A. C. (1998). *Learning* (4th ed.). Upper Saddle River, NJ: Prentice-Hall.
- Chorpita, B.F. & Southam-Gerow, M. (2006). Fears and anxieties. In E. J. Mash & R. A. Barkley (Eds.), *Treatment of childhood disorders* (pp. 271-335). New York: Guilford Press.
- Cuvo, A. J. (2003). On stimulus generalization and stimulus classes. *Journal of Behavioral Education*, 12(1), 77-83. doi:<http://0-dx.doi.org.almirez.ual.es/10.1023/A:1022374406394>
- Davis, T.E. III & Ollendick, T.H. (2005). Empirically supported treatments for specific phobia in children: Do efficacious treatments address the components of a phobic response? *Clinical Psychology: Science and Practice*, 12, 144-160.
- Dougher, M. J. (1998). Stimulus equivalence and the untrained acquisition of stimulus function. *Behavior Therapy*, 29, 577-591.
- Dymond, S., Roche, B., Forsyth, J.P., Whelan, R. & Rhoden, J. (2008). Derived avoidance learning: Transformation of avoidance response functions in accordance with same and opposite relational frames. *The Psychological Record*, 58, 269-286
- Eifert, G.H. & Forsyth, J.P. (2007). From normal anxiety to anxiety disorders: An experimental avoidance perspective. In D.W. Woods & J.W. Kanter (Eds.), *Understanding behavior disorders: A contemporary behavioral perspective* (pp. 81-115). Reno, NV: Context Press.
- Greco, L., & Hayes, S. C. (Eds.). (2008). *Acceptance and mindfulness treatments for children and adolescents: A practitioner's guide*. Oakland, CA: New Harbinger.
- Greenway, D. E., Dougher, M. J., & Wulfert, E. (1996). Transfer of consequential functions via stimulus equivalence: Generalization to different testing contexts. *The Psychological Record*, 46, 131-143
- Grey, I. & Barnes-Holmes, D. (1996). Stimulus equivalence and attitudes. *The Psychological Record*, 46, 243-270.
- Hayes, S. C. (2004). Acceptance and commitment therapy, relational frame theory, and third wave of behavioral and cognitive therapies. *Behavior Therapy*, 35, 639-665.
- Hayes, S. C., Barnes-Holmes, D. & Roche, B. (Eds.). (2001). *Relational frame theory: A post-skinnerian account of human language and cognition*. Nueva York: Plenum Press.
- Hayes, S. C., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and Commitment Therapy: An experiential approach to behavior change*. New York: Guilford Press.
- Hayes, S.C., Wilson, K.G., Gifford, E.V., Follette, V.M. & Strosahl, K. (1996). Experiential avoidance and behavior disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology*, 64, 1152-1168.

- McPhee, A.R. & Andrews, J.J.W. (2003). Twelve-year review of *in vivo* exposure: Treating specific phobias in children. *Canadian Journal of School Psychology, 18*, 183-201.
- Mowrer, O.H. (1947). On the dual nature of learning a re-interpretation of "conditioning" and "problem-solving". *Harvard Educational Review, 17*, 102-148.
- Muris, P., Merckelbach, H., de Jong, P.J. & Ollendick, T.H. (2002). The etiology of specific fears and phobias in children: a critique of the non-associative account. *Behaviour Research and Therapy, 40*, 185-195.
- Murrell, A. R. & Scherbarth, A. J. (2011). State of the research & literature address: ACT with children, adolescents and parents. *International Journal of Behavioral Consultation and Therapy, 7*, 15-22.
- Ollendick, T.H. & King, N.J. (1998). Empirically supported treatments for children with phobic and anxiety disorders: Current status. *Journal of Clinical Child Psychology, 27*, 156-167.
- Páez, M., Gutiérrez, O., Valdivia, S. & Luciano, C. (2006). Terapia de Aceptación y Compromiso (ACT) y la importancia de los valores personales en el contexto de la terapia psicológica. *International Journal of Psychology and Psychological Therapy, 6*, 1-20.
- Perkins, D.R., Dougher, M.J. & Greenway, D.E. (2007). Contextual control by function and form of transfer of functions. *Journal of the Experimental Analysis of Behavior, 88* (1), 87-102.
- Ruiz, F. J. (2010). A review of Acceptance and Commitment Therapy (ACT) empirical evidence: Correlational, experimental psychopathology, component and outcome studies. *International Journal of Psychology and Psychological Therapy, 10*, 125-162.
- Smeets, P.M. & Barnes-Holmes, D. (2003). Children's emergent preferences for soft drinks: Stimulus-equivalence and transfer. *Journal of Economic Psychology, 24* (5), 603-618.
- Servera, M. & Tortella-Feliu, M. (2002). Fobias y trastornos de ansiedad. In M. Servera (coord.) *Intervención en los trastornos del comportamiento infantil* (pp. 145-178). Madrid: Pirámide.
- Skinner, B.F. (1974). *About Behaviorism*. New York: Alfred A. Knopf.
- Visdómine, C., & Luciano, M.C. (2002). Formación de locus de control por transferencia de funciones. *International Journal of Psychology and Psychological Therapy, 2*, 57-73.
- Watson, J. B. & Rayner, R. (1920). Conditioned and emotional reactions. *Journal of Experimental Psychology, 3*, 1-14.
- Wilson, K & Luciano, C. (2002). *Terapia de Aceptación y Compromiso. Un tratamiento conductual orientado a los valores*. Madrid: Pirámide.