

Theory of Mind in Young People with Down's Syndrome

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ABSTRACT

The ability to describe, assign and attribute certain mental states is referred to as Theory of Mind. This topic has been extensively studied in the field of autism, where deficits in social interaction skills that characterize this disorder are thought to be due to a lack of a Theory of Mind. However, there is also evidence that children with developmental disabilities have difficulties in solving tasks concerning the attribution of mental states. In this paper, we present two studies that have been conducted with young people with Down's Syndrome and developmental delay with a task in which they should report the preferences of a character who is unknown to them in different situations. The results in the first study are variable, and it was difficult for participants to accurately report the preferred options of the character, even after watching that person choosing. However, all the participants in the second study were able to put themselves in the place of the character and accurately report on his/her preferences. The difference between the results in the two studies is analyzed in terms of the subject's experience with the character and the prompts that ensure discrimination of the most relevant elements in the task.

Key words: Theory of Mind, Down's Syndrome, Developmental Delay, putting oneself in another's place.

RESUMEN

La habilidad de describir, asignar y atribuir estados mentales a otros y a uno mismo es referida como *teoría de la mente*. Esta temática ha sido estudiada, principalmente, en el ámbito de análisis del autismo, entendiéndose que las carencias en interacción social características de este trastorno se explican por la ausencia de una teoría de la mente, llegándose a proponer este déficit como propio y específico del autismo. También se ha comprobado, en menor medida, que niños con retraso en su desarrollo presentan dificultades en tareas de atribución de estados mentales. Se presentan dos estudios en los que jóvenes con Síndrome de Down y retraso en el desarrollo deben informar en diferentes situaciones de cuáles creen que son las preferencias de un personaje desconocido para ellos. En el primer estudio los participantes presentan dificultades para informar correctamente de las preferencias del personaje, aún después de haberlo observado eligiendo. En el segundo estudio los participantes consiguen ponerse en el lugar del personaje e informar correctamente de sus preferencias. La diferencia entre estos resultados es analizada en términos de experiencia con el personaje y facilitación de la discriminación de éste y sus preferencias frente a las de los participantes.

Palabras clave: teoría de la mente, Síndrome de Down, retraso en el desarrollo, ponerse en el lugar de otro.

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One of the main limitations of persons with developmental delay is their social skills and interpersonal relations. The American Association on Intellectual and Developmental Disabilities defines disability in this area as personal limitations that place the individual at a disadvantage when attempting to function in society. It is clear that the deficit in other behavioral areas condition this social disadvantage. From a cognitive conception of psychological development, social intelligence is a system that serves as a support for interpersonal relationships. Children develop this kind of sociocognitive competencies from 2 to 5 years of age. From this conception, all of our relational life is based on assumptions such as that others, as we ourselves, have representations and intentions, beliefs and desires, memories and perceptions. This ability to ascribe, assign, attribute mental states (like believe, think, desire, attempt) to others and to oneself is referred to as *Theory of Mind*, as it was originally called by Premack and Woodruff (1978), defined also by other authors as the ability to attribute mental states to others and to see these as the basis of people's actions (Bosacki, 2000). It would therefore be considered as a prerequisite skill for human interaction, in so much as it is necessary to understanding, explaining, predicting and manipulating the behavior of others (Yirmiya, Erel, Shaked, & Solomonica-Levi, 1998). Besides, Theory of Mind favors self-control, self-understanding and any type of social interaction (Zelazo, Burack, Benedetto, & Frye, 1996). To have a Theory of Mind (ToM) is to have the ability to reason about one's own and others' mental states (Benson, Abbeduto, Short, Bibler, & Maas, 1993), to recognize them as the same or different (Yirmiya, Solomonica-Levi, & Shulman, 1996), and use them to explain and predict actions.

The debate with regard to the moment in development of the individual when ToM starts remains unresolved. There does seem to be certain agreement concerning its gradual development during the early years of a child's life (Yirmiya *et al.*, 1998), pointing to four years of age as the moment when clear indicators of the presence of this competence begin to appear (Wimmer & Perner, 1983). Around 18 months the child has developed the symbolic play and is able to recognize the intentions of behavior of adults by watching their faces. During the second year of life people are understood as "armor wrapping intentions, desires..." (Baron-Cohen, Leslie, & Frith, 1985; Meltzoff, 1995). At three years the child has begun to demonstrate a wide understanding of mental states, and between three and four years is already able to understand false beliefs, distinguish between appearances and reality, understand the concepts of desire and intention, as well as different sources of beliefs, attributing them causal functions of behavior (Yirmiya *et al.*, 1998).

Interest in the study of ToM was awakened by the work of Baron-Cohen *et al.* (1985), who suggested that the lack of competence in social interaction and self-understanding characterizing autism would be explained by the absence of a ToM in persons with this disorder. These authors evaluated the ability to attribute beliefs to others and predict their behavior in autistic children, children with Down's Syndrome and children with no development deficit. They used for this purpose using the now classic task of the false belief developed by Wimmer and Perner (1983), known as the "Sally and Anne task". While 80% of the autistic children failed the test, 85% of the normal children (chronological age of 4 years, younger than the rest of the children)

and 86% of the children with Down's Syndrome (with a lower mental age than the autists) passed it. Since then, a large amount of research has been generated in the field of ToM in autistic individuals (Pilowsky, Yirmiya, Arbelle, & Mozes, 2000), suggesting that the deficit in ToM is typical of autistic children and would explain their cognitive deficiencies (Baron-Cohen, 1989; Yirmiya & Shulman, 1996).

However, later studies have found results that contradict the proposal that the deficit in ToM is characteristic of and specific to autism (Benson *et al.*, 1993; Yirmiya *et al.*, 1998; Yirmiya, Pilowsky, Solomonica-Levi, & Shulman, 1999; Yirmiya & Shulman, 1996; Yirmiya, Solomonica-Levi, Shulman, & Pilowsky, 1996). Thus, for example, Benson *et al.* (1993) report that mentally retarded children have greater difficulties in solving ToM tasks than children of the same mental age who are not retarded. Yirmiya and Shulman (1996) concluded that understanding of the false belief is not very different in autistic and mentally retarded children with unknown etiology. Along the same line, Yirmiya, Solomonica-Levi, and Shulman (1996) found that autistic children did not differ from mentally retarded children (of the same mental age) in their ability to manipulate the behavior of others using deceive. For Pilowsky *et al.* (2000), comparing ToM skills in autistic, mentally retarded (Down's Syndrome or with no known etiology) and individuals with normal development, most of the studies seem to show that the deficit in ToM is not unique to autism. Shaked and Yirmiya (2004) conclude from their metaanalysis that there are significant differences in ToM skills between retarded persons and persons with normal development, so a ToM deficit cannot be identified as characteristic of autism.

Studies in which autism and developmental delay are compared to analyze ToM usually include children with Down's Syndrome and retarded children without a definite etiology. It is understood that people with Down's Syndrome have attention, social and emotional characteristics which, *a priori*, would be related to skills typical of ToM tasks, so they would seem to be considered as an ideal group for comparison in studying the difficulties unique to autistic children (Shaked & Yirmiya, 2004). When autistic children are compared to children with Down's Syndrome, these seem to be socially sensitive and attentive to the emotions of others (Kasari, Freeman, & Hugues, 2001), with a higher degree of social competence and solve ToM tasks correctly. Nevertheless, their action in this type of tasks is not as good as expected in children with normal development (Yirmiya *et al.*, 1998). In this sense, Zelazo *et al.* (1996) found that 9 out of 12 adults with Down's Syndrome (and a mental age between 3.9 and 6.3) failed to solve tasks typical of ToM, while children without difficulties and of the same mental age completed them successfully.

As presented so far, approximation to this topic is usually from the cognitive or neurocognitive proposals, which conceptualizes ToM and approaches its "origin" or development in the repertoire of a child as another chronological fact, along with the age and biological development. From another point of view, and from the intercultural differences found, it could be suggested that this phenomenon has a social nature (Lillard, 1998). That is, it could be argued that ToM is a social product. Several studies in this direction (e.g., Watson, Nixon, Wilson, & Capage, 1999; Welch-Ross, 1997) have provided data in favor of the relevance of parent-child interactions in forming ToM in

children, concluding that the skills that define it are not simply given. It is suggested that the ability to describe, assign, and attribute mental states to others and to oneself originates as a part of socialization, and therefore, in the interactions of the child with his most immediate social surroundings. There is no doubt about how useful it would be for people closest to the child (at time of his earliest development, although later it will be also, as mentioned, a social interaction skill of the utmost importance) if he were able to give them information about his “mental states”, as this knowledge would allow them to make predictions, control and prepare themselves for what he is going to do (Skinner, 1974). Thus the verbal community will insist on teaching the child to describe the states of his own body in a suitable manner, and likewise, and for similar reasons, make inferences and predictions about the states of others. The way in which the community sets the necessary conditions for the person to describe “his private world” is not going to differ from the conditions needed to learn to describe the “public world”, as long as the problem of accessibility of the private world can be solved (see, e.g., Pérez, 2004; Skinner, 1974). This need for the verbal community will mean a continual demand for information about what is private, about the child’s body states (How are you? What hurts? What are you thinking? What are you going to do now? Don’t you like it? Which one do you want? and so forth), providing enough conditions until the child himself to be able to discriminate such states (“I see you have a fever, so you are sick”, “You don’t have a fever anymore so you are better”, “You left all the vegetables on your plate. Don’t you like them?” and so on). This way, that knowledge (now self-knowledge) also becomes relevant to the child. Self-knowledge is going to have a special value for the individual. The person who has become “aware of himself” is in a better situation to predict and control his own behavior. This ability will finally extend to knowledge (inferred) of the states of others, and thereby becoming able to understand, explain and predict his own behavior and that of others.

The previous proposal summarizes an alternative to a mentalist conceptualization of ToM based on a behavioral analysis of the phenomenon proposed. Although the approach to the experimental study of ToM from a behavioral perspective has not been very abundant (Leblanc *et al.*, 2003), the appearance in recent years of the Relational Frame Theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001) has advanced in an approach to language and cognition from a behavioral-functional viewpoint, with which phenomena such as perspective-taking, false beliefs, deception, empathy, and in fact, the ToM, are being conceptualized and analyzed from an eminently behavioral approach (McHugh, Barnes-Holmes, & Barnes-Holmes, 2004a, 2004b, 2009; Spradlin & Brady, 2008; Valdivia, Luciano, Gutiérrez, & Visdómine, 2009). These *cognitive* skills are a complex series of relational abilities derived from an understanding of the self, of space and time, or deictic relationships. Thus a training program in ToM skills should include deictic relationships like I/you, here/there and now/then, their different levels of complexity and combination (see McHugh *et al.*, 2009 for a description of a training protocol).

The research described below is based on a behavioral conception of the ToM and although it does not have the RFT as an explicit reference, neither it has involved the typical protocols indicated in the previous paragraph, some of its characteristics are somehow involved. This study is based on a common phenomenon related to ToM. It is

that the behavior of others can be “guessed” or predicted in a given situation when there has been a particular history where several examples of the others’ behaviors have been contacted. In the study conducted by Luciano, Molina, Gómez, & Gómez (2000), this was clearly isolated, however, it was also necessary that the person observing the others’ behaviors differentiates between him/herself and others, as well as his/her behaviors or ideas about something and those of the others. That is, it is therefore a matter of putting oneself in the other’s place and saying what he is going to do, predicting his tastes, his preferences, his intentions (Cassidy, 1998; Phillips, Baron-Cohen, & Rutter, 1998; Yuill & Pearson, 1998; Ziv & Frye, 2003). The first study attempts to establish the conditions by which the participants can “put themselves in the other’s place” and report their preferences in persons who have Down’s Syndrome in an attempt to provide more data in this field of research with persons with developmental delay. In a second study, additional conditions are added that facilitate participants making suitable predictions. This is based on the fact that “knowing” the thoughts (likes, preferences, etc.) of others is related to experience of shared individual histories. It does seem clear that it is possible to know what another person prefers if several circumstances in which that person has acted in a certain way have been shared (Hayes, 1994; Kantor, 1959; Luciano *et al.*, 2000).

First Study

METHOD

Participants

Fifteen people participated in this study (6 women and 9 men) with Down’s Syndrome and developmental delay, aged from 5 to 35 years (mean: 12.6 and SD: 9.5). The most deficient behavioral areas were language, cognition and personal autonomy, but having adequate motor function and social interaction. All of them received assistance from the multi-professional team at the association they belonged to. At the time of the study, no reports were available that could supply standardized scores of any kind. Information provided by the professionals who usually worked with them referred to the level of general prerequisite behavior (attention, following instructions, imitation, motivational susceptibility to social surroundings and absence of disturbing behavior), and specific prerequisites to the tasks was used to select participants. Nevertheless, these behaviors were evaluated as described in the following section.

Context and materials

The study was carried out in one of the association’s classrooms in which a table and three chairs had been placed. An observer recorded the participants’ responses to the tasks presented. A variety of materials, such as drawings, puzzles, colored pencils, scissors, etc., were used for evaluating the prerequisite behaviors.

The tasks involved the use of 15cm x 20cm cards designed for the purpose. On one of them there was a black and white drawing of a character called Luis (Figure 1).

Another 32 cards were used to present the various elements in the tasks organized in four categories: *sports, food, animals and transports*. Four cards (*Choice cards*) showed different elements of each of the categories, and another four showed Luis with each one of these elements (*Luis's choice cards*). For example, Figure 1 shows the *Choice cards* and *Luis's Choice cards* corresponding to the *transports* category. Table 1 describes the contents of all the cards used.

Little gifts were given at the end of the session to thank the participants for their participation and helping us in our study.



Figure 1. Top, the card introducing Luis. Below, the *Choice cards* showing four means of transport, and *Luis's Choices* in the *Transports* category, with the character using these means.

Design and Variables

The participants were asked on two separate occasions what they thought Luis preferred in four different situations. Between the two tests, they observed what he did in such situations. The dependent variable in this study was the participant's answer about the Luis's preferences, and the independent variable watching the character perform in different situations. Three phases were set up. In Phase I (evaluation of the preferences

Table 1. Content of the different cards in the categories in the first study.

Categories	Choice Cards	Luis's Choice Cards
Sports	(A) a bicycle (B) a goal and a soccer ball (C) a racket and a tennis ball (D) an athletics track	Luis playing each of these sports
Food	(A) a plate of fish (B) fruit (C) a sandwich (D) a roast chicken	Luis eating each of these foods
Animals	(A) an elephant (B) a fish (C) a porcupine (D) a duck	Luis with each of these animals
Transports	(A) a car (B) a boat (C) a train (D) an airplane	Luis travelling on each of these means of transport

attributed to Luis), each participant was asked what he thought Luis would choose in each situation or category. In Phase II (observation of Luis's preferences), the character was shown "acting" in the four situations. In Phase III (posttest of the preferences attributed to Luis), participants were again asked the same questions as in Phase I, asking them to answer according to what they had seen Luis do. The procedure was applied individually, in an A-B-A design with within-subject measurements and between-subject replications.

Procedure

Over two weeks, the prerequisite behaviors of several people were evaluated, and 15 were selected to participate in the study. One session with each participant was required to complete the experimental tasks.

In the general procedure, the experimenter accompanied the participants one by one to the experiment room and told them they were going to spend a few minutes doing tasks to help him with his work.

Assessment of general prerequisite behavior. To assess *following instructions*, five instructions such as "Stand next to the door", "Jump and then come", "Pick up the pencil and give it to...", "Bring me the notebook on the table", etc., were given. If the participant acted accordingly in the following five seconds, the experimenter went on to the next instruction. If any of the criteria were not covered, the same instruction was repeated. Two mistakes in a row led to a new instruction. Five right answers in a row or three mistakes in a row ended evaluation of this behavior.

The criteria followed in the evaluation of *attention* were: (a) proper position (seated and with arms crossed, on the table or in their lap) 80-100% of the times required and

for at least 80% of the total working time, and (b) eye contact (whether spontaneous or required) with persons and objects. Eye contact had to be established with a delay equal to or less than five seconds. Tests included *call the participant by his name* from different positions in the room, *look for elements in a picture* with drawings made up of many elements, *look for a specific object in a collection* (for example, a red pencil in among a large number of different colored pencils), *do a jigsaw puzzle* with 3 or 4 pieces, *matching-to-sample* using different objects (for example, pick a balloon like the one the experimenter is holding from a group of balloons). Attention during the assessment of the rest of the prerequisites was also taken into consideration.

Disturbing behavior and *social motivation* was evaluated based on the report requested from the educators, in addition to interaction with them during the rest of the assessments. Participants were required to have a minimal or no *disturbing behavior* and be sensitive to contact, presence and behavior of others.

Assessments of specific prerequisite behaviors. Self-others and past-present-future discrimination and pointing and naming were considered prerequisite behaviors for adequate performance of the tasks. For evaluation of *self-others discrimination*, each participant performed a series of actions and he was asked questions like "What are you doing?", "Who is cutting out?", "Who is drawing?" Other times it was the experimenter who performed these actions while he asked, for example, "What am I doing?", "Who is drawing?" The procedure was similar with the observer's actions, alternating one type of test with the other. Participants were also shown photographs of themselves with schoolmates and they were asked "Who is wearing a red sweater?", "Who is next to you?", "What color is the sweater you are wearing in the photo?" etc. Natural situations and activities in the context were also made use of in a similar manner to assess whether the participants answered properly with regard to *present*, *past* and *future*. They were asked about activities they had already done, what they were doing or what they, the experimenter or the observer were going to. For questions about the future, answers were accepted if they fit the question, were possible or were what usually happened.

For assessing *pointing/naming* behavior, participants were given different situations in which they were asked to name or point to objects around them. For example, "Point to what you want to play with," "What is this called?", or "What does he/she have in his/her hand?" etc.

The procedure with the 15 participants who were selected was as follows. In the first place, the participants' preferences in the different categories that made up the task were evaluated. The *Choice* cards for each of the situations or categories were shown them sequentially and they were asked what they preferred. For example, for the *Sports* category, the experimenter said, "I am going to show you some pictures and you have to tell me what each one is." The *Choice* cards were shown one by one and they were asked, "What sports is this? And this one? And this? etc." It was not necessary for the participants to say the specific name of the elements shown them, but could differentiate them by naming them somehow (which the experimenter would use in the following interactions). Thus, either "cycling" or "bicycle", "athletics" or "race" or "running" were accepted as correct. The experimenter then placed the four cards on the table and said, "Which of these sports do you like the best?" The participant pointed or named

one of them and the experimenter removed the card. With the three remaining cards he again asked, "Now which sport do you like the best?" The participant pointed or named one of them and the experimenter removed the card, and so forth until all four cards had been removed. The same procedure was employed for the *Choice* cards in all the categories. The order of presentation followed in all cases was (each choice was identified with a letter, not visible to the participants): *Sports*: cycling (A), football (B), tennis (C), athletics (D); *Food*: fish (A), fruit (B), sandwich (C), chicken (D); *Animals*: elephant (A), fish (B), porcupine (C), duck (D); and *Transports*: Car (A), boat (B), train (C), airplane (D). The observer wrote down the participant's preferences (A, B, C or D). This information would then be used to organize Phase II.

Phase I. Test of preferences attributed to Luis. Luis was introduced in this phase. The experimenter showed the card with the picture of a boy (Figure 1), and said, "We are going to play with this boy whose name is Luis. He is X years old, like you", and placed the card on the table, where it remained until the end of the phase. In continuation, preferences attributed to Luis by the participants in the various categories were evaluated. The experimenter showed the *Choice* cards in order and asked the participant what he thought Luis liked best. For example, with the *Sports Choice* cards, he asked, "What sports do you think Luis likes best?" He removed the selected card and asked the same thing with the remaining cards, in order. He did the same thing with all four categories.

Phase II. Observation of Luis's preferences. After a few seconds pause, the choices Luis "preferred" in each category were shown on a card on which the character was doing one of the choices. The experimenter said, "Let's see what Luis likes," and showed him the pertinent *Luis's Choice* card saying that this was the character's preference. Continuing the above example referring to *sports*, the experimenter showed a card on which Luis is practicing athletics and says, "This is Luis running. The sport that Luis likes best is athletics. He loves to run. Look." This was done for all four categories.

In each case Luis appeared with the choice "least preferred" by each participant (the one that he had chosen last when the preferences were evaluated). That is, if the participant had chosen athletics last, Luis was shown practicing athletics, in order to differentiate clearly the preferences of the participants from those of Luis, which could be relevant in the following phase.

Phase III. Posttest of preferences attributed to Luis. The preferences each participant attributed to Luis in each of the different categories were evaluated again. The procedure was the same as in Phase I.

At the end of this test, the experimenter talked to the participant for a few minutes and thanked him for his help in our work, giving him a little gift.

RESULTS

In the analysis of the results, only data referring to the choice selected first by each participant is considered, understanding that of the four possible, that is the one preferred, or depending on the phase, the one preferred by Luis. As already noted,

placing the various choices in order of preference served to present the one chosen in fourth place as the one preferred by Luis in Phase II. The preferences of the participants were compared to those attributed to Luis in Phase I, in an attempt to recognize where that first attribution came from. This also made it possible to differentiate whether participants' answers in Phase III were given according to the known preferences of Luis (Phase II) or their own. Table 2 shows the choices made at each time, with some interesting results.

In the first place, it might be of interest to find out whether the participants maintained their own preferences when, in Phase I, they were asked to show what they thought Luis would like best (they could be expected to answer according to their own preferences, as they did not know anything about Luis). These coincidences are marked with an asterisk in Table 2. As seen in Figure 2, 14 of the 15 participants maintained their first selection in one or several of the categories referring to Luis. One repeated his selection in the four categories, four did so in three of them, another four did in two, five in one and only one of the participants answered a different way each time he was asked about Luis. By categories, in *Food*, 11 of the participants repeated their choice, while in *Transports*, there were only four coincidences. In *Sports* and *Animals*, seven participants repeated their choice. Participant number 5 (P.5) showed coincidence in all of the categories and number 15 in none of them.

However, the most interesting result refers to whether the participants begin to attribute the right preferences to Luis according to their knowledge of him after observing him in Phase II. Coincidences are marked in gray in Table 2. In Figure 3, 12 of the 15 participants in Phase III gave answers corresponding to what they had observed in Phase II in one or more categories, where the *Sports* category is where most correspondence of this type is observed (nine), followed by *Animals* and *Transports*, with five coinci-

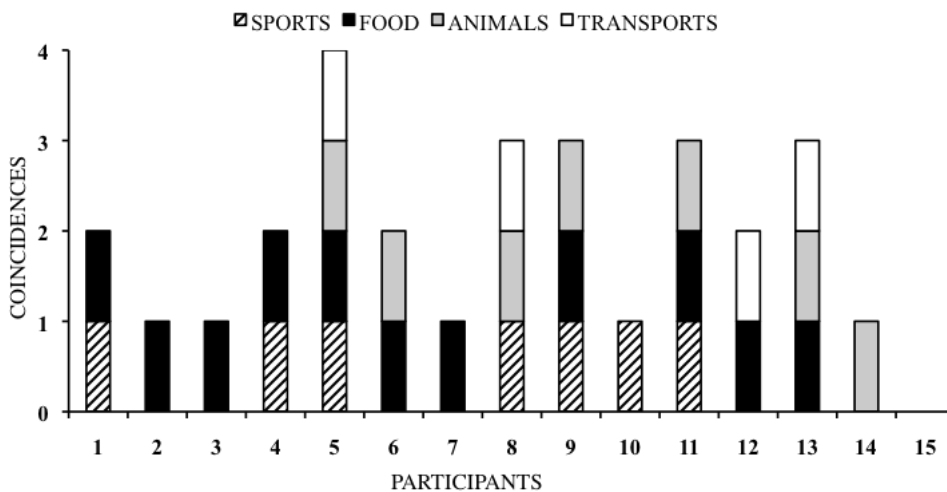


Figure 2. Coincidences between participant preferences and those attributed to Luis in the first test (Phase I), in the categories in the first study.

Table 2. Preferences indicated by the participants in the tests in the first study.

		Participants														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SPORTS	Participant's preference	A*	C	D	B	B*	D	B	C*	A*	C*	B*	D	A	C	C
	Preference attributed to Luis (Phase I)	A*	B	A	B*	B*	A	D	C*	A*	C*	B*	B	B	A	D
	Preference attributed to Luis (Phase III)	D	B	D	B	C	A	D	C	D	B	A	B	B	B	D
FOOD	Participant's preference	A*	D*	C*	D*	A*	A*	D*	D	A*	A	A*	D*	A*	D	C
	Preference attributed to Luis (Phase I)	A*	D*	C*	D*	A*	A*	D*	C	A*	A	A*	D*	A*	C	B
	Preference attributed to Luis (Phase III)	A	A	D	C	A	A	D	C	A	D	B	D	A	B	C
ANIMALS	Participant's preference	A	A	D	B	A*	A*	D	A*	A*	D	A*	B	A*	A*	B
	Preference attributed to Luis (Phase I)	B	D	B	A	A*	A*	C	A*	A*	C	A*	A	A*	A*	A
	Preference attributed to Luis (Phase III)	D	C	D	C	A	A	B	A	A	D	A	D	D	D	A
TRANSPORTS	Participant's preference	B	C	B	B	A*	A	D	A*	C	D	C	D*	D*	C	D
	Preference attributed to Luis (Phase I)	C	B	D	A	A*	C	C	A*	A	C	A	D*	D*	A	A
	Preference attributed to Luis (Phase III)	C	C	D	D	B	D	C	D	C	D	D	D	C	B	A

* When the choice preferred by the participant coincides with the one attributed to Luis in the first test.
 Square: if the participant made the same choice every time.
 Shaded in gray: if the choice attributed to Luis coincides with the one previously observed about him.
 Underlined: if the one attributed to Luis coincides in the first and in the second tests.

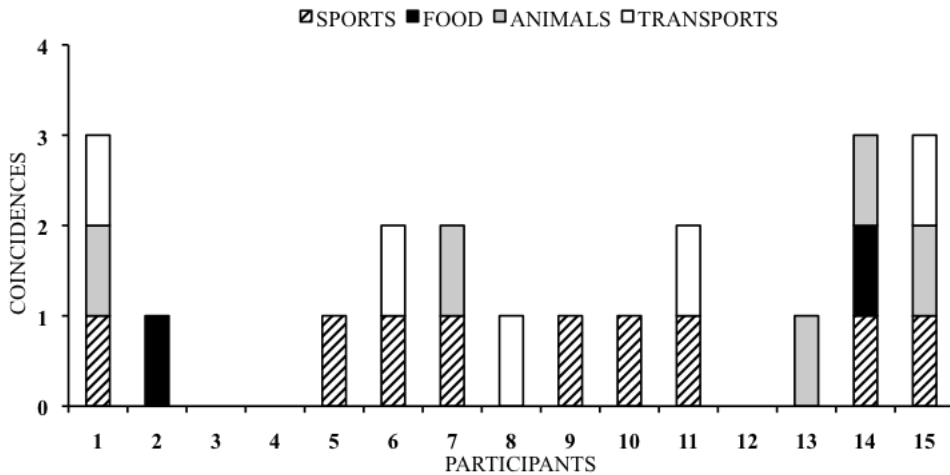


Figure 3. Coincidences between Luis's preferences observed and those attributed to him by the participants in the posttest (Phase III), in the categories in the first study.

dences, and finally *Food* with only two. Of these twelve participants, three answered according to the character in three of the four categories, another three did so in two, six coincide in only one and finally, three participants did not answer according to what they observed about Luis in Phase II at all. These results, with some participants, meant changing from one choice that they had repeated in the previous phases. For example, the first participant chose A in the *Sports* category when asked about his preferences and about Luis the first time, changing to D in Phase III. Participant 2 did something similar (*Food*), as did P.5, P.9, P.10 and P.11 (*Sports*), P.8 (*Transports*), and P.13 and P.14 (*Animals*). Others indicated different choices in the first tests and then made the same choice as Luis after observing him. For example, the first participant chose A as preferred in the animal category, and B when asked for the first time about the Luis's preferences, changing to the choice he observed him make in Phase III. P.6 and P.11 did the same in *Transports*, P.7 in *Animals*, and P.14 in *Sports* and *Food*.

It should be mentioned that even after observing Luis's preference (Phase II), nine participants still maintain their original choice in one or several of the categories. That is, their choice is always what they like whenever they are asked what Luis prefers. These data are shown inside a square in Table 2, where five participants are observed to do this in two categories and four in only one, and especially in the *Food* category where this happened the most (seven participants, five of whom always chose fish), followed by *Animals*, with five participants (all of whom always chose the elephant), *Sports* with two and *Transports* with one.

Finally, some participants chose the same option both times they were asked about Luis's preferences (underlined in Table 2), which was different from what they preferred.

DISCUSSION STUDY 1

The first time they were asked about Luis's preferences, the participants, who did not have any reference in this regard, answered with any of the choices presented or with their own. To check this last result, it was helpful to have previously evaluated their own preferences. As shown in Figure 2, except for one, the participants attribute their own preferences to Luis in at least one of the categories. This coincidence occurs in 11 of the participants when choosing *Food* preferred, followed by *Animals* and *Sports*, with seven participants attributed their own preference to Luis.

Participants' action in the posttest shows certain within-subject and between-subject variability. Only three of the subjects answered according to the preferences of the character in three of four activities. That is, in Phase III, only three participants selected the choice they had observed Luis make in Phase II in three categories. Nine of them answered correctly in one or two of the situations, and three participants did not adjust to the choices presented as those preferred by Luis at all.

It is hard to come to a conclusion about the effect that observing Luis choosing has on the preferences the participants later attribute to him. After exposure to Luis, only some of the participants seem to put themselves in his place when attributing likes or preferences to him. That is, their history with Luis in the experiment does not seem to be determining when they attribute his preferences, since some participants answered according to their own preferences (as previously tested) or a different way each time.

We could say that in some situations it is harder for them to put themselves in the place of Luis, for example, when choosing his preferred *food*. The reasons behind this *difficulty* could be motivational variables, that is, situations lived repeatedly by participants in which, when they have to choose, their particular direct history of contingencies prevails over a single test of exposure to the preferences of another. In other, less familiar situations, or with histories with less defined contingencies, the preference would not be strong enough to compete directly with their own. That is, in situations of *Transports*, *Animals* and *Sports* the choice or preference of the participants would not be as strongly established as in the *Food* situation, more ordinary and exposed to reinforcement contingencies and therefore, with much more established functions. The history shared with Luis, on the other hand, is limited to a single exposure to him in each of the situations, with which discrimination of his behavior, as such and different from their own, does not seem to be guaranteed. That is why a second study was proposed directed at making this discrimination well enough, perhaps necessary, although maybe insufficient, for the participants to respond according to what they know about Luis and put themselves in his place when choosing his preferences.

A new, slightly more complicated procedure than simple exposure to Luis and his preferences, was then carried out for this purpose. The idea is to ensure that the participants discriminate between themselves and Luis, as well as between their preferences and his, using aids directed at favoring this discrimination.

Second Study

METHODS

Participants

This study was carried out with the participants 6, 10, 12, 13, 14 and 15 in the first: three girls and three boys with Down's Syndrome and developmental delay aged from 7 to 35 years (mean: 18.6 and *SD*: 13.21). No criterion was established a priori for selection of these participants. In view of the results of the first study, it was considered advisable to perform a new one, and for various reasons outside of the control of the researchers, not all of the participants were available.

Context and materials

There were no changes from what was described for Study 1, except concerning the tasks which are described below.

Four new categories called *Games*, *Drinks*, *Vacation* and *Presents* were set up which involved preparation of 32 cards similar to those in the first study, in addition to the card on which Luis appears (Figure 1). Four *Choice* cards and four *Luis's Choice* cards were designed for each category or activity (Table 3). As in Study 1, material necessary to fill out the observation records was used. Also, at the end, the participants were given a little gift, thanking them expressly for their participation and helping us in our work.

Table 3. Content of the different cards in the categories in the second study.

Categories	Choice cards	Luis's Choice Cards
Games	(A) a Parcheesi board	Luis playing each of these games
	(B) a chess board	
	(C) tic tac toe board	
	(D) playing cards	
Drinks	(A) a carton of milk	Luis having each of these drinks
	(B) a bottle of water	
	(C) cans of soft drinks	
	(D) bottles of fruit juice	
Vacation	(A) a beach	Luis on the beach, at the movies, watching TV and listening to music
	(B) a television set	
	(C) a movie theater	
	(D) a stereo	
Presents	(A) dolls	Luis next to each one of these things
	(B) a swimming pool	
	(C) a bicycle	
	(D) a soccer ball	

Design and Variables

As in Study 1, each of the participants was asked what he thought Luis preferred in different situations or categories at two different times. They also had access to Luis acting in each one of the situations. The difference was that each of the participants explicitly established the discrimination between Luis and himself and between his own choice and what Luis chose. Thus the participant's answers about Luis's preferences are the dependent variable in this study, keeping as independent variables direct access to these preferences and to the explicit aids for differentiating between Luis/self and "Luis+action"/"self+action".

Four phases were set up. In Phase I (*Test of preferences attributed to Luis*) they were asked about what Luis would choose in each of the four situations. In Phase II (*Observation of Luis's preferences*) the character was shown "acting" in four situations. In Phase III (*Discrimination Luis/self and Luis+action/self+action*) the aids were introduced to help participants to differentiate Luis from themselves and Luis's choice from their own. Finally, in Phase IV, *Posttest of preferences attributed to Luis* they were again asked the same thing as in Phase I, and told to answer according to what they had seen Luis do and by what they knew about him.

The final arrangement of the variables in play led to an A-B-C-A design with within-subject measurements and between-subject replications.

Procedure

The procedure was carried out individually with the six participants, in the same manner described for Study 1, except in Phase III, which is described in more detail.

It began by showing the participant the *Choice* cards which made up each of the categories (*Games, Drinks, Vacation and Presents*), and *their preferences were tested* in each of them, in a set order, from more to less, as done in the first study. Then Luis was introduced again, reminding them that they had worked with him before, and they were asked what he preferred in each of the four situations (Phase I). In continuation, they were shown what Luis preferred (*Luis's Choice* cards) in each of the categories (Phase II) which, as in the previous study, was the last option they had chosen before.

In Phase III (*discrimination Luis/self and Luis+action/self+action*) the goal was for each participant to differentiate correctly between himself and Luis, and between what he had indicated as his own preference and what he had seen Luis choose. To do this, when it was necessary, aids or prompts were used that enabled all of them to answer these questions correctly. The experimenter asked the participant to point to himself asking "Where are you? Where is X (his name)?" Then he was asked to point to Luis asking him "Where is Luis?" -the card with the illustration of Luis was on top of the table. Then the four *Choice* cards for one of the categories were immediately placed on the table and he was asked to point to what he had previously said he preferred. For example, "What does X (his name) like to do on vacation? Finally, he was asked what Luis likes to do in that situation. The same thing was repeated for the other three situations.

After a few minutes they were asked again about what choice Luis liked best in each of the four categories (Phase IV).

In all cases an observer recorded the answers given by the participants.

Reliability

In this, as in the previous study, agreement between the observers (calculated with the formula: number of agreements divided between agreements plus disagreements) was 100% for answers given by the participants in all the phases. To establish the degree of agreement between observers, the experimenter intermittently filled out a record sheet identical to the one used by the observer.

RESULTS

As in Study 1, only data referring to the choice selected first by each participant is considered. The preferences of the participants were evaluated in each of the categories and the answers given were used for comparing to those attributed to Luis in the following phases and to arrange the presentation of Phase II (Luis with the choice pointed to by the participant in last place).

Again it might be expected that the attributions made by the participants about Luis's preferences were their own, since they did not know anything about Luis in the situations presented. These coincidences are shown with an asterisk in Table 4. As this table shows, all the participants kept their original choice to refer to Luis in one or several categories: one repeated his choice in three categories, three did so in two categories, and two of them in one. Differences are observed by categories (Figure 4) in correspondence between participant preference and the one attributed to Luis the first time, where *Presents* (four participants) is the category where this occurs the most, followed by *Games* (three participants) and *Drink* and *Vacation* (two participants).

The most interesting result was that, in Phase IV, all of the participants answered with Luis's preferences after observing him in Phase II and prompts of Phase III to ensure discrimination of relevant elements in the task were introduced (see Table 4, shaded in gray, and Figure 5). The only exception was P.3 who maintained the choice given as his own preference in the *Presents* category.

Finally, it might be mentioned that in some cases, underlined in Table 4 (P.2 in *Vacation*; P.4 in *Games*, *Drink* and *Presents*; and P.5 in *Drink* and *Presents*), the choice attributed by the participants to Luis in Phase I coincides with the choice selected by the character. This means that in the *posttest* when these participants chose the preference shown by Luis, there would be no change over the one attributed to him in the *pretest*. This makes it hard, in these cases, to come to a conclusion concerning the influence of observing Luis make his choice.

Table 4. Preferences indicated by the participants in different tests in the second study.

		Participants					
		1	2	3	4	5	6
GAMES	Participant's preference	D*	B	D*	A	A	C*
	Preference attributed to Luis (Phase I)	D*	D	D*	<u>D</u>	D	C*
	Preference attributed to Luis (Phase IV)	B	A	B	<u>D</u>	C	D
DRINKS	Participant's preference	D*	B*	C	A	A	C
	Preference attributed to Luis (Phase I)	D*	B*	D	<u>D</u>	<u>C</u>	A
	Preference attributed to Luis (Phase IV)	A	A	A	<u>D</u>	<u>C</u>	B
VACATION	Participant's preference	B	C	C	A*	A*	D
	Preference attributed to Luis (Phase I)	D	<u>A</u>	A	A*	A*	A
	Preference attributed to Luis (Phase IV)	A	<u>A</u>	D	D	B	B
PRESENTS	Participant's preference	D*	D*	B*	D	B	B*
	Preference attributed to Luis (Phase I)	D*	D*	B*	<u>C</u>	<u>D</u>	B*
	Preference attributed to Luis (Phase IV)	A	A	B	<u>C</u>	<u>D</u>	D

X*: when the choice preferred by the participant coincides with the one attributed to Luis in the first test.
 With a square: if the participant made the same choice every time.
 Shaded in gray: if the choice attributed to Luis coincides with the one previously observed about him.
 Underlined: if the one attributed to Luis coincides in the first and in the second tests.

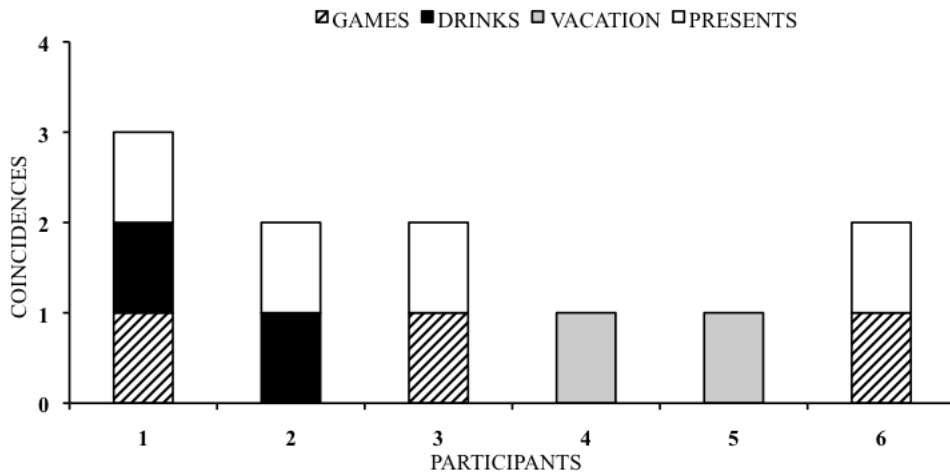


Figure 4. Coincidences between participant preferences and those attributed to Luis in the first test (Phase I) in the categories in the second test.

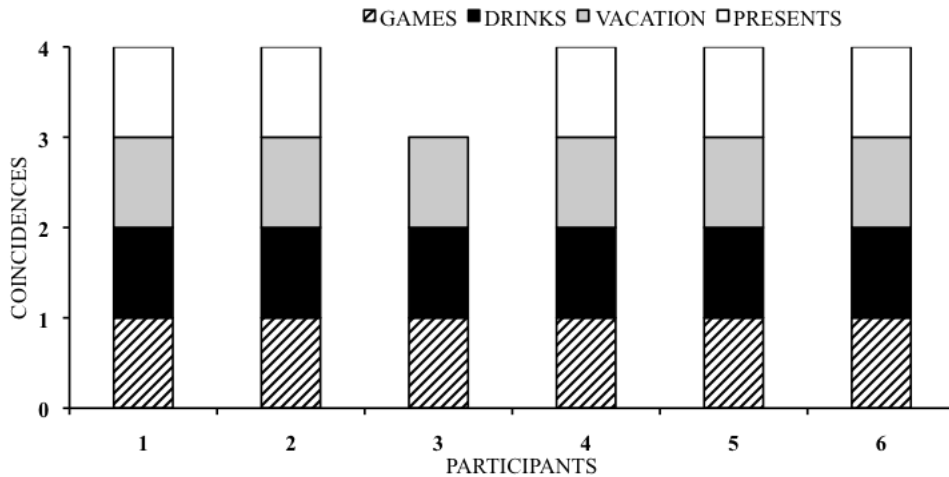


Figure 5. Coincidences between Luis's preferences observed and those attributed to him by the participants in the posttest (Phase IV), in the categories in the second study.

DISCUSSION STUDY 2

The most remarkable result of this study is that, unlike the first one, all of the participants (except one) answered in the posttest by choosing in all the categories what they had seen the character choose. They recognized the preferences of Luis and *they put themselves in his place* when choosing what he would choose.

With a simple procedure, which involved establishing *self* as different from *the other*, and own preferences as different from those of Luis, the variability observed in the first study is reduced and the participants end up "putting themselves in the other's place", responding correctly to the task, attributing to Luis the choice previously selected by him as the one he prefers. It should be pointed out that the results for P.3 may be explained by circumstances having nothing to do with the study which took place during application of the procedure. Specifically, the session was interrupted by third persons, which altered the application of the procedure. It was decided to include the data with the corresponding indication of this alteration as a sample of variability triggered by a variation in the arrangement of the variables in play.

On the other hand, like the first study, in this case, in some categories (e.g. *Presents*), the participants showed a tendency to answer the same way in the first test of preferences attributed to Luis (phase 1) with the own preferences. Apart from the strong motivation for the choice selected in this category (as a possible present), it was observed that some of the participants "had a hard time accepting" that, for example, Luis liked a doll for a present more than a ball or a bicycle, and even said that "boys do not play with dolls." In fact the doll (Choice A) was not selected at all until Phase IV.

It would also have to be considered that the presents had already been included in the first study in the *Sports* category: bicycle and ball. It might be thought that this

could exert influence in some way by being presented as choices again. However, as mentioned, the intervention carried out produces the change to the preference of Luis in Phase IV in all cases: P.1, P.2 and P.4, who had chosen the ball as their preference, and P.1, P.2, P.4 and P.5, who at first chose the ball or the bicycle as Luis's preference.

GENERAL DISCUSSION

Reviewing the research done on the acquisition of ToM in children with Down's Syndrome (which is scarce compared to the plentiful bibliography on ToM in autistic children), it is concluded that although they come closer to the ToM skills typical of children with normal development, they do show some difficulty, although not as much as autists (Baron-Cohen, 1989; Yirmiya and Shulman, 1996). The two studies presented here provide some data about ToM in persons with Down's Syndrome.

As mentioned above, it has been proposed that, at approximately four years of age, indicators appear showing the presence of social competence in understanding, explaining and predicting both own behavior and that of others (Wimmer & Perner, 1983; Yirmiya *et al.*, 1998). In this respect it should be considered that the two studies presented were carried out with the participation of persons 5 to 35 years of age, all of them with generalized developmental delay. Nevertheless, chronological age does not seem to be a relevant factor in explaining the results, and it is the skills present in regard to the tasks and the variables in play which should be considered.

The results of the first study show that in general, most of the participants have difficulty in solving the tasks given them. These data are in agreement with previous studies that show the difficulty of children with Down's Syndrome in solving ToM tasks. Nevertheless, the results in the second study show that this difficulty can be overcome. This is accomplished by a simple intervention to establish the pertinent prerequisite discrimination. This way, the participants successfully answer according to what they know about the other (Luis, in this case), putting themselves in his place in the various situations presented instead of keeping their own preferences or answering in a more or less random manner as in the first study.

Many of the participants, in both studies, show stability in their choices in the first two measurements in all of the categories. Fewer do so in all three measurements, especially when the choice is about *Food* or *Animals* (in the first study) or *Presents* (one of the participants in the second study); and this regardless of whether they were asked about their own preferences or those of Luis. As mentioned, some participants appeared insensitive to their limited experience with Luis's preferences, and knowledge of them did not affect the way they answered or attributing to the character the choices they had seen him choose. In this respect the relevance of evaluating the preferences of the participants in the different situations at the beginning should be mentioned. This allowed observing, beyond any possible speculation had it not been done in this way, that when asked about someone unknown, the most likely response is according to your own experience, as it is the only reference for answering. Thus in both studies there are participants who, when asked for the first time, attribute the preferences previously

shown as their own to Luis. However, when you have had experience in putting yourself in the other's place and discriminating that the other does not have to think, want, prefer, etc., the same way as you yourself do, the answer might be something different from your own preferences, or even better, you might say that you cannot answer for a person you do not know. In this sense, the first time asked about Luis's preferences, none of the participants say they cannot know what they are, although some point to an option other than their own preferences. There is no information available for concluding, without more, about their reason for answering that way. They might be responding about an unknown person who, because he is unknown, likes different things. There might be an option of not choosing any answer proposed as they do not know anything about the preferences of the other; although this option does not seem feasible in an experimental context in which they must choose one of the alternatives proposed.

When asked for the first time about Luis's preferences, variability is observed in the answers according to the categories or situations. In the first study, most of the participants repeated the same choice in the *Food* category, and a few did so in *Transports*. In the second study, four of the six participants repeated their preferences when choosing *Presents* and three did so in *Games*. The participants preferences might be said to be very clearly established in these categories, and are highly probable, highly motivated answers, more so when they do not know anything about the preferences of the other. The most probable is for them to interpret the behavior of the other, which they do not know, from the knowledge of their own, from their own history, and especially in highly motivated situations, such as *Food* or the choice of a *Present* or *Game* (Luciano *et al.*, 2000).

However, the most interesting data refer to what the participants respond when they are asked about the preferences of Luis after observing him choose. The differences between the results in the first and second studies are remarkable. In the first, none of the participants answer according to what they have observed in Luis in all four categories. Only three of them answered as the character in three of the four categories, three did so in two categories, six in one and three did not do so in any of them. On the other hand, all of the participants in the second study (except P.3) ended up pointing to the preferences of Luis correctly in all of the situations posed. That is, all of them answered according to their particular history with the character whom they had seen choosing. This difference in the results of one study and the other might be interpreted because of the variation introduced in the procedure of the second, addressed at differing clearly between "self" and "other" and thereby contextualizing the respective preferences. This served, furthermore, to weaken or alter the functions that certain situations or categories could have for each one of the participants according to their personal history (e.g., Bentall & Lowe, 1987; Gómez & Luciano, 2000; Roche & Barnes, 1997; Valdivia, Luciano, & Molina, 2006), as well as facilitating discrimination between their own preferences and those of Luis, explicitly shown in the question when asked to answer according to what they had seen and what they knew about Luis as occurred in the Luciano *et al.*' study (2000).

Considering the goals set, it may be concluded that the experience of observing the other, even in a small number of examples, is sufficient for some of the participants

to put themselves in his place and answer about his preferences. It could be said that persons with Down's Syndrome have difficulties in putting themselves in the place of the other, in the sense mentioned in the introduction of this report. However, if in addition to observing the other showing his preferences, discriminations of interest to answer by putting themselves in his place, are clearly made, all of the participants answer correctly when asked. In other words, it could be said that the participants get to know Luis's "mind", his preferences, when they are made explicit and thus shared, in the sense of the analysis made by Kantor (1959) and Hayes (1994). Furthermore, from the viewpoint of the RFT (McHugh, Barnes-Holmes, & Barnes-Holmes, 2009) it may be said that the training served to establish, or in some cases, strengthen, some of the basic deictic relationships that are at the bottom of these more complex behaviors. That is, limiting study to showing the difficulties of these people in demonstrating whether they have developed a ToM or not would not be of value. It has to go one step further in showing that it can be developed. The evidence of this study shows that the kind of history they have with certain events is related to the attribution of mental states (in this case the preferences of others), essential and defining element of the ToM.

It has thus been demonstrated using a simple procedure, how ToM skills are developed in persons with developmental delay. Beyond proving again whether certain evaluation tests can be solved or not, we analyzed the phenomenon (defined in this case as putting oneself in the place of another to choose) and then based on this, we proposed a series of variables which made it possible to generate it. These variables, which call on the history of differential contingencies through situations, are shown to be relevant in approaching the explanation of how one gets to know a person and what he thinks, his opinions or what he prefers. The preliminary nature of these studies, as discussed in the introduction, should be recalled, and as is the rule in research, the results should be replicated with variations in the procedure. For example, by increasing the number of participants, which in the second study is very limited; working with more than one character, which would allow the self/other discrimination to be demonstrated and, especially, discrimination of own preferences as different from (or the same as) those of the other, providing contextual prompts necessary to facilitate participants reporting correctly when they do not know the preferences of one character or another, and evaluating and training the deictic relationship more completely (in line with the suggestions of McHugh, Barnes-Holmes, & Barnes-Holmes, 2009). Finally, still pending is testing derivation of this recognition of the "mind" of the other to situations with no previous training, as well as the advisability of training in a larger number of examples (more situations or tasks), which would probably allow a larger number of participants to answer correctly, distinguishing themselves and their preferences from the other and his preferences.

REFERENCES

- Baron-Cohen S (1989). The autistic child's theory of mind. A case of specific developmental delay. *Journal of child Psychology and Psychiatry*, 30, 285-297.
- Baron-Cohen S, Leslie, AM, & Frith U (1985) Does the autistic child have a theory of mind? *Cognition*, 21, 37-46.

- Benson G, Abbeduto L, Short K, Bibler J, & Maas F (1993). Development of theory of mind in individuals with MR. *American Journal on Mental Retardation*, 98, 427-433.
- Bentall RP & Lowe CF (1987). The role of verbal behavior in human learning: III. Instructional effects in children. *Journal of the Experimental Analysis of Behavior*, 47, 177-190.
- Bosacki SL (2000). Theory of mind and self-concept in preadolescents: Links with gender and language. *Journal of Educational Psychology*, 92, 709-717.
- Cassidy KW (1998). Preschoolers' use of desires to solve theory of mind problems in a pretense context. *Developmental Psychology*, 34, 503-511.
- Gómez I & Luciano MC (2000). Autocontrol a través de reglas que alteran la función. *Psicothema*, 12, 418-425.
- Hayes LJ (1994). Thinking. In SC Hayes, LJ Hayes, M Sato, & K Ono (Eds.), *Behavior Analysis of Language and Cognition* (pp. 149-164). Context Press, Nevada.
- Hayes SC, Barnes-Holmes D, & Roche B (2001). *Relational Frame Theory: A post-Skinnerian account of language and cognition*. New York: Plenum.
- Kantor JR (1959). *Interbehavioral Psychology*. Chicago: Principia Press
- Kasari C, Freeman SF, Hughes MA (2001). Emotion recognition by children with Down Syndrome. *American Journal of Mental Retardation*, 106, 59-72.
- LeBlanc LA, Coates AM, Daneshvar S, Charlop-Christy MH, Morris C, & Lancaster BM (2003). Using video modelling and reinforcement to teach perspective-taking skills to children with autism. *Journal of Applied Behavior Analysis*, 36, 253-257.
- Lillard A (1998). Ethnopsychologies: Cultural variations in theories of mind. *Psychological Bulletin*, 123, 3-32.
- Luciano C, Molina FJ, Gómez I, & Gómez S (2000). *An experimental-analytic example of thinking*. 26th Association for Behavior Analysis Convention, Washington DC.
- McHugh L, Barnes-Holmes Y, & Barnes-Holmes D (2004a). A relational frame account of the development of complex cognitive phenomena: Perspective-taking, false belief understanding, and deception. *International Journal of Psychology and Psychological Therapy*, 4, 303-324.
- McHugh L, Barnes-Holmes Y, & Barnes-Holmes D (2004b). Perspective-taking as relational responding: A developmental profile. *The Psychological Record*, 54, 115-143.
- McHugh L, Barnes-Holmes Y, & Barnes-Holmes D (2009). Understanding and training perspective taking as relational responding. In RA Rehfeldt & Y Barnes-Holmes (Eds.), *Derived Relational Responding. Applications for Learners with Autism and Other Developmental Disabilities* (pp. 281-300). Oakland, CA: Context Press.
- Meltzoff AN (1995). Understanding the intentions of others: Re-enactment of intended acts by 18-month-old children. *Developmental Psychology*, 31, 838-850.
- Pérez M (2004). *Contingencia y drama. La Psicología según el conductismo*. Madrid: Minerva Ediciones.
- Phillips W, Baron-Cohen S, & Rutter M (1998). Understanding intention in normal development and in autism. *British Journal of Developmental Psychology*, 16, 337-348.
- Pilowsky T, Yirmiya N, Arbelle S, & Mozes T (2000). Theory of mind abilities of children with schizophrenia, children with autism, and normally developing children. *Schizophrenia Research*, 42, 145-155.
- Premack DG & Woodruff G (1978). Does the chimpanzee have a "theory of mind"? *Behavioral and Brain Sciences*, 1, 515-526.
- Roche B & Barnes D (1997). A transformation of respondently conditioned sexual arousal functions and

- accordance with arbitrary relations. *Journal of the Experimental Analysis of Behavior*, 67, 275-301.
- Shaked M & Yirmiya N (2004). Matching procedures in autism research: Evidence from meta-analytic studies. *Journal of Autism and Developmental Disorders*, 34, 35-40.
- Skinner BF (1974). *About Behaviorism*. New York: Alfred A. Knopf.
- Spradlin JE & Brady N (2008). A Behavior Analytic Interpretation of Theory of Mind. *International Journal of Psychology and Psychological Therapy*, 8, 335-350.
- Valdivia S, Luciano C, Gutiérrez O, & Visdómine C (2009). Establishing Empathy. In RA Rehfeldt & Y Barnes-Holmes (Eds.), *Derived Relational Responding. Applications for Learners with Autism and Other Developmental Disabilities* (pp. 301-312). Oakland, CA: Context Press.
- Valdivia S, Luciano C, & Molina F (2006). Verbal regulation of motivational states. *The Psychological Record*, 56, 577-595.
- Watson AC, Nixon CL, Wilson A, & Capage L (1999). Social interaction skills and theory of mind in young children. *Developmental Psychology*, 35, 386-391.
- Welch-Ross MK (1997). Mother-child participation in conversation about the past: Relationships to preschoolers' theory of mind. *Developmental Psychology*, 33, 618-629.
- Wimmer H & Perner J (1983). Beliefs about beliefs: Representations and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, 13, 103-128.
- Yirmiya N, Erel O, Shaked M, & Solomonica-Levi D (1998). Meta-analyses comparing theory of mind abilities duals with autism, individuals with mental retardation, and normally developing individuals. *Psychological Bulletin*, 124, 283-307.
- Yirmiya N, Pilowsky T, Solomonica-Levi D, & Shulman C (1999). Brief Report: Gaze behavior and Theory of Mind abilities in individuals with autism, Down Syndrome, and mental retardation of unknown etiology. *Journal of Autism and Developmental Disorders*, 29, 333-341.
- Yirmiya N & Shulman C (1996). Seriation, conservation, and theory of mind abilities in individuals with autism, individuals with mental, retardation, and normally developing children. *Child Development*, 67, 2045-2059.
- Yirmiya N, Solomonica-Levi D, & Shulman C (1996). The ability to manipulate behavior and to understand manipulation of beliefs: A comparison of individuals with autism, mental retardation, and normal development. *Developmental Psychology*, 32, 62-69.
- Yirmiya N, Solomonica-Levi D, Shulman C, & Pilowsky T (1996). Theory of mind abilities in individuals with autism, Down syndrome and mental retardation of unknown etiology: The role of age and intelligence. *Journal of Child Psychology and Psychiatry*, 37, 1003-1014.
- Yuill N & Pearson A (1998). The development of bases for trait attribution: Children's understanding of traits as causal mechanisms based on desire. *Developmental Psychology*, 34, 574-586.
- Zelazo PD, Burack JA, Benedetto E, & Frye D (1996). Theory of mind and rule use in individuals with Down's syndrome: A test of the uniqueness and specificity claims. *Journal of Child Psychology and Psychiatry*, 37, 479-484.
- Ziv M & Frye D (2003). The relation between desire and false belief in children's theory of mind: No satisfaction? *Developmental Psychology*, 39, 859-876.

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