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ISSN 1577-7057

Printed in Spain

Volume 26, number 1 March 2026
Volumen 26, número 1 Marzo 2026

ISSN: 1577-7057

IJP&PT

International Journal of Psychology & Psychological Therapy

https://www.ijpsy.com

IJP&PT IS INCLUDED IN THE FOLLOWING INDEXING AND DOCUMENTATION CENTERS:

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International Journal of Psychology & Psychological Therapy, 2026, 26, 1, 129-141

Promoting Perspective-Taking in Adults with Intellectual Disabilities through Naturalistic Conditional Discrimination Training

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Abstract

Perspective-taking is a social skill that allows an individual to put themselves in another's place and understand how that person would act in a given situation. Previous research has shown that various populations -including people with intellectual disabilities- may experience difficulties deploying this skill. From a behavioral perspective, this repertoire emerges from a set of learned relations among stimuli that enable the individual to locate themself in relation to other people, places, or points in time. Relational Frame Theory proposes that deictic and hierarchical frames underlie this ability. The present study introduces a training protocol designed to teach responses to deictic and hierarchical discriminations through a series of activities carried out in a naturalistic context with three adults with Down syndrome. The results showed that all three participants improved their performance on the trained discriminations. The study provides exploratory evidence supporting the utility of teaching deictic and hierarchical relations -using differential reinforcement and various types of prompts and aids- for learning complex perspective-taking skills in individuals with cognitive developmental difficulties.
Key words: perspective taking, Down syndrome, Relational Frame Theory, deictic and hierarchical relations.

How to cite this paper: Montoya-Rodríguez MM, de Souza-Franco VA, Harana-Lahera B, Polin E, Lobato D, & Molina-Cobos FJ (2026). Promoting Perspective-Taking in Adults with Intellectual Disabilities through Naturalistic Conditional Discrimination Training. *International Journal of Psychology & Psychological Therapy, 26,* 1, 129-141.

Novelty and Significance

What is already known about the topic?

- Perspective-taking has traditionally been studied through Theory of Mind tasks, which often rely on highly structured and artificial scenarios.
- From a Relational Frame Theory perspective, perspective-taking is understood as relational responding based on deictic frames.
- Previous Relational Frame Theory-based protocols have shown that deictic relations can be trained and are related to performance on social-cognitive tasks.

What this paper adds?

- Introduces a training protocol that systematically integrates hierarchical framing with personal, spatial, and temporal deictic relations.
- The findings extend Relational Frame Theory-based perspective-taking research to individuals with intellectual disabilities, illustrating the functional relevance of hierarchical framing in training complex perspective-taking repertoires.

Consider a scenario where two siblings are planning a family dinner. María, who loves cooking, is enthusiastic about preparing a homemade meal, believing it will add a personal and special touch to the evening. In contrast, her brother Sam prefers to order takeout, citing their busy schedules as a reason for convenience. During their

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discussion, María passionately argues that cooking from scratch will make the dinner more memorable, but she fails to acknowledge Sam's practical concerns about time constraints and the stress of preparing a large meal. As the disagreement escalates, María's inability to appreciate Sam's viewpoint leads to mounting frustration. This situation highlights the challenge of perspective-taking -the ability to recognize and understand that others, or oneself in other temporal and spatial frames, may have different needs, constraints, and preferences (Díaz-Borda, García-Zambrano & Pfeiffer Flores, 2024).

Research on perspective-taking (PT) has traditionally centered on how individuals understand and adopt viewpoints related to mental states -such as beliefs, desires, and knowledge- in social contexts. This cognitive skill is essential for effective social interactions and constitutes a core component of Theory of Mind (ToM; Wimmer & Perner, 1983), which is traditionally described in the cognitive literature as the ability that allows individuals to explain and predict their own and others' behavior. Early research primarily focused on children, especially those with autism who often face difficulties with ToM tasks (Fletcher-Watson, McConnell, Manola, & McConachie, 2014), including false-belief paradigms (e.g., the Sally-Anne task; Baron-Cohen, Leslie, & Frith, 1985), appearance-reality distinctions (Baron-Cohen, 1989; Hansen Nir, Simonin, & Veneziano, 2025), and second-order belief tasks (Polyanskaya, Eigsti, Brauner, & Blackburn, 2021), all of which require inferring another person's thoughts or beliefs in contrast to one's own. However, it is crucial to recognize that PT challenges are not limited to a specific population or to particular ToM tasks. Young people, for instance, also encounter difficulties with perspective-taking skills that can impact their personal relationships (Farrell & Vaillancourt, 2021). Traditional ToM tasks may not fully capture the complexity of these challenges, as they often focus on a narrow set of responses to highly structured and artificial scenarios that have traditionally been used to assess abilities considered central or characteristic of ToM. These tasks tend to emphasize the correct identification of beliefs or knowledge states in others, centering almost exclusively on the description of inferred cognitive structures and processes, while shedding little light on the actual behavioral variables involved (Schlinger, 2009). This ToM-based approach overlooks the multidimensional nature of perspective-taking, which encompasses flexible repertoires that vary across contexts, social contingencies, and developmental histories. A functional analysis of perspective-taking behavior is therefore needed to identify the key elements and contingencies that support or hinder its emergence and generalization, thereby providing a more comprehensive account and opening the possibility of influencing the phenomenon through targeted interventions.

Relational Frame Theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001) offers a behavioral perspective on human language and cognition, providing a comprehensive framework for examining perspective-taking. According to RFT, perspective-taking involves engaging with a set of deictic frames that describe the relation between the speaker's viewpoint and the stimulus (Barnes-Holmes, McHugh, & Barnes-Holmes, 2004; McHugh, Barnes-Holmes, & Barnes-Holmes, 2004). These frames include personal relations (I-you), spatial relations (here-there), and temporal relations (now-then), all of which are fundamental to understanding perspectives. Mastery of these frames typically develops through interactions involving questions such as "What are you doing now?", "What was I doing there?", and "What would you do now if you were in my position?" (Hayes et alii, 2001; Villatte, Monestès, McHugh, Freixa, & Loas, 2010). Prior research has demonstrated that consistent reinforcement of these relational patterns can enhance PT skills (Barnes-Holmes *et alii*, 2004; Montoya-Rodríguez & Molina Cobos, 2016). In 2001, Barnes-Holmes introduced a protocol for teaching three primary deictic frames (I-you, here-there, now-then) across varying levels of complexity: simple (e.g., "I have a red brick and you have a green brick. Which brick do I have?"), reversed (e.g., "if I

were you, which brick would I have?"), and double reversed (e.g., "if I were you and here were there, where would I be sitting?"). This protocol has been adapted in subsequent studies (Chastain & Dixon, 2025; Gilroy, Lorah, Dodge, & Fiorello, 2015; Lovett & Rehfeldt, 2014; Montoya Rodríguez & Molina Cobos, 2018), offering an alternative approach to assessing and training PT. These adaptations include conversational formats, the use of children's stories, and everyday scenarios with more natural vocabulary, all aiming to embed deictic relations in familiar contexts to facilitate the generalization of perspective-taking skills.

From this standpoint, effective perspective-taking can be understood as a more complex and multidimensional skill than has traditionally been assumed. It involves not only understanding a third person's viewpoint and imagining their thoughts or feelings in a given situation but also the ability to place oneself in a past moment or memory and re-experience those emotions (Villate *et alii*, 2016). This capacity allows individuals to act differently in the present as if they were reliving the past experience. Consequently, PT encompasses more than learned relations among stimuli like I, you, or other; it also involves integrating temporal discriminations such as before, now, and after within a specific spatial context (McHugh & Stewart, 2012). In essence, effective perspective-taking requires skill in navigating various temporal and spatial contexts as well as adopting the viewpoints of others.

Over the past decade, research has demonstrated that applications of RFT have extended to various clinical populations, including individuals with schizophrenia, borderline personality disorder, autism spectrum disorder, and intellectual disability (Hempkin, Sivaraman, & Barnes-Holmes, 2024; Montoya Rodríguez, McHugh, & Molina Cobos, 2017; Montoya Rodríguez & Molina Cobos, 2019; Walton *et alii*, 2024; O'Neill & Weil, 2014). These studies highlight a significant connection between deictic frames and developmental levels of perspective-taking. For example, Walton *et alii* (2024) examined perspective-taking in individuals with Borderline Personality Disorder (BDP) from an RFT-based approach, comparing a clinical group with a control group using a behavioral deictic relational task and a self-report measure. The authors found that, despite greater self-reported difficulties in perspective-taking among individuals with BPD, no deficits were observed in behavioral deictic relational tasks, suggesting a discrepancy between objective performance and subjective perception of the ability. Another example of application is the work of Montoya Rodríguez and Molina Cobos (2019), who developed a training protocol aimed at enhancing PT skills, especially in relation to ToM tasks. This protocol sought to address the limitations of previous methods, such as the Barnes-Holmes protocol, by incorporating elements such as verbs referring to private events, conditional relations (if-then), and various deictic frames (he, she). The application of this protocol led to notable improvements in ToM performance. However, some participants struggled to meet the criteria for deictic relational responses, with difficulties particularly evident in understanding causal or conditional relations, underscoring the need for further targeted training.

The RFT literature also indicates that perspective-taking requires not only the coordination of deictic relations but also the articulation of hierarchical relations, in which psychological content (e.g., thoughts, memories, or emotions) is differentiated from the observing or responding individual and framed as belonging to, or being included within, a broader class that encompasses the individual as a whole (Foody, Barnes-Holmes, Barnes-Holmes, & Luciano, 2013; Luciano *et alii*, 2011; Villatte, Villatte, & Hayes, 2016).

In this regard, López López and Luciano (2017) tested this hypothesis by comparing two protocols: one that included exercises based on deictic relations (I/You, Here/There,

Now/Then) and another that included the same exercises plus hierarchical relations that helped participants locate themselves as something larger than their thoughts (e.g., "Who is noticing that sensation?"). The results showed that the protocol combining deictic and hierarchical relations was significantly more effective than the protocol including only deictic relations, as well as more effective than the control condition. Importantly, these findings suggest that combining deictic and hierarchical relations strengthens the repertoire of discriminations involved in perspective-taking, allowing individuals to respond with greater variability and generalization across situations. From a behavioral standpoint, the exercises function as training conditions that establish new stimulus control over private events, reducing rigid patterns of responding and facilitating more effective interaction with the environment. This connection between basic research and applied settings highlights the relevance of arranging training conditions that not only establish specific responses but also promote broader repertoires with practical impact, as shown in interventions that help individuals relate differently to their own thoughts, sensations, or memories (Ruiz & Perete, 2015).

Despite the evidence reported in the literature regarding the effectiveness of combining deictic and hierarchical relations to foster perspective-taking repertoires, no studies to date have examined this approach in populations with intellectual disabilities. Building on these findings, the present study aims to address two primary objectives. The first objective was to design an alternative training protocol that integrates interpersonal, spatial, and temporal deictic frames. The protocol also included specific questions designed to prompt participants to differentiate the reported action from the agent performing that action (i.e., "who?"). The second objective was to evaluate the effects of this training protocol on performance across varying levels of deictic complexity in individuals with intellectual disabilities.

Method

Participants

Three adults with Down syndrome and diagnosis of intellectual disability participated (see Table 1). All attended a comprehensive training center where they engaged in activities aimed at improving academic skills, communication, personal autonomy, and social inclusion. Inclusion criteria were a confirmed diagnosis of intellectual disability, absence of disruptive behavior, ability to name everyday events and actions, ability to ask open-ended questions, and to answer others' questions. Information on these criteria was obtained from the center staff, allowing an initial selection that was finalized after an interview with the experimenters prior to the study onset. All three participants had been evaluated one year earlier with the Kaufman Brief Intelligence Test (K-BIT; Kaufman & Kaufman, 1990) and fell within the mild-to-moderate intellectual disability range.

Table 1. Participant characteristics

Participant	Sex	Age	*IQ*	Educational level	Current programs/activities	Communication and functional profile	Employment status
P1	Female	32	50	Secondary education completed	Programs focused on social and work skills with emphasis on independent living	Oral communication; able to engage in complex conversations with some support to organize responses	Employed as a stock clerk in a supermarket chain (2 years)
P2	Male	24	47	Primary education completed	Job placement workshops focusing on basic workplace behaviors and administrative task management	Oral communication; occasional support needed to sustain conversations and organize ideas	Not employed
P3	Male	23	49	Primary education completed	Structured activities targeting self-care, communication, independent living skills, and basic household tasks	Oral communication; occasional support needed for clarity; follows verbal instructions easily	Not employed

Legal guardians provided informed consent, and participants had given their assent prior to enrollment. This study was approved by the Ethics Committee of the Universidad Católica del Uruguay (code 240418b). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Setting and Materials

The study was conducted in the participants' local day care center. During the pretest and posttest sessions, the participant and the experimenter were seated face-to-face at a table. These sessions lasted approximately 15 to 20 minutes. In the training sessions, the experimenter and the participant were arranged more flexibly within the room, depending on the planned activities. These sessions lasted 30 minutes and included a 5-minute break at the midpoint.

For the initial assessment (pretest) of perspective-taking skills, we used a shortened version of the protocol published by Montoya Rodríguez and Molina Cobos (2018). Given participant characteristics and prior findings indicating that the double reversal structure can permit correct responding without deictic relational control (Davlin, Rehfeldt, & Lovett, 2011; Jackson, Mendoza, & Adams, 2014; Rehfeldt, Dillen, Ziomek, & Kowalchuk, 2007), double reversal relations were removed from the protocol in this study. The six simple complexity items and six reversed complexity items (12 items in total) were administered using photographs depicting the stimuli described in each question (e.g., a photo of a bicycle, roller skates, a hamburger, etc.). Each item consisted of two questions, and an item was considered correct only if both questions were answered correctly (e.g., "I have a yellow pencil, and you have a green pencil. What do you have? What do I have?").

For the posttest, the specific stimuli referenced in each question were changed while maintaining item structure. For example, "I have a red block, and you have a blue block" was used instead of "I have a yellow pencil, and you have a green pencil."

Training was conducted with a deictic relations protocol structured as shown in Table 2, using the materials required for the activities specified for each relational frame (e.g., a loaf of bread, a pizza, a knife, a newspaper, colored cardstock, etc.). Beyond deictic relations, the training protocol incorporated hierarchical frames whenever questions included who, insofar as participants had to assign the different actions to the categories I or you, as appropriate. That is, as shown in Table 2, each training

Table 2. Trial sample used during training.

I-You	Setting	"Look at what I'm doing. I am cutting the pizza with a knife, and you are going to cut this bread. I cut the pizza, and you cut the bread."
	Simple relations (used only in mixed sessions)	"What am I cutting?" "What are you cutting?" "Who cuts the pizza?" "Who cuts the bread?"
	Reverse relations	"Imagine that you are me, what would you be cutting?" "Imagine that I am you, what would I be cutting?" "So, who would be cutting the pizza? And who would be cutting the bread?"
Here-There	Setting	"Pay attention to where we are. I am next to the mop, you are next to the broom"
	Simple relations (used only in mixed sessions)	"Where am I?" "Where are you?" "Who is next to the mop?" "Who is next to the broom?"
	Reverse relations	"Imagine that the mop was the broom, where would I be? Imagine that the broom was the mop, where would you be?" "Who would be next to the mop?" "And who would be next to the broom?"
Now-Then	Setting	"Yesterday I cut the pizza with a knife, today I am looking at the tablet"
	Simple relations (used only in mixed sessions)	"What am I doing today?" "What was I doing yesterday?" "Who was cutting the pizza yesterday?" "Who is looking at the tablet today?"
	Reverse relations	"Imagine that yesterday were today, what would I be doing yesterday? Imagine that today were yesterday, what would I be doing today?" "Who would be cutting the pizza? Who would be looking at the tablet?"

trial comprised four questions: two referring to the action (what/where/when) and two referring to the person (who). A trial was considered correct only if all four questions were answered correctly.

Design

We employed a within-subject, quasi-experimental design with pretest–posttest measures and replication across participants. The independent variable was training in the conditional discriminations *I-you, here-there,* and *now-then*; the dependent variable was individual performance on the perspective-taking protocol. The intervention was delivered individually across multiple sessions until participants reached 80% correct responses for each discrimination type.

Procedure-Intervention

Procedures were conducted individually. At the start of the first session, the participants were given a general description of the activities and informed that their participation would be required over several days. They were also told they could return to class at any time if they wished; no participant chose to do so.

Practice trials. To evaluate comprehension of the structure and flow of deictic relation trials, three practice trials used in prior studies were administered (Jackson *et alii*, 2014; Montoya Rodríguez & Molina Cobos, 2016). These trials had the same format as the questions in the target protocol. For example, the experimenter said: "If the sky is yellow and the sun is blue, what color is the sky? What color is the sun?" It was predetermined that any participant who did not respond correctly to the practice trials would be excluded from the study. All three participants answered all practice trials correctly.

Pretest. In the first study phase, baseline measures were collected using the Montoya Rodríguez and Molina Cobos (2018) protocol. Because this was an assessment, the experimenter provided no feedback following the participants' responses. Consistent with prior studies (Jackson *et alii*, 2014; O'Neill & Weil, 2014; Weil, Hayes, & Capurro, 2011), participants were deemed to possess the deictic relational repertoire if they met an 80% correct criterion.

Training. For each participant, training began at the first level of deictic complexity not met during the pretest. All training sessions included 10 trials, but the number of training sessions varied per participant until the final criterion was achieved.

A key feature of the training was that deictic relations were embedded within activities carried out during the session, thereby exposing participants to natural environmental contingencies. The same activities were used with all participants. In addition, to target the yesterday-today relation, activities produced permanent products that could be used in the subsequent session to facilitate recall (e.g., inflating a balloon, painting a picture, cutting bread). For example, when the experimenter stated, "I cut the pizza, and you cut the bread," she was actually cutting a piece of pizza while the participant was cutting bread. On the following day, for training the yesterday–today relations, the experimenter showed the participant the products of the activities carried out the previous day and retrieved cues that facilitated recall of the situation (e.g., "Remember that yesterday I was cutting this pizza and I told you that I really like pizza but not pepperoni"). The experimenter then initiated a new activity in order to present the trial (e.g., "Yesterday I cut the pizza with a knife; today I am looking at the tablet").

To facilitate understanding of the reversal cue, prompts consisted of physically enacting the change while the experimenter presented the trial. For example, the experimenter would say "Imagine that I am you" while moving to the participant's location. For the spatial here-there relation, objects were moved. When the experimenter said, "I am next to the mop, you are next to the broom. Imagine that the mop was the broom…," a second experimenter moved the mop (initially next to the experimenter) and placed it next to the participant. A similar procedure was used when training reversed yesterday-today relations. The experimenter said, "Yesterday you were inflating a pink balloon (present now as

yesterday's product), and today you are inflating a blue balloon. Imagine that yesterday were today…" while the second experimenter moved the pink balloon -positioned farther away to represent yesterday- and placed it next to the participant.

For Participant 2, additional mixed simple–reverse trials were conducted after the posttest procedures in order to facilitate discrimination between the two levels of complexity, as performance on simple relations deteriorated following training in reversed relations (see Results). The aim was to highlight the difference between no spatial relocation (simple relations) and spatial relocation (reversed relations). In these trials, simple relations were presented first, followed by reversed relations within the same scenario. To illustrate one scenario, the experimenter stood next to the mop, while the participant stood next to the broom. The experimenter then presented a trial at the simple level of complexity, asking the four questions ("Where am I? Where are you? Who is next to the mop? Who is next to the broom?"). After the participant responded correctly, the experimenter proceeded to the reversed level of complexity, emphasizing the reversal cue: "Now we are going to make a change. Pay close attention. Imagine that the mop were the broom-where would I be?" As noted above, while the experimenter stated "the mop were the broom," a second experimenter moved the mop (initially next to the experimenter) and placed it next to the participant.

During training sessions, the experimenter delivered social reinforcement (e.g., "Great!" "You're doing that really well!") for correct responses and corrective feedback (e.g., "Oh no, I should be -correct response") for incorrect responses. Incorrect trials were followed by a re-presentation of the trial, accompanied by minimal physical prompts described above, which consisted of enacting the reversal cue while the experimenter presented the trial. These prompts were systematically faded across repetitions as participants demonstrated improved performance. Specifically, fading consisted of gradually reducing the physical displacement toward the other person's position until the deictic relation was presented solely in oral form, without any accompanying physical movement. An 80% correct response without prompts criterion in each deictic relation (personal, spatial, temporal) was required to terminate training.

Posttest. The posttest was administered one week after the participant reached the training performance criterion. Assessment procedures matched the pretest, with stimuli changed relative to prior phases. For Participant 2, a second posttest was conducted after additional training that incorporated both simple and reversed relations.

Interobserver Agreement

A second experimenter served as an external observer and recorded data in 100% of the pretest and posttest sessions and 67% of training sessions. Interobserver agreement (IOA) was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100 [A/(A+D)×100]. An agreement was defined as a priori as observers' concurrence in scoring the participant's trial response as correct or incorrect. During deictic relations training, a correct response was defined as answering all four questions in a trial without any prompts. IOA for pretest and posttest sessions was 100%. IOA for training sessions averaged 97%, ranging from 88% to 99%.

RESULTS

With respect to pretest measures of deictic relations, all participants achieved 100% correct responses on simple relations, and none reached 80% correct on reversed relations. Therefore, all three participants began training with reversed relations. In addition, P2 received additional training that incorporated simple relations after scoring below 80% on both relation types in an initial posttest.

Figure 1 illustrates each participant's performance across the testing and training phases, disaggregated by type of relation (I-you, here-there, yesterday-today). Although

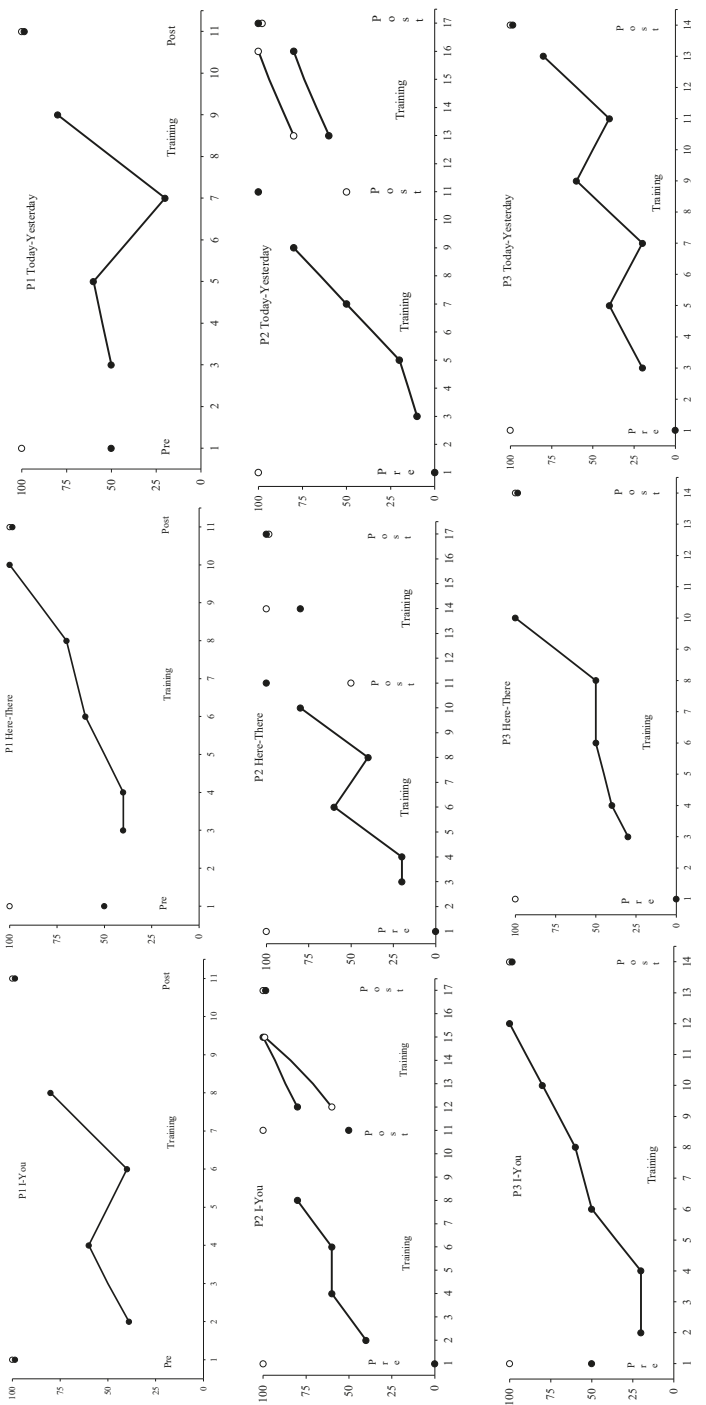

Figure 1. Percentage of correct responses by participants during tests and training. White circles represent simple relations; black circles represent inverse relations.

P1 showed criterion-level performance for reversed I-you relations during the pretest, performance at this level of complexity was limited to 50% correct for both spatial and temporal relations. She required nine training sessions to reach 80% correct on all reversed relations. In the evaluation conducted one week later (posttest), P1 maintained pretest performance on simple relations and markedly increased correct responding on reversed relations, reaching 100%.

In contrast to P1, P2 did not produce any correct responses during the pretest for any of the reversed relations. P2 also needed nine sessions to meet the training criterion on reversed relations, a percentage that was maintained at posttest. However, in the first posttest a reduction was observed in his percentage of correct responses on simple relations, which dropped to 50% on spatial and temporal relations. Based on this result, combined training in simple and reversed relations was scheduled to facilitate their differentiation. After five training sessions, P2 reached the 80% criterion for all relation types and obtained 100% correct on all deictic relations in the new posttest (Session 17).

Finally, P3 showed 50% correct responding on reversed I-you relations at pretest, whereas performance was 0% for both here-there and yesterday-today relations. P3 required 12 sessions to reach the 80% criterion during training. The posttest exceeded 80% correct at both levels of complexity.

Discussion

The results of this study provide preliminary evidence supporting the effectiveness of a training protocol that combines deictic and hierarchical conditional discriminations in improving performance across increasing levels of deictic complexity in young adults with Down syndrome. The protocol was designed based on existing RFT-based training approaches and tailored to the characteristics of this population. Following training, all participants improved their performance on reversed complexity levels of the I-you, here-there, and now-then relational frames, suggesting that perspective-taking skills can be taught systematically and functionally even in populations with moderate intellectual disability.

These findings align with prior research showing that PT, understood within the conceptual principles of RFT, is not a natural skill that emerges spontaneously but can be shaped through multiple interactions in which different kinds of arbitrary relations among stimuli are established (Hayes *et alii*, 2001; Barnes-Holmes *et alii*, 2004; Montoya Rodríguez *et alii*, 2017). In this line, the present study extends empirical support for this account to a relatively underexplored population: adults with Down syndrome.

Consistent with prior work (Montoya Rodríguez & Molina Cobos, 2016; Montoya Rodríguez *et alii*, 2017), a key methodological feature of the present study was presenting deictic relations embedded in a variety of concrete, everyday activities within participants' natural contexts. This contrasts with previous protocols that presented deictic frames in artificial setting or through highly structured tasks (Barnes Holmes *et alii*, 2004; Heagle & Rehfeldt, 2006). This strategy also ensured that reversal cues had a clear physical and contextual anchor, facilitating the establishment of the required relational control.

The use of dynamic visual aids -such as physically relocating objects and physically taking the other's place (e.g., moving to the participant's location while stating "imagine that I am you")- is another innovation aimed at allowing participants to experience a change in frame of reference, thereby facilitating discrimination between one's own and

another's viewpoint. These aids can be understood as facilitating antecedent stimuli, in that they provide concrete visual supports to a verbal instruction that guide the target behavior (Chesnut, Williamson, & Morrow, 2003; Matson & Francis, 1994). This is particularly useful for individuals who may show difficulties in working memory and in tasks requiring flexible shifting among rules, especially when tasks involve verbal processing, which is very common in people with Down syndrome (Lanfranchi, Jerman, Dal Pont, Alberti, & Vianello 2010; Tungate & Conners, 2021).

In this respect, the present study also introduced a modification to the original Barnes-Holmes protocol by replacing the phrasing "if I were you" with "imagine that I am you" during training. This modification was based on preliminary observations indicating greater comprehension with the latter phrasing. Although not evaluated here, it is possible that "imagine that I am you" affords a more concrete and direct representation of perspective reversal. It is important to note that during pre- and posttest assessment sessions, the original "if I were you" phrasing was reinstated, which suggests that the final performance observed may not be explained solely by rote or literal learning of the wording. Future research should evaluate the effects of different formulations on the PT repertoire as a potential prerequisite for adequate trial performance.

From an RFT standpoint, responding relationally to reversed deictic frames entails not merely acquiring an arbitrary response but establishing a complex network of hierarchical relations among stimuli, events, and roles (Villatte *et alii*, 2010). Accordingly, the protocol incorporated questions designed to discriminate who performs the action (e.g., "Who cuts the pizza?") alongside questions designed to describe the action (e.g., "What are you doing?"). This allowed participants to organize actions under social categories (I, you) that enable greater abstraction. By separating the action from the agent performing it, the protocol promoted the formation of hierarchical relations in which multiple actions were organized as members of broader social categories (I, you). In this way, these categories functioned as higher-order classes that subsumed specific instances of behavior, thereby supporting greater abstraction and facilitating generalization across contexts. The inclusion of hierarchical frames thus represents a promising direction for future studies aimed at teaching complex skills involved in inferring mental states.

Despite the promising findings, several limitations should be considered. The absence of a baseline phase and of control participants limits the ability to attribute changes exclusively to training. Nevertheless, the within-subject design with repeated measures and the systematic replication of the effect across the three participants affords reasonable confidence in the internal validity of the findings. Another limitation is the lack of generalization measures. Although training activities were designed to reflect natural contexts, the transfer of acquired skills to untrained social situations was not assessed. This omission is noteworthy, as previous research has shown that even when improvements in the deictic repertoire are observed, these do not always predict gains in empathic skills or interpersonal regulation (Taylor, Sargisson, & Edwards 2023). It would be important, for example, to examine whether participants who meet criteria on complex deictic relations can anticipate how another person will feel in a particular situation or adjust their behavior accordingly. Future work should also incorporate observational behavioral measures or third-party ratings (e.g., family members, educators) to document changes in participants' everyday interactions. Such assessments would better illuminate the functional impact of learning beyond assessment protocols.

Finally, the study's results invite reflection on the role of perspective-taking in social inclusion and self-determination for people with intellectual disabilities, as well as for other populations with PT difficulties, such as individuals with autism spectrum disorder (Peters & Thompson, 2018), personality disorders (Ritter *et alii*, 2011), or other conditions (Marton, Wiener, Rogers, Moore, & Tannock, 2009). The ability to imagine what another feels -or how one would act in a different temporal or spatial situation- has implications not only for social cognition but also for personal planning, decision-making, and the development of a more flexible, adaptive identity (McHugh & Stewart, 2012). Promoting such skills may help reduce interpersonal conflict, improve mutual understanding, and increase the active participation of individuals with PT difficulties in community contexts.

In conclusion, the results suggest that it is feasible to adapt a deictic relations training protocol to support the learning of complex perspective-taking skills in young adults with Down syndrome. The combination of verbal, visual, and contextual elements provided a comprehensive approach that warrants replication and extension in future research.

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Received, December 8, 2025
Acceptance, February 3, 2026