RESEARCH ARTICLES

Building a Protomentalist Skills Scale for Infants

Construcción de una Escala de Habilidades Protomentalistas para infantes

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Summary

Protomentalist skills are the basis for developing the theory of mind, that is the cognitive component of empathy so important for the effective social bond of human beings (Riviére, 2000; Sáiz, Carbonero and Román, 2012; Westby and Robinson, 2014). The objectives of the present study were to build a scale for the evaluation of the development of Protomentalist skills (PROTO - HM) aimed at infants under the age of 3, and to estimate its content validity. The scale was evaluated by 12 expert judges in child development in the United States of America, Chile and Peru. They observed the clarity of the statements, as well as the relevance and representativeness of the items according to the proposed theoretical model. In order to obtain the validity of content, Aiken V was used with 95% confidence intervals. The results show that all the items, dimensions and sub-dimensions of the protomentalist skills of interaction with people and interaction with objects show values higher than .80, these being statistically significant with respect to the minimum criteria of Aiken (.60). At the same time it evidences a good item performance because the lower limits of the 95% confidence interval were greater than .50 in all cases.

Keywords: Judge Criteria; Protomentalist Skills; Interaction with People; Interaction with Objects; Content Validity.

Resumen

Las habilidades protomentalistas son la base para desarrollar la teoría de la mente que es el componente cognitivo de la empatía, tan importante para el vínculo social efectivo de los seres humanos (Riviére, 2000; Sáiz, Carbonero & Román, 2012; Westby & Robinson, 2014). El objetivo del presente estudio fue construir una escala para la evaluación del desarrollo de Habilidades Protomentalistas (PROTO - HM) dirigido a infantes menores de 3 años y estimar su validez de contenido. La escala fue evaluada por 12 jueces expertos en desarrollo infantil de Estados Unidos, Chile y Perú, quienes observaron la claridad de los enunciados, así como la relevancia y la representatividad de los ítems según el modelo teórico propuesto. Para obtener la validez de contenido se utilizó la V de Aiken con intervalos de confianza al 95%. Los resultados demuestran que todos los ítems, dimensiones y subdimensiones de las habilidades protomentalistas de interacción con las personas e interacción con los objetos presentan valores superiores a .80, siendo estos estadísticamente significativos respecto al criterio mínimo de Aiken (.60). A su vez evidencia un buen funcionamiento de ítems debido a que los límites inferiores del intervalo de confianza al 95%, fueron mayores a .50 en todos los casos.

Palabras clave: Criterio de jueces; Habilidades protomentalistas; Interacción con personas; Interacción con objetos; Validez de contenido.

Introduction

Mentalistic abilities are developed during childhood and are also known as *Theory of Mind.* These skills enable understanding that people do not share the same thoughts and feelings, that everyone has their own way of thinking. For Peterson, Wellman, and Slaughter (2012) the theory of mind or mentalistic abilities involves "explicit understanding of how human behavior is governed by the mental states of belief, intention, memory, and desire" (p. 469). These abilities allow us to "tune in" to other people's perspectives (Sussman, 2006), thus developing empathy.

The empathic ability is the tendency to be psychologically in tune with the feelings and perspectives of others, and it facilitates bonding efficiently (Decety & Lamm, 2006). Davis (1994) recognizes that empathic sensitivities are multidimensional in nature; they are shaped by various emotional dimensions such as feelings of concern and compassion for others, and also by cognitive dimensions or mentalist abilities such as the ability to imagine different points of view beyond your own.

A study made by Chopik, O'Brien and Konrath (2017) explored cultural variation in empathy and how this variation was related to psychological characteristics and pro-social behavior in every culture. According to data analyzed from 104,365 adults in 63 different countries, Ecuador was the country with the most empathetic people in the world, followed by Saudi Arabia and Peru. However, according to data from the National Institute of Statistics and Informatics (INEI) in 2018, Peru has paradoxically one of the highest rates of violence; 85.3% of Peruvians over the age of 15 feel unsafe, and 22.2% have suffered threatening and intimidating behaviors. Concurrently, there are also high rates of ethnic discrimination and gender violence. The aforementioned behaviors contradict the results given before, as they do not actually show that Peru is one of the most empathetic countries on the planet.

Empathy is learned from the first years of life; therefore, it is important to stimulate it from an early age. These skills do not emerge overnight, though, they start developing within a predictable and sequential pattern of neuro-typical development during childhood. Berk (2004) refers to milestones of emotional development in the child, which allow understanding that the first two years are full of psychosocial interactions, all resulting from genes, maturation, culture and the caregivers, all providing a wide range of emotions.

Research indicates that the development of mental skills is acquired between the ages of four and five (Berk, 2004). However, there are precursor mentalist skills or proto-mentalist skills that are necessary for the development of theory of mind or mentalistic abilities and these arise in early childhood. Babies find other people fascinating early in life, and even before they can speak, they can interact and communicate with them. Such interest and interaction depend on early forms of social cognition (Moore, 2010). Nevertheless, Astington and Edward (2010) alert about the existence of problems in interpreting how and when infants develop social cognition. Some researchers claim that babies are even aware of other people's desires and thoughts, while others think that this understanding does not develop until the preschool years. For Astington and Edward (2010), this contradiction can be resolved by taking an evolutionary view of the theory of mind, that is, intuitive consciousness becomes more reflective and explicit during early development; furthermore, the development of children's language skills plays an important role in this transition.

Protomental abilities

For Sáiz, Carbonero and Román (2012) *protomentalist skills* are those precursors to mental activities or theory of mind, an essential aspect for the development of empathy, activated before the age of three. During early childhood, children learn protomental skills for their interaction with people through social mediation, and through instrumental mediation for their interaction with objects; the latter type of interaction marks the development of mental representation.

For Riviére (2000) during the process of social interaction, babies learn to differentiate between objects and people. They progressively discover that people speak, move, have a face and interact and, above all, that they have the mind and ability to relate to other minds. This set of characteristics differentiates people from objects. Therefore, human mental capacity could be defined as the competence to attribute mind to others; besides, beliefs and desires, as mental entities, allow predicting and understanding their behavior (Moore, 2010).

Dimensions of protomentalist skills

De Villiers and Westby & Robinson (2014), state that there are precursor abilities or protomentalist skills that need to be developed for the mentalistic abilities or the theory of mind to exist, and these arise during childhood, before age 4. The protomentalist dimensions are divided into skills of interaction with people and skills of interaction with objects. Sáiz et al., (2012) made a proposal:

- *Interaction skills with people*. They are capacities that are produced by social mediation, conformed by triangular relations, inter-subjectivity, symbolism and social reference.

- *Triangular relations.* They assess the child's ability to engage in relationships with others about things. Communicative relationships are triangular in the sense that they include three components they deal with: "I," "you," and "the object". Triangular relationships comprise the following skills: eye contact, attention, guidelines for joint attention, use of the proto-imperative and the proto-declarative.

- *Intersubjectivity*: It evaluates different ways in which contact is established with the subjectivity of the other. It has to do with three aspects: (a) first, with the sense of interpersonal communion between subjects who adjust both their emotional states and the respective expressions to each other, (b) secondly, with that which defines joint attention to reference objects in a shared domain of linguistic or extra-linguistic conversation, and (c) finally with the ability to infer the intentions, beliefs, and feelings of others. It encompasses simulation or the ability to "read" the mental states and processes of others (referring to the concept of empathy).

- *Symbolism*: The symbolic function consists of being able to represent something (any "meaning": object, event, conceptual scheme, etc.) by means of a differentiated "signifier" that only applies to what is valid for that representation ". Symbolism comprises symbolic play and imitation.

- *Social reference*: These are forms of non-verbal communication that involve seeking out discriminatory stimuli provided by others over contingencies in an ambiguous context, to respond in a way that produces reinforcement. These skills are: Manifestation, identification and recognition of emotions. This type of learning is manifested in a class of triadic exchanges called acts of social reference. These are forms of non-verbal communication that involve seeking out discriminatory stimuli provided by others over contingencies in an ambiguous context to respond in a way that produces reinforcement. These skills are: manifestation, identification and recognition of emotions. This type of learning is manifested in a class of triadic exchanges called acts of social reference.

- *Interaction skills with objects.* It evaluates the capacity that arises thanks to instrumental mediation, that make the development of mental representation possible. They are made up by the permanence of the object, the practical intelligence and the resolution of problems with objects as well as the relationship of objects (causality and logic).

- *Permanence of the object*: It implies the cognitive existence of the object in the mind of the subject, independently of its real presence and of the actions taken on it "here and now". That is to say, the subject understands that the object exists independently of its physical presence and of the actions that could be taken on it.

- *Practical intelligence and problem solving with objects*: The development of practical intelligence implies, besides the acquisition of the notion of the object, the capacity of the subject to solve problems without the continuous use of trial-error strategies and from the beginning of hypothetical-deductive learning.

- *Relationship with objects:* The ability to relate to objects looking for causes and logic. It comprises two types of relationship. Causality relationships: which is the subject's ability to solve problems using objects or tools along with their representation; this will facilitate the creation of relationships among actions, objects and goals. The other type of relationship is the logical relations, referred to the hierarchical system that allows the organization of the

world into categories and establishing between them inter-conceptual relations. Language is important for its development in infants.

Development of protomentalist skills.

Babies begin life with interest and preference for social stimulation. Thus, human voices and faces are the most effective ways of capturing their attention (Rochat, 2001).

According to Moore (2010) from two to three months, babies are able to participate in simple social interactions with others through which they can coordinate their gestures, vocalizations, and facial expressions. Social stimulation comes to make a reliable pattern that plays an important role in this development. However, other changes that are due more to maturity such as brain organization, cognition and its complexity, also seem to be important.

From 4 to 6 months of age, babies begin to participate in joint or shared activities with objects such as their toys. They may participate in simple turn-taking games with others; they may also be able to draw other people's attention; they may develop emotions toward objects based on the emotions that others express; they may learn new ways of relating to objects by directly imitating others. This type of behavior indicates that babies become increasingly sensitive and understanding of the psychological states of others, although at first this understanding manifests itself only in situations where babies can share such psychological states with others (Moll &Tomasello, 2007).

Along the 6 months of age, babies see simple actions, but with directed objectives such as reaching for an object, and then they start to perform more and more complex and sequential actions. At this age, babies can also differentiate between accidental and intentional actions. They can recognize as well that only animate beings (and not inanimate objects) have goals and intentions. Another important aspect of social cognition is to recognize the meaning of perceptual acts and emotional expressions (Sommerville, 2010).

From 9 to 12 months of age, according to Sommerville (2010) babies seem to understand simple perceptual experiences and recognize the value of different emotional expressions. For example, babies recognize that adults have a perceptual experience, if they look at a toy with open eyes, but they won´t have this experience if they look at the toy with closed eyes (Brooks & Meltzoff, 2005). Babies also develop social reference because they can use the emotional expression of an experimenter or their parents to decide whether or not to approach a new toy (Baldwin & Moses, 2001) or participate in a new activity (Adolph, Tamis, Ishak, Karasik& Lobo, 2008). The ability to know how personal characteristics influence behavior is also a critical aspect of social cognition.

Between 12 and 15 months, babies begin to understand simple dispositions and preferences. For example, babies this age expect a character to maintain a previous behavior or keep doing the same activity when placed in a novel situation. In addition, babies understand that people have personal preferences and dispositions, i.e. they understand that different people may like different things (Kuhlmeier, Wynn &Blomm; Song, Baillargeon& Fisher, cited by Sommerville, 2010).

During the first 18 to 24 months, babies are able to recognize that others may experience psychological states different from their own; for example, they may understand that someone cannot see something that they can see or that someone may feel something that they do not feel. At the same time, babies show clear evidence of self-awareness, such as recognizing their image in a mirror. This development leads to profound changes in social relationships, social behavior and cooperative behavior with others, as these behaviors become more effective (Warneken & Tomasello, 2009). At the same time, babies become more autonomous, able and willing to express

and exercise their independence. These findings reveal that the development of social cognition in childhood is progressive and it even develops before language is established (Herol & Akhtar, 2008). In other words, babies begin to show empathic and pro-social behavíor towards others, even though they are not yet able to use language to interact with others or express their understanding. Therefore, Moore (2010) suggests that it is important to explore the development of infant social cognition in order to explain what babies understand about themselves and others without relying on language.

Sommerville (2010) points out that at the end of the second year of life, babies are experts at understanding other people's intentions, basic goals, perceptions and emotional expressions, as well as simple preferences and dispositions. These socio-cognitive skills are the building blocks for more mature aspects of social cognition, such as the theory of mind (Astington & Dack, 2008; Miller, 2010). In addition, early socio-cognitive abilities contribute to learning in a variety of domains, such as language learning, imitative learning, causal learning, and representational understanding. Three-year-olds know that different people may want, like, and feel different things.

Between ages of 4 and 5, children actually begin to think about the thoughts and feelings of others, and that is when the true theory of mind emerges (Peterson et al., 2012; Sussman, 2006; Wellman & Liu, 2004). Children's mental theory continues to develop after the age of five. Over the next few years, they will learn to predict what one person thinks or feels about what another person is thinking or feeling. Thus, children begin to understand complex language such as lies, sarcasm, and figurative language based on the theory of mind (Wellman & Liu, 2004).

According to Astington and Edward (2010), mentalist abilities or theory of mind are gradually developed, with intuitive social skills appearing in infancy and then reflective social cognition is developed during the preschool and early elementary school years. Some experts state that the development of the theory of mind continues throughout life, as one has more opportunities to experiment with people and their behavior (from Villiers & de Villiers, 2014; Miller, 2012).

Social and internal factors that develop mentalist abilities.

For Astington and Edward (2010) there are some factors in the social and internal environment that influence the typical development of the theory of mind:

- If mothers talk about their thoughts, desires and feelings, and provide reasons for correcting missbehavior, they will make their children more aware of mental states.
- Having brothers and/or sisters stimulates awareness of mental states.
- Participating in role-play or simulations stimulates the development of the theory of mind.
- Having experiences reading story books.
- Talking to others about past experiences.
- Within the child's internal factors that that have an influence on the development of mental skills, there are the language skills, and cognitive skills that control and regulate behavior (known as executive functions)

Functionality of protomentalist skills

From early childhood, children learn the proto-skills they will need in order to develop their own mentalistic abilities later on. Westby and Robinson (2014) and De Villiers and de Villiers (2014) suggest that proto abilities enable infants to:

- pay attention to people and imitate them.
- recognize emotions in other people and use words to express them ("angry", "happy", "sad").
- pretend to be someone else when they play (e.g. as a salesperson, a doctor, or a teacher)
- understand the causes and consequences of emotions (*"if I throw my toy, Mom will get upset"*).
- understand that they are different from other people and that they have different likes/dislikes from others.
- learn that people act according to what they want.

Research shows that the development of the theory of mind has consequences for social functioning and school success for children; teachers rate them as more socially competent. Children with a more developed theory of mind are better communicators and can resolve conflicts with friends more efficiently; their simulated play is more complex; they impress with being happier in school and more popular with peers; and their schoolwork is more advanced in some respects. However, a well-developed theory of mind can also be used in an antisocial way, such as making fun, bullying, and lying (Astington& Edward, 2010).

Problems in the development of mentalist skills.

Kimbi (2014) and Lowry (2016) indicate that poor development of mentalist skills leads infants to have difficulties in their social interaction and adaptation, for example, there are many skills that are difficult for them to perform, such as:

- participating in symbolic play where they personify and play "as if".
- having a socially acceptable conversation.
- understanding why people say and do what they do.
- telling a story spontaneously, without juxtapositions.
- understanding the views of characters in storybooks.
- making friends at school or in their communities.

Importance of the evaluation of protomentalist skills.

Westby and Robinson (2014) state that currently the existence of standardized tools available to evaluate the dimensions of mentalist skills or theory of mind separately are scarce; this situation is extrapolated with greater reason to the evaluation of protomentalist skills that are even less studied from a more psychometric approach. Thus, in view of this problem, they suggest that in order to evaluate the mentalist or protomentalist abilities the course of the evolutionary pattern that these abilities follow must be observed in order to understand them, and in this way be able to initiate the knowledge of their state of development in infants.

Sommerville (2010) points out that, in order to assess early social cognition, researchers must rely on novel and innovative nonverbal methods, because babies cannot perform language-based tasks due to their poor development. Methods for assessment are given in natural or experimental contexts, where they are used to assess babies' social behavior. It is this way that visual responses to simple social events have provided a great deal of information regarding early social cognition. However, as the findings of these methods are often open to multiple interpretations, convergent methods are still needed to obtain an accurate and carefully controlled image of social cognition in childhood, and thus significantly reduce the number of possible alternative interpretations of research results.

Research Objective

The objective of the present research was to build an instrument that would suit the theoretical model on the existence of skills prior to the mentalization or theory of mind, and that it fit the abilities of the protomentalist skills construct, identified and recognized in previous studies. In turn, the authors set out to collect evidence of validity based on the content of the test, and from the analysis concerning the assessment given by a group of expert judges of the pilot version of the scale for the evaluation of the development of Protomentalist Skills (PROTO - HM) in children under 3 years of age from Lima, Peru, by making use of the Aiken coefficient V (Aiken, 1985; Merino & Livia, 2009).

Method

Participants.

The PROTO - HM scale was sent to a group of judges who assessed the content of the items in the psychometric instrument. The expert judges were selected according to their area of specialization, a vast knowledge in early childhood development, and psycho-educational experience in early intervention. They fulfilled the role of judges by evaluating the clarity, relevance and coherence of the 80 items that were originally designed. To this end, there participated 12 judges residing in the United States (1), Chile (1) and Peru (10). Eight experts are dedicated to teaching and research, having publications in scientific journals on child development, and the other four judges are professionals dedicated to the psycho-educational intervention on infants with and without neuro-typical development.

Instrument

Using as a reference the instruments for the detection of mentalist abilities in early childhood designed by Sáiz and Guijo (2011) and the social dimension of the I.D.E.A. inventory of Riviére and Martos (1997), an instrument adapted to the reality of infants under the age of 3 in our context was also elaborated. The scale was designed as a product of the previous operationalization of the variables *protomentalist abilities of interaction with objects* and *social interaction*, out of which diverse indicators were obtained that made their observation and measurement feasible.

Protomentalist skills are precursors of the mentalist activitieswhich are developed before the age of four and are mechanisms that help the human baby to access the shared mental space. The skills of interaction with people are capabilities that are produced through social mediation and are shaped by triangular relationships, intersubjectivity, symbolism and social reference. On the other hand, the abilities of interaction with objects are capacities that arise thanks to instrumental mediation, and enable the development of mental representation. Besides, they are shaped by the permanence of the object, the relationship between objects (causality and logic), the practical intelligence and the resolution of problems with objects. These variables were measured from a final selection of those that were considered convenient for each of the dimensions mentioned before.

Subsequently, an instrumental or operationalization matrix of variables was constructed to decompose the study variables into dimensions and indicators and to obtain the possibilities of items elaboration in relation to the dimensions of the protomentalist skills. A pilot version of the instrument was then developed. This scale contained questions for parents, behavioral observations of infants as well as tasks to be performed by children. Likewise, an attempt was made to provide a tool with friendly and more attractive evaluation material, which would permit the collection of information in a valid and interactive way, congruent with the cognitive capacities, chronological age and social development of the infants.

The original version presented 80 components designed in proportion to the dimensions that were evaluated. The dimension *interaction skills with people* was made up by 61 items and the dimension *interaction skills with objects* by 19 items. Likewise, the test has items that present three forms of application that could be given jointly or separately: Observation (O), Structured Task (ST) applied to the infant and Informational Interview (I) of the parents or guardian of the child. These responses were categorized into general scores of 2 points if the skill was always performed (A), 1 point if it was sometimes performed (S) and finally 0 points if it was not performed (N). It is important to mention that each item has a qualitative and specific way of scoring, but all are based on the quantitative categories mentioned. The application is personal and takes approximately 30 minutes.

Procedure

An instrumental research design was used (Ato, López & Benavente, 2013). To achieve the content analysis of the scale, the evaluation of expert judges or informed opinion of people with authority was requested (Escobar-Pérez & Cuervo-Martínez, 2008) to evaluate the degree of clarity, representation and relevance of the domain to be measured. Each judge received a copy of the original instrument with 80 items and the evaluation protocol, which included the objective of study, the instructions, with their respective qualification standards, and the anonymity agreement.

The voluntary nature of the judges' participation was taken into consideration. Initially, a list of 15 professionals with expertise in child development and early intervention was drawn up with a view to inviting them as expert judges. The invitation was sent through personal and/or institutional emails, due to the variety of places where the judges lived and the short time for personal contact. The judges' places of residence were the United States, Chile and Peru. Finally, 12 experts agreed to participate in the study; two guests declined to participate for reasons of time and one professional did not respond to the request. The presentation of the scale and the instructions to the judges/experts were as follows:

"You have been chosen as an expert to express your opinion on the content of the 80 items of this scale. Your experience is very valuable to formulate a consensual opinion on the quality of the items in this instrument construction process. Let us assure you that your participation will be kept confidential, and that it is voluntary. This test is designed to assess the mature development of the child's proto or pre-mentalist skills during the first three years of life. These prior skills help the infant to interact with people and for their social adaptation. Participants will be infants from 1 to 47 months of age, as well as their caregivers, especially their mothers."

Out of 80 items, 61 of them correspond to 4 different dimensions of protomentalist skills of interaction with people: 1) Triangular Relationships, 2) Intersubjectivity, 3) Symbolization, and 4) Social Reference. Table 1 contains the original 61 items of the instrument

Table 1.

List of 61 items of the Protomentalist Skills Scale of interaction with people.

Dimension I: Triangular Relations
Eye contact
    1.Maintains spontaneous eye contact with people when exploring the environment
    2. Maintains eye contact when requested to "l*ook at me·* or when called by his/her name.

Attention

3. Maintains sustained attention while listening to an adult suggesting play or an activity.

4. Maintains attention when executing a task or play suggested by an adult.
5. Maintains sustained attention when executing a task or play spontaneously.

Guidelines for joint attention

6. Takes part in social play such as "*Here comes the Boogyman*".
7. It is observed that he/she joins the adult in his or her emotional state
8. It is observed that he/she joins infants of his/her own age or group in their emotional state
9. Follows the guidelines of shared attention.

Use of the imperative proto

10. Intentionally incorporates an adult as an agent or instrument to achieve some end, specifically a desired object.

Use of the declarative proto

11. Makes pre-verbal efforts to draw the adult's attention to an event or object, by using an object to capture the adult's attention.

Dimension II: Intersubjectivity
Primary intersubjectivity

12. Imitates the already known actions done by a model.

13. Makes proto-conversations, that is, exchanges sounds with an adult with the intention of communicating during their daily life activities.
14. Interactively synchronizes behaviors, making movements linked to human voice.
15. Face-to-face relationships: shows different facial expressions.

Secondary ntersubjectivity
Practical activities

16. Points at the object he/she is interested in
17. Shows things of interest to the people around.
18. Gives things that are asked of him.

19. Offers things to other people.
20. Reaches out to get something he /she is interested in

Interpersonal

21. Smiles when facing funny or novel situations.
22. Articulates sounds or words to communicate.
23. Looks at people's faces when communicating.
24. Seeks the adult to communicate what happens to an object, person or situation, in the present moment.
25. Looks for the adult to communicate something about an object, person or situation that is NOT present, but is still in the memory or represented in the mind of the child.

Dimension III: Symbolic

Imitation

26. Imitates the sounds or words that hears from other people.

27. Imitates physical actions observed in other people.

Symbolic play

28. Plays at representing in a fictitious way ("as if") daily actions making use of his/her body.
29. Plays by distributing roles ("as if") to dolls or people, who wait for or receive the action recommended by the child.
30. Plays using the real objects and in natural size or these represented as toys.
31. Replaces a real and familiar object by an indefinite one simulating daily actions while playing.
32. Play is just short activities which are simple and isolated (not sequenced) for only two or more objects of agents are used.
33. Plays with objects or dolls and makes them represent activities or actions of daily life.
34. Actively involves dolls while playing in the situations represented, as if they were alive.
35. Performs actions with dolls as leading characters when playing, while making verbalization as if it were the doll talking

36. Uses real objects with a defined function and replaces the function for which they were created by simulating daily actions.
37. His/her play represents true sequences, more than two short activities in which two or more symbolic actions are included. It is observed that the sequence progresses without any previous planning
38. Looks for the toys or objects that will be needed to play, takes them to a certain place, and accommodates them before starting to perform the ludic action.

Dimension IV: Social reference skills

Response to the manifestation of emotions of other people.

39. When an adult shows him/her joy, he/she responds with the same emotion.
40. When an adult shows him/her sadness, he/she responds with the same emotion.
41. When an adult shows him/her anger, he/she responds with the same emotion.
42. When an adult shows him/her surprise, he/she responds with the same emotion.
43. When a child shows him/her joy, he/she responds with the same emotion.
44. When a child shows him/her sadness, he/she responds with the same emotion.
45. When a child shows him/her anger, he/she respond with the same emotion.
46. When a child shows him/her surprise, he/she responds with the same emotion.

Manifestation of emotions in front of people

47. Smiles at a known adult when approaching him or her.
48. Smiles at an unknown adult when approaching him or her.
49. When around with unfamiliar adults, manifests fright and/or mistrust.
50. Performs actions or tasks when asked to by an adult he or she knows.
51. Shakes his arms or waves some part of his body as a sign of joy when an adult shows something new (task, situation or object) to him/her

52. Shows sadness on his/ her face when a known adult leaves.

Identification of emotions

53. Differentiates an object from a person.
54. Identifies people who show joy.
55. Identifies people who show sadness.
56. Identify people who show anger.
57. Identify people who show surprise.
58. Identify his/her expressions of joy.
59. Identify his/her expressions of sadness.
60. Identifies his/her expressions of anger.
61. Identify his/her expressions of surprise.

"And the other 19 items correspond to 3 dimensions of protomentalist skills to interact with objects: 1) Permanence of the object, 2) Practical intelligence and problem solving with objects, and 3) Relationships with objects (causality and logic). As an expert, you should rate the items in a range of 1 (nothingness) to 5 (completely), in 3 aspects of analysis: Clarity, Relevance and Representativeness. Clarity designates whether the item is understandable, clear and comprehensible; Relevance refers to the relationship of the item with the study construct; and Representativeness refers to how the item is representative and important for the measurement of the protomentalist skills construct. Table 2 contains the original 19 items of the instrument.

Table 2.

List of the 19 items in the Protomentalist Skills Scale of interaction with objects.

Dimension I: Object permanence

1. Visually follows a moving object.
2. Looks closely at the point at which an object has disappeared, but still does not look for it when it disappears.
3. Searches for the partially hidden object.
4. Looks for the totally hidden object that has just disappeared.
5. Discovers the same object in the different places that are hidden. He/she is not yet able to take into account non-visible displacements.
6. Looks for the object in the places where they were hidden by means of invis displacements.

Dimension II: Practical intelligence and problem solving with objects
Medium-end strategies:
7. Coordinates grip and vision when picking up small objects.
8. Shows intention to reach objects out of reach, but does so at random, slowly and not systematically, and also without using supports or tools as a means to reach those objects.
9. Performs simple tasks through intentional actions, but not very coordinated and efficient; starts using supports or tools.
10. Solves simple tasks that allow him/her to obtain the object she or he wants through intentional and coordinated behaviors, using tools efficiently.

11. Solves tasks differentiating between the tools or means that have to be used to achieve something.
12. Uses anticipation strategies of at least 3 steps to achieve the goal, i.e. when he or she wants to get something, actions are taken to avoid or overcome the obstacles present in the situation.
13. Uses anticipation strategies regarding objects with correction of actions to avoid mistakes; self-monitors his or her behavior
14. Uses anticipation strategies regarding people, i.e. he or she associates the appearance and disappearance of familiar people with day to day events.
15. Initiates planning strategies ("creates an advanced representation of the action") solving problems by means of his/her capacity of analysis that leads him/her to use means in order to achieve his objective. These means start from the representation he/she makes in his/her mind and not only from direct action.

Dimensión III: Relationships between objects (causality and logic)
16. Performs any action that indicates that he/she wants something to be repeated "something interesting".
17. Performs coordinated and directed actions to keep repeating "something interesting" relating tool and act.
18. Performs coordinated actions autonomously as a consequence of a stimulus or a request.
19. Shows curiosity to find the source of the stimulus, trying to find who moves the object or produces a sound.

Data analysis

For Sánchez and Echeverry (2004) to obtain the psychometric validation of an instrument involves that it evidences basic characteristics required for it to be used in a specific population, in a way that ensures that the results of its measurements are ethical, accurate, exact and stable.

The evidence of validity based on the content of the protomentalist skill scales, considered one of the five sources of evidence of validity, was collected through the criteria of 12 qualified expert judges in child development issues (Skjong & Wentworht, 2001), who gave information, evidence, judgment, and evaluated the clarity, relevance and representativeness of the items with respect to the dimensions they measure. To obtain a quantitative index of each of these aspects, the Aiken coefficient V (Aiken, 1985) was used in order to evaluate the degree of agreement in the opinion of experts on the validity of the content of an instrument, the relevance of an item or the quality of wording. This coefficient varies between 0.00 and 1.00, where closer to the unit indicates an improvement in the quality of the item with respect to the aspect evaluated (clarity, relevance or representativeness); a V= .50 was established as a critical value. Likewise, confidence intervals were calculated (Penfield & Giacobbi, 2004), at a level of 95%, where those cases whose lower limit was higher than .50 were considered acceptable. The program developed by Merino and Livia (2009) was used to calculate the Aiken V and the confidence intervals for the V coefficient.

Results

The following are the results of the quantitative analysis of the judges' assessments concerning the content of the items on their clarity, relevance and representativeness, based on the Aiken V coefficient of the PROTO - HM scale for each dimension.

       In relation to the items of the scale PROTO - HM of interaction with people (table 3), all of them presented values higher than .80 in the three aspects considered in the evaluation of the items content This indicates that the content adjusts to the dimensions to which they belong, and in general, to the construct they measure. These results provide evidence of content to the inferences that can be made from the scores obtained in this scale. Complementarily, the lower limits of the confidence interval were greater than .50 in all cases, indicative of a good functioning of the items.

Table 3.

Confidence intervals in the V coefficient (95%) of the PROTO HM scale of interaction with people.

Ítem	Clarity			Relevance			Representativeness		
	V	95% IC		V	95% IC		V	95% IC	
		LI	LS		LI	LS		LI	LS
Dimension I: Triangular Relations									
Eye contact									
Item _1	.967	.885	.991	1.00	.940	1.00	1.00	.940	1.00
Item _2	.933	.842	.974	1.00	.940	1.00	1.00	.940	1.00
Attention									
Ítem_3	.867	.758	.930	1.00	.940	1.00	1.00	.940	1.00
Ítem_4	.800	.682	.882	.933	.842	.974	.933	.842	.974
Ítem_5	.867	.758	.930	.933	.842	.974	.967	.885	.991
Guidelines for joint attention									
Ítem_6	.900	.799	.953	1.00	.940	1.00	1.00	.940	1.00
Item _7	.900	.799	.953	.967	.885	.991	.967	.885	.991
Item _8	.933	.842	.974	.933	.842	.974	.967	.885	.991
Item _9	.933	.842	.974	.900	.799	.953	.900	.799	.953
Use of the imperative proto									
Item _10	.933	.842	.974	.967	.885	.991	.967	.885	.991
Use of the declarative proto									
Item _11	.933	.842	.974	.967	.885	.991	1.00	.940	1.00
Dimensión II: Intersubjectivity									
Primary intersubjectivity									
Item _12	.833	.720	.907	.900	.799	.953	.900	.799	.953
Item _13	.967	.885	.991	1.00	.940	1.00	1.00	.940	1.00
Item _14	.900	.799	.953	.933	.842	.974	.933	.842	.974
Item _15	.833	.720	.907	.967	.885	.991	.967	.885	.991
Secondary intersubjectivity									
Item _16	.967	.885	.991	1.00	.940	1.00	1.00	.940	1.00
Item _17	.933	.842	.974	1.00	.940	1.00	1.00	.940	1.00
Item _18	.933	.842	.974	1.00	.940	1.00	1.00	.940	1.00
Item _19	.967	.885	.991	1.00	.940	1.00	1.00	.940	1.00
Item _20	.933	.842	.974	.967	.885	.991	.967	.885	.991
Item _21	.967	.885	.991	.967	.885	.991	.967	.885	.991
Ítem_22	.967	.885	.991	.967	.885	.991	.967	.885	.991
Item _23	.967	.885	.991	.967	.885	.991	.967	.885	.991
Item _24	.933	.842	.974	1.00	.940	1.00	1.00	.940	1.00
Item _25	.967	.885	.991	.933	.842	.974	.933	.842	.974
Dimension III: Symbolic									
Imitation									
Item _26	.967	.885	.991	1.00	.940	1.00	1.00	.940	1.00
Item _27	.967	.885	.991	1.00	.940	1.00	1.00	.940	1.00
Symbolic play									
Item _28	.967	.885	.991	1.00	.940	1.00	1.00	.940	1.00

Item _29	.933	.842	.974	.933	.842	.974	.933	.842	.974
Item _30	.933	.842	.974	.933	.842	.974	.933	.842	.974
Item _31	.933	.842	.974	.933	.842	.974	.933	.842	.974
Item _32	.900	.799	.953	.933	.842	.974	.933	.842	.974
Item _33	.967	.885	.991	.933	.842	.974	.933	.842	.974
Item _34	.900	.799	.953	.933	.842	.974	.933	.842	.974
Item _35	.933	.842	.974	.933	.842	.974	.933	.842	.974
Item _36	.800	.682	.882	.933	.842	.974	.933	.842	.974
Item _37	.867	.758	.930	.933	.842	.974	.933	.842	.974
Item _38	.933	.842	.974	.867	.758	.930	.867	.758	.930
Dimension IV: Social reference skills									
Expression of emotions									
Item _39	.933	.842	.974	.933	.842	.974	.967	.885	.991
Item _40	.933	.842	.974	.933	.842	.974	.933	.842	.974
Item _41	.933	.842	.974	.933	.842	.974	.933	.842	.974
Item _42	.933	.842	.974	.933	.842	.974	.933	.842	.974
Item _43	.933	.842	.974	.933	.842	.974	.933	.842	.974
Item _44	.933	.842	.974	.933	.842	.974	.933	.842	.974
Item _45	.933	.842	.974	.933	.842	.974	.933	.842	.974
Item _46	.933	.842	.974	.933	.842	.974	.933	.842	.974
Manifestation of emotions									
Item _47	.967	.885	.991	.967	.885	.991	.967	.885	.991
Item _48	.967	.885	.991	.967	.885	.991	.967	.885	.991
Item _49	.967	.885	.991	.967	.885	.991	.967	.885	.991
Item _50	.833	.720	.907	.900	.799	.953	.900	.799	.953
Item _51	.967	.885	.991	.967	.885	.991	.967	.885	.991
Item _52	.967	.885	.991	.967	.885	.991	.967	.885	.991
Item _53	.900	.799	.953	.833	.720	.907	.833	.720	.907
Recognition of emotions									
Item _54	.900	.799	.953	.967	.885	.991	.967	.885	.991
Item _55	.900	.799	.953	.967	.885	.991	.967	.885	.991
Item _56	.900	.799	.953	.967	.885	.991	.967	.885	.991
Item _57	.900	.799	.953	.967	.885	.991	.967	.885	.991
Item _58	.900	.799	.953	.967	.885	.991	.967	.885	.991
Item _59	.900	.799	.953	.967	.885	.991	.967	.885	.991
Item _60	.900	.799	.953	.967	.885	.991	.967	.885	.991
Item _61	.900	.799	.953	.967	.885	.991	.967	.885	.991

Note. V = Aiken V Coefficient; IC = Confidence Interval; LI = Lower Limit; LS = Upper Limit

In relation to the dimensions and subdimensions of the PROTO - HM scale of interaction with people (table 4), these obtained Aiken V coefficients above .90, with the exception of the Attention and Primary Intersubjectivity subdimensions, both in respect to the clarity of their items. Notwithstanding, these values were higher than .80, being considered an adequate level. The best indices were obtained in the relevance and representativeness of the dimensions with respect to the construct they measure. Therefore, at the level of the variables that compose the scale of interaction with people, they have adequate levels of validity evidence based on the content of the items that compose them.

Table 4.

Average Aiken V coefficients for the variables of the PROTO HM Scale of Interaction with People.

Variable	Clarity	Relevance	Representativeness
Dimension I: Triangular Relations	.906	.964	.973
Eye contact	.950	1.00	1.00
Attention	.845	.955	.967
Guidelines for joint attention	.917	.950	.959
Use of the imperative proto	.933	.967	.967
Use of the declarative proto	.933	.967	1.00
Dimension II: Intersubjectivity	.933	.972	.972
Primary intersubjectivity	.883	.950	.950
Secondary intersubjectivity	.953	.980	.980
Dimension III: Symbolic	.923	.943	.943
Imitation	.967	1.00	1.00
Symbolic `play	.915	.933	.933
Dimension IV: Social reference	.923	.946	.948
skills	.993	.933	.937
Expression of emotions			
Manifestation of emotions	.938	.938	.938
Recognition of emotions	.900	.967	.967

     The items of the scale PROTO - HM of interaction with the objects (table 5), presented Aiken V coefficients above .80 in clarity, relevance and representativeness, considering this to be an adequate level. Only item 13 of the sub-dimension Strategies of anticipation and planning presented problems regarding its clarity, as it obtained a coefficient V = .733; however, it is still within the permissible limits (higher than .70). It was therefore considered to maintain it in the previous scale modification to improve its writing and comprehension. Additionally, the lower limits of the confidence interval of the Aiken V coefficients were higher than .50 in all items, which indicated a good performance of the items.

Table 5.

Confidence intervals in the coefficient V (95%) of the PROTO HM Scale of Interaction with objects.

	Clarity			Relevance			Representativeness		
		95% IC			95% IC			95% IC	
	V	LI	LS	V	LI	LS	V	LI	LS
Dimension I: Permanence of the object									
Item _1	.933	.842	.974	1.00	.940	1.00	1.00	.940	1.00
Item _2	.917	.818	.963	.983	.913	.997	1.00	.940	1.00
Item _3	.950	.863	.983	.967	.885	.991	1.00	.940	1.00
Item _4	.950	.863	.983	.983	.913	.997	1.00	.940	1.00
Item _5	.933	.842	.974	.983	.913	.997	1.00	.940	1.00
Item _6	.933	.842	.974	.983	.913	.997	1.00	.940	1.00
Dimension II: Practical Intelligence									
Medium-end strategies									
Item _7	.833	.720	.907	.900	.799	.953	.900	.799	.953
Item _8	.900	.799	.953	.933	.842	.974	.933	.842	.974
Item _9	.900	.799	.953	.967	.885	.991	.967	.885	.991
Item _10	.933	.842	.974	.967	.885	.991	1.00	.940	1.00
Item _11	.933	.842	.974	1.00	.940	1.00	1.00	.940	1.00

Anticipation and planning strategies

Item _12	.933	.842	.974	.967	.885	.991	1.00	.940	1.00
Item _13	**.733**	.611	.829	.900	.799	.953	.900	.799	.953
Item _14	.867	.758	.930	.933	.842	.974	.933	.842	.974
Item _15	.933	.842	.974	.933	.842	.974	.933	.842	.974
Dimension III: Relationships among objects									
Item_16	.920	.824	.966	.960	.877	.988	.960	.877	.988
Item _17	.880	.774	.940	.960	.877	.988	.960	.877	.988
Item _18	.920	.824	.966	.960	.877	.988	.960	.877	.988
Item _19	.920	.824	.966	.960	.877	.988	.960	.877	.988

Note. V = Aiken V Coefficient; IC = Confidence Interval; LI = Lower Limit; LS = Upper Limit

Considering the dimensions and subdimensions of the PROTO - HM scale of interaction with objects (table 6), these have adequate Aiken V coefficients, in all cases greater than .80 in clarity, relevance and representativeness. The highest coefficients were obtained for the last two aspects, in all cases higher than .90. These results permit to conclude that the dimensions under consideration have evidence of validity based on the content of the items that compose them.

Tabla 6.
Average Aiken V coefficients for the variables of the PROTO HM scale of interaction with objects.

Variable	Clarity	Relevance	Representativeness
Dimension I: Permanence of the object	.936	.983	1.000
Dimension II: Practical Intelligence	.885	.944	.952
Medium-end strategies	.900	.953	.960
Anticipation and planning strategies	.867	.933	.942
Dimension III: Relationships among objects	.910	.960	.960

Discussion

Considering the importance of being able to measure the development of protomentalist skills, precursors of the theory of mind, which is the cognitive basis of empathy (Riviére, 2000; Sáiz, Carbonero&Román, 2012), the Scale for the Evaluation of the Development of Protomentalist Skills (PROTO - HM) was built and evidence of the validity of the content was obtained from identifying the scarcity and the problems to obtain instruments that could evaluate this construct in early age infant populations. To date, no studies were found that reported evidence of the existence of instruments for the evaluation of protomentalist skills at national level, coinciding with Westby and Robinson (2014) who state that currently the existence of standardized tools available to evaluate the dimensions of protomentalist skills are scarce and even less studied from a more psychometric approach.

The Protomentalist Skills Development Scale (PROTO - HM), in its original version, provides quite significant evidence of content validity, both in the skills of interaction with people and in skills of interaction with objects, which allows to confirm that the content of the items fits the dimensions to which they belong and to the construct they measure. At the same time, it evidences a good operation of items due to the fact that the lower limits of the 95% confidence interval were greater than .50 in all cases (Penfield &Giacobbi, 2004). It is appropriate to point out that psychometric validation of an instrument involves this evidence showing basic characteristics that are required for it to be used in a specific population in order to ensure that the results of its measurements are ethical, precise, exact and stable (Sánchez &Echeverry, 2004).

On the other hand, it is worth mentioning that the criterion of clarity of the sub-dimensions of Attention and Primary Intersubjectivity and of item 13 of the sub-dimension Strategies of anticipation and planning were observed for their restructuring; however, these values were higher than .70 which is in the acceptable limit (Aiken, 1985). Based on this experts' opinion, some adaptations were made to improve the degree of clarity of some items, permitting a better understanding of the demand for the items by the evaluators and, in turn, the authors proceeded to contextualize and adapt the scale to the reality in which this study was conducted, and to the age group to which it is directed.

This reflects the fact that the PROTO-HM scale is an instrument that has evidence of content **validity**, but still requires a more extensive examination of the psychometric properties of the instrument, which is a limitation for the time being. However, once the psychometric process is completed, this instrument is a candidate to be able to make population profiles, establish reference values for subsequent studies on child development, evaluate the effect of interventions in protomentalist skills to guide actions and public policy decisions on psychological health in early childhood, and to conduct research studies in other uses that present the correct assessment of this construct.

Conclusions

The psychometric analysis of validity demonstrates that the Scale for the Evaluation of the Development of Protomentalist Skills (PROTO - HM) is an instrument that fits the conceptual model on which the research is based (de Villiers & de Villiers, 2014; Riviére, 2000; Sáiz, Carbonero and Román, 2012; Westby & Robinson, 2014).

The items of the PROTO HM scale of interaction with people show clarity, relevance and representativeness due to the fact that all of them presented Aiken V values higher than .80, which allows confirming that the content of the items fits the dimensions to which they belong and the construct that they measure in turn evidences a good functioning of items because the lower limits of the 95% confidence interval were higher than .50 in all cases.

The dimensions and subdimensions of the Scale PROTO - HM of interaction with people obtained coefficients V of Aiken above .90, with the exception of the Attention and Primary Intersubjectivity subdimensions, both with respect to the clarity of their items; however, these values were higher than .80, considering an adequate level in relevance and representativeness with respect to the construct they measure.

The items of the PROTO HM scale of interaction with the objects, evidence an adequate level in clarity, relevance and representativeness because all of them presented Aiken coefficients V above .80; item 13 of the subdimension Anticipation strategies and planning was the only one that presented a coefficient V = .733, being within the allowed limits (higher than .70), which permits to confirm that the content of the items fits the dimensions to which they belong and to the construct they measure. At the same time, it evidences a good operation of items due to the fact that the lower limits of the 95% confidence interval were higher than .50 in all cases.

The dimensions and subdimensions of the PROTO - HM scale of interaction with objects obtained Aiken V coefficients higher than .80 in clarity, relevance and representativeness. In these last two aspects the highest coefficients were obtained, Aiken V higher than .90 in all cases.

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