Short Research Report

The Role of Language in the Relationship between Emotion Comprehension and Theory of Mind in Preschool Children

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Introduction

For several decades, there has been an interest in understanding how Emotion Comprehension (EC) and Theory of Mind (ToM) are related during the preschool years. In addition, the links between language and ToM (Astington & Baird, 2005; Schick, de Villiers, de Villiers, & Hoffmeister, 2007) and language and EC (Cutting & Dunn, 1999; Hughes, White, & Ensor, 2014; Pons, Lawson, Harris, & de Rosnay, 2003) have been studied.

Numerous studies have highlighted the important role played of language in ToM (Astington & Jenkins, 1999). For some authors, the specific properties of language are necessary for the development of ToM, and not only those related to age and neurological maturity (de Villiers & Pyers, 2002; Jackson, 2001; Remmel, Bettger, & Weinberg et al., 2001; Schick et al., 2007). Moreover, in recent years, evidence has been obtained about the relation between language and EC. Children with high scores in linguistic abilities show better EC (Cutting & Dunn, 1999; Pons et al., 2003; Ruffman, Slade, Rowlandson, Rumsey, & Garnham, 2003). Various studies show an important relation between EC and early conversations between adults and

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children. Thus, the frequency, style, and content of the discourse between parents and children, including emotional references and explanations, are positively related to EC in children (Beck, Kumschick, Eid, & Klann-Delius, 2012).

Although prior work shows the influence of language on ToM and EC, the relationships among these three variables have not been sufficiently studied until now and, as we will see, evidence is contradictory. All three skills seem to have close relations and develop considerably in the same age period. Certainly, the age of four seems to be an age especially relevant in these domains. A critical period in the development of ToM emerges around the age of four, when children begin to understand false beliefs (FB). Although FB is only a part of ToM, and children understand other mental states earlier in their development (Callaghan et al., 2005), FB has been considered a developmental milestone in ToM. Regarding EC, around the age of four, children handle the external dimension of emotions (i.e. identify facial expressions and understand the causes of emotions considering their own desires and those of others) (Harris, 2008). From a linguistic point of view, there is an important increase in the use ¶of emotional vocabulary and mental terms at about four years old (Widen, 2013).

Evidence about the relations among these skills has been inconsistent. Cutting and Dunn (1999) only found a close relation between language and FB, but not between EC and FB. On the other hand, Weimer, Sallquist and Bolnick (2012) found a weak relation between EC and FB in children between 4½ and 6½ years old. In a longitudinal study, Hughes and Dunn (1998) found correlations between ToM and EC and a relationship between both of these domains and the frequency of children's mental-state talk. In a similar study, O'Brien et al., (2011) only found a relationship between ToM and EC.

One of the main problems of these studies is the way they evaluate ToM and EC. Differences in the results obtained and their interpretations are inseparable from the definition and measurement problems related to both concepts. Very closely linked to this conceptual difficulty is the measurement of the constructs and the child's development process. Measurement instruments are elaborately based on the conception of the construct. When working with such complex constructs that include so many different elements, different relationships can be found, depending on the aspects the measure includes, as well as, the moment the measurement is performed. Therefore, the relationships found in different studies are linked to both the ways ToM and EC are conceptualized and measured by researchers and the time of administration. Most of the studies reduce ToM to FB tasks and EC to basic components, i.e. facial expression identification, linguistic labels, emotion situational knowledge or causality. Even though these two tasks are core dimensions of ToM and EC, both domains include many other components that are already present at the age of four.

The aim of this short research report is to test the relations among these three skills during a critical period of development, using a wide range of ToM, EC, and language components. To do so, we evaluated EC through six components of the TEC (Pons & Harris, 2000) and ToM through the seven tasks of the Wellman and Liu Theory of Mind Scale (2004). Language was evaluated by the PLON-R (Aguinaga-Ayerra, Armentia, Fraile, Olangua, & Uriz, 2005), a Spanish test of language development that includes four different dimensions.

Considering the thesis that emotions provide access to the mental world (Hobson, 1993; Trevarthen, 1986) and recent research that finds correlations between EC and ToM (Ornaghi, Pepe, & Grazzani, 2016; Seidenfeld, Johnson, Cavadel, & Izard, 2014), we predict a strong relation between these two variables. Based on evidence about the way EC and ToM develop when children have no access to language (i.e. deaf children) or linguistic alterations (i.e. Specific Language Impairment) (de Villiers, 2005; Nilsson & de López, 2016), we also expect high correlations between language and these two variables. From our point of view, children begin by unfolding a series of communicative skills within an emotional context. The external and expressive nature of emotions would facilitate their comprehension and use by the child from the first months of life. Thus, at first, the child manages the basics of EC thanks to the preverbal communicative context in which s/he is immersed with an adult. Later, and due to the progressive acquisition of language and its representational nature, the child will be able to begin to name and recognise different components of ToM. At that moment, language is established as a fundamental mediator variable between EC and ToM, and its absence could produce later ToM difficulties. Based on language, the child will gradually access different mentalist elements and develop ToM.

Method

Participants were 101 four-year-old preschoolers ($M = 51.60$ months; $SD = 3.57$; Range: 46-57 months, 50 girls and 51 boys), from a private school in the northern area of the Community of Madrid with a medium socio-economic level. All the children were of Spanish origin, except two Germans and one Ecuadorian. The children were evaluated in individual 30-minute sessions at school. Before data collection, the parents were informed of the study objective and procedure, and they signed an authorization for their child's voluntary participation.

Instruments

Language. The Revised Navarra Oral Language Test (PLON-R) for children from three to six years old was used (Aguinaga-Ayerra et al., 2005). The test evaluates four different dimensions of language: phonology, syntax-morphology, semantics, and pragmatics. Scores for four-year-old children range from 1 to 80. PLON-R has shown to be a reliable test (α=.81) (Aguinaga-Ayerra et al., 2005).

Theory of Mind. The Spanish translation of the Wellman and Liu scale (2004) was used. It consists of seven tasks arranged by order of difficulty: Diverse Desires, Diverse Beliefs, Knowledge Access, False Belief, Explicit False Belief, Belief-Emotion, and Real-Apparent-Emotion. Depending on the task, either a card with drawings or dolls that stage the situation are used to support the explanation. The child receives one point for each task correctly resolved, so that the minimum score is 0 and the maximum 7. The scale has shown a good index of reproducibility (.96) (Wellman & Liu, 2004) and acceptable test-retest index (α=.58).

Emotion comprehension. The Test of Emotion Comprehension (Pons & Harris, 2000) was used. This test was chosen because, as stated by Pons et al. (2003), it uses simple vocabulary in order to measure emotion comprehension. This reduces the effect of language ability on the understanding of emotions. Moreover, it has

previously been used in the Spanish population (Fernández-Sánchez, Quintanilla, & Giménez-Dasí, 2015). The TEC evaluates emotion comprehension in children from 3 to 11 years old. Based on the presentation of cartoon scenarios, the child has to identify how the protagonist feels in each cartoon. The TEC is divided into nine components: 1) identification of basic emotions, 2) understanding of the situational causes of emotions, 3) understanding that desires can cause emotions, 4) understanding the role of beliefs in emotions, 5) understanding the role of memories in emotions, 6) understanding that emotions can be hidden, 7) knowledge about emotion regulation strategies, 8) understanding mixed emotions, and 9) understanding the role of morality in emotions. Based on the presentation of cartoon scenarios, the child has to identify how the protagonist feels in each cartoon. For the purpose of the study and due to the participants' age, we only considered the first six components. TEC has shown a high test-retest correlation within a 13-month period (α = 0.68) (Pons & Harris, 2005).

Data analyses

First, descriptive statistics were computed for the instruments. Second, the potential mediating role of language in the relation between EC and ToM was examined using the PROCESS macro for SPSS (Hayes, 2013). The mediational analysis was carried out by performing a bootstrapping analysis that simulated 5000 samples. According to this procedure, an indirect effect is significant if its 95% confidence interval does not include the 0 value. Likewise, the Sobel test was also carried out to verify the significance of the possible indirect effect.
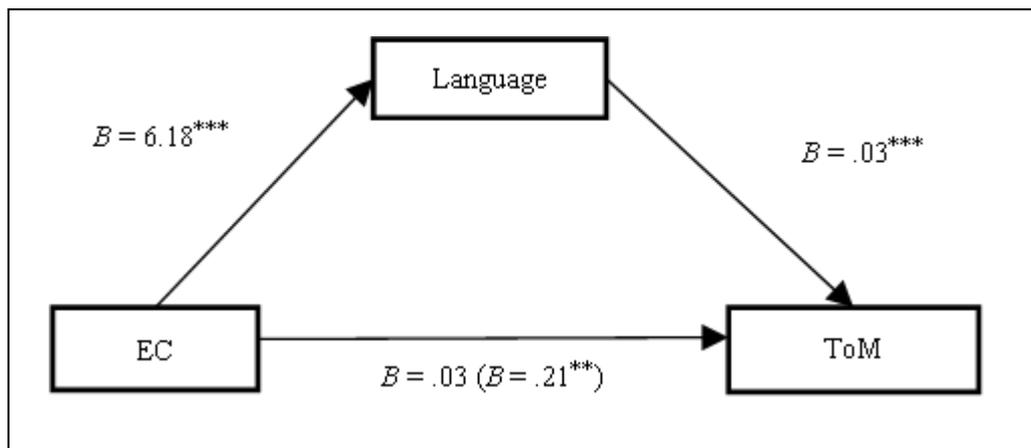
Results

The descriptive statistics for the variables used in the model are shown in Table I. The mean scores obtained on ToM, EC, and language are common values in children of this age. Both ToM and EC were positively correlated with language ($r(99)= .42\ p < .01$ and $r(99)=.33\ p < .01$, respectively). The correlation between ToM and EC was not significant. As Figure 1 shows, the mediation analysis revealed that the direct effect of EC on ToM was not statistically significant ($B = .03$, $p = 0.83$). However, the bootstrapping results revealed that the indirect effect was positive and significant ($B = .21$, 95% CI: .09 - .37), indicating that language mediated the relation between EC and ToM. Likewise, the *Sobel test* ($b =.56$, $z = 2,66$, $p < .01$) also revealed that the indirect effect was statistically significant.

Table I. Descriptive statistics and correlations among the empirical variables

Variables	*M*	*SD*	1	2
1. Theory of Mind	4.00	1.50		
2. Language	44.17	18.92	.42**	
3. Emotional Comprehension	3.06	0.93	.15	.33**

Note. *p < .05; **p < .01

Figure 1. Direct and indirect effects of EC and Language on ToM. The indirect effect of EC on ToM through Language is in parentheses. Non-standardized coefficients. ** p <.01; *** p <.001

Discussion

Our results show that at four years of age, the relationship between ToM and EC is mediated by language, suggesting that language is a key process in the development of socio-emotional competence. Our results coincide with research on children with limited access to language that shows important delays in EC and ToM. The results suggest the need to work on EC and ToM through language from early ages. Through their discourse, adults influence the child's comprehension of mental and emotional realities and model their narrative skills. These narrative skills allow the child to construct coherent and structured explanatory frameworks, making explicit what in most cases is implicit. As many authors have pointed out, language allows the efficacious representation of socioemotional experience, giving shape to social relationships (Camras, Shuster, & Fraumeni, 2014; Lemerise & Harper, 2014; Saarni, 1999). Thus, language fulfils the function of a social communication and self-regulation tool that makes it possible to organize emotional and cognitive knowledge (Vigostky, 1986). For example, intervention programs based on dialogue to improve socio-emotional competence in preschoolers have been shown to be effective (Giménez-Dasí, Fernández-Sánchez & Quintanilla, 2015; Giménez-Dasí, Quintanilla & Daniel, 2013). This kind of intervention, where children explicitly talk about emotions, social relations, empathy, and emotion regulation amongst others, have also been effective with vulnerable children in preschool and primary education (Fernández-Angulo, Quintanilla & Giménez-Dasí, 2016; Giménez-Dasí, Quintanilla, Ojeda & Lucas-Molina, 2017) and with clinical samples of preschoolers with dysregulation problems (Giménez-Dasí y Edo, 2017).

This study has a number of limitations. First, the sample is not representative of the population of Spanish children. Second, in line with the reviewed literature, we assume a conceptual and statistical model in which EC precedes ToM, with language acting as mediator, but there may be other models that fit the data. To address this question, it would be necessary to perform longitudinal studies, which, in addition, would allow us to test how these relations behave throughout development. Third, because our study was carried out in

Spain, its results would have to be verified before they can be generalized to other cultures and populations. Finally whilst this study contributes to consistent results that support the evaluated model, in which language acts as a mediator in the relationship between CE and ToM in four-year-old children, longitudinal studies are needed to confirm how the three variables are related over time.

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