Can you read my mind?
Indirect requests comprehension and Theory of Mind abilities

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The present project addresses from a Behavioural Experimental Pragmatics perspective a well-known pragmatic phenomenon with early theoretical roots, dating back to the 60s: speech acts (Austin, 1962; Searle, 1969). Indirect speech acts (ISAs) comprehension, with particular regard to indirect requests (IRs) have been one of the first topics (Noveck & Sperber, 2004: 10) to be investigated through reaction time studies (Clark & Lucy, 1975; Gibbs, 1981), revealing higher processing costs for IRs than their direct equivalents. Other studies addressing the role of (a supportive) context in the comprehension process, though, provided evidence supporting a direct access to the directive meaning of IRs with no particular efforts required (Gibbs, 1979). A few more recent studies address the topic both through reaction time studies and eye-movement experiments (Ruytenbeek et al., 2017), and even neuroscientific methods like EEG (Coulson & Lovett, 2010) and fMRI (Van Ackeren et al., 2012). Nevertheless, the difference in terms of experimental design between the early and the recent studies on the topic makes it difficult to combine them in a comprehensive picture.

Other studies on atypical and pathological populations, particularly on children and adults with a diagnosis of Autism Spectrum Disorder (Kissine et al., 2015; Deliens et al., 2018), but also on right-hemisphere lesion patients (Champagne-Lavau & Joanette, 2009), and traumatic brain injury patients (Muller et al., 2010) have enriched the picture by also taking into account some cognitive functions that might have a role in IRs comprehension, such as inhibition, flexibility, working memory, and theory of mind (ToM). Nevertheless, no study to date addressed the potential role of ToM in IRs comprehension in typically developing children, nor in Autism Spectrum Disorder (ASD), even though the debate on pragmatic deficits in ASD and their relationship with ToM skills has been lively and well fed since the 90s, with particular regard to metaphor and irony processing (see Happé, 1993; Norbury, 2005) and scalar implicatures (Chevallier et al., 2010).

In particular, several accounts in theoretical pragmatics support a distinction between different pragmatic processes types: following Andrés-Roqueta and Katsos (2017), a line could be drawn between linguistic-pragmatics (for pragmatic tasks relying on structural language and semantics only, along with a general competence with pragmatic norms) and social-pragmatics (for pragmatic tasks where ToM skills are needed). This distinction is particularly crucial for young typically developing (TD) children and children with ASD.

The main aims of this project are therefore (1) to test the comprehension of different forms of IRs in neurotypical development, (2) to investigate the role of Theory of Mind components (namely cognitive and affective ToM) in IRs comprehension in typical development, aiming at understanding what kind of pragmatic process IRs comprehension involve, and (3), possibly, to investigate its relationship with the selective pragmatic impairment observed in ASD. As a first step towards this goal, a pilot study on 43 Italian children, 14 HFA children [MA = 10,6; SD = 1.17; 2f] and 26 age-matched TD children [MA = 11.03; SD = 0.61; 9f] has been conducted, testing both their IRs comprehension and their ToM skills (through two false-belief tests: Hutchins & Prelock, 2014), along with their morphosyntactic abilities (through an Italian test, the BVL: Marini et al., 2015).

With regard to the IRs comprehension task, children were asked to help the experimenter recreate a drawing of a farm: the experimenter would request their help through either direct requests (DIR: e.g., *What colour is the grass?*), IRs (IND: e.g. *I don't remember the colour of the grass*) or highly IRs (HIR: e.g., *The colour of the grass is hard to remember*). The analyses conducted with binomial logistic regression models revealed that children's accuracy significantly differed depending on the (DIR/IND/HIR) condition only (p<.0001): they performed significantly worse with INDs and HIRs than with DIRs (DIR vs. IND: p< .005; DIR vs. HIND: p< .0001). Moreover, children's performance in the BVL and ToM tests significantly predicted their accuracy in the IRs task (positive correlation between accuracy and the BVL scores: p<.05; β=4.78; and between accuracy and ToM tests: 1st order ToM: p<.05; β=1.59; 2nd order ToM: p<.05; β=2.71). Interestingly, accuracy in the HIND condition negatively correlated with both children's BVL scores (p<.05; β=-0.16); and children's scores in the 2nd order ToM test (p<.05, β = -3.04), i.e., participants with better morphosyntactic and ToM abilities still performed lower with HIRs than DIRs and INDs. Different kinds of HIRs will be tested to see whether this pattern is confirmed.

Results of the pilot study

Speech Acts Task				Linguistic and Mind Reading abilities		
Condition	Overall Accuracy (%)	Accuracy by Group		Test	Score by Group	
		TD	HFA		TD	HFA
Direct	91(0.27)	100(0)	76(0.42)	*BVL*	37,25(2.28)	30,12(5.94)
Indirect	78(0.41)	83(0.36)	68(0.46)	*1st order ToM*	0,92 (0.25)	0,50 (0.50)
Highly Indirect	75(0.43)	73(0.44)	78(0.41)	*2nd order ToM*	0,71(0.45)	0,35 (0.48)

Tab. 1 Left: Mean frequency (%) and standard deviation of children's correct responses in the Speech Acts (IRs) Task. Right: Mean scores (standard deviation) of children's linguistic and ToM performance.
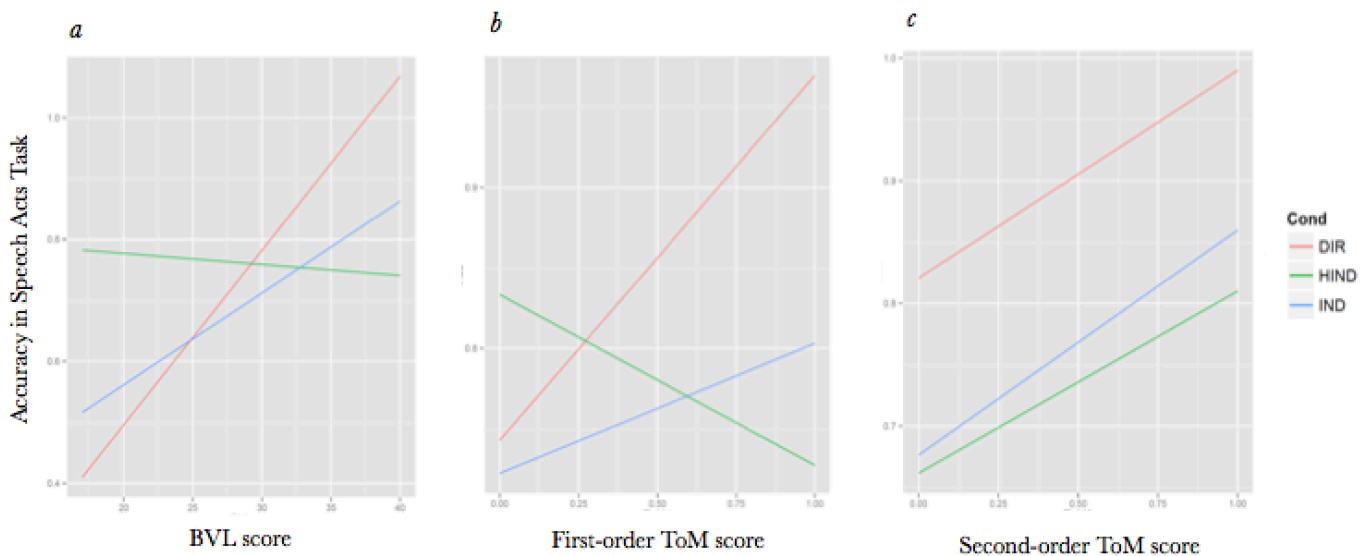

Fig. 1 Correlations between children's accuracy in the IRs task (separate regression lines per condition) and scores in BVL test (a), I-order ToM test (b) and II-order ToM test (c).

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