

Pragmatics and epistemic vigilance: a developmental perspective

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Abstract Any form of overt communication, be it gestural or linguistic, involves pragmatic skills. This paper investigates the social–cognitive foundations of pragmatic development from infancy to late childhood and argues that it is driven by, among other things, the emergence of the capacities to assess the communicator’s *competence* (e.g., perceptual access, epistemic states) and *honesty*. We discuss the implications of this proposal and show how it sheds new light on the developmental trajectory of a series of pragmatic phenomena, with a specific focus on the development of irony comprehension.

KEYWORDS

pragmatic development, epistemic vigilance, competence, honesty, deception, irony

1. INTRODUCTION

Current research in developmental pragmatics suggests that even pre-linguistic infants are heavily engaged in overt communication. That is, from about 12 months of age they display an understanding of communicative gestures as intentional and ostensive. For instance, they are able to produce and interpret pointing gestures as having the goal of providing information that is relevant to the ongoing situation (e.g., Behne, Carpenter, Call, & Tomasello, 2005). Furthermore, they show early sensitivity to the communicator’s epistemic states and are able to take those into account when interpreting a communicative gesture (e.g., Moll, Carpenter & Tomasello, 2007; Southgate, Chevallier & Csibra, 2010).

This early ability is most striking in light of the complex coordination between communicator and addressee that underlies all communicative exchanges. Communication is indeed a coordination problem: “[I]nterlocutors always share at least one common goal, that of understanding and being understood” (Sperber & Wilson, 1986/1995, p. 268). The achievement of this minimal goal arguably requires the capacity to track the interlocutor’s epistemic states and intentions. On the one hand, the communicator needs to design her utterance by taking into consideration how the addressee would be likely to interpret it. On the other hand, the addressee needs to build an interpretation that the communicator could have reasonably intended, based on her abilities and goals. Crucially though, communicators are neither always *competent*, nor

always *honest*, and when we fail to track their abilities and goals, we increase the risk of misunderstandings.

The development of the child's pragmatic competence appears to be bound to the ability to cope with misunderstanding and intentional deception. How does its emergence impact on the development of pragmatic competence? This ability—which Sperber et al. (2010) see as part of a broader capacity for “epistemic vigilance”—relies on the child's capacity to assess the communicator's competence and honesty, and to use this information to recognize her intended meaning. According to Sperber (2010), the assessment of the speaker's competence and honesty constitutes the output of a suite of mechanisms dedicated to the epistemic vigilance towards the *source* of information. These mechanisms, together with those dedicated to the evaluation of the believability of the *content* of the information (independently from the reliability of its source), play a crucial role in communication. For instance, they are quintessential to the recognition of lies or of ironical uses of language, both of which appear later in development.

This raises the question of the co-functioning and co-development of pragmatic capacities and epistemic vigilance, a question that is open to empirical investigation. With regard to their co-functioning, a handful of studies in experimental pragmatics with adults have started investigating the role that considerations about the speaker's competence and honesty play in pragmatic inferences (see, e.g., Breheny, Ferguson & Katsos, 2013; Dulcinati, 2018; Grodner & Sedivy, 2011; Mazzarella, Trouche, Mercier & Noveck, 2018; Morisseau, 2014). With regard to their co-development, the literature is still lacking. However, the availability of much research on the acquisition of pragmatic competence, on the one hand, and the development of epistemic vigilance, on the other hand, offer enough evidence to begin drawing a unified picture encompassing them both.

The aim of this paper is to develop this picture and investigate the role of epistemic vigilance in the acquisition of increasingly advanced pragmatic abilities. Our hypothesis is that the unfolding of the child's capacities to assess the communicator's competence and honesty buttresses the development of new, more advanced, interpretative strategies as well as the understanding of diverse pragmatic phenomena. In what follows, we illustrate three different interpretative strategies and discuss their degree of sophistication, that is, the extent to which they require children to fine-tune their interpretations to the communicator's epistemic and intentional states (Section 2). We review and discuss a series of experimental studies that investigate children's capacity to track the communicator's competence (Section 3) and honesty (Section 4), and illustrate their implications for the question of the development of pragmatics. Crucially, in Section 4, we will zoom in on the analysis of one specific pragmatic phenomenon,

that is, irony understanding. By offering a new account of the cognitive requirements for irony understanding, we aim at shedding new light on the relationship between pragmatic competence and epistemic vigilance capacity, which we argue being more closely intertwined than previously assumed.

2. THREE INTERPRETATIVE STRATEGIES

In order to cope with misunderstanding or intentional deception, children need to employ increasingly advanced interpretative strategies. That is, children need to revise their expectations about the speaker's competence and honesty and adjust their interpretations accordingly. According to Sperber (1994), this revision would lead young children from a stage of "naïve optimism", in which they "believe that one is talking about what happens to be foremost in their mind (and conversely that what they want to talk about is foremost in the minds of the listeners)" (Sperber, 1994, p. 10) to the recognition that interlocutors may have divergent perspectives, knowledge and interests. Naïve optimism would thus be followed by a second stage, "cautious optimism", in which children cease to take the speaker's competence for granted, and a third one, "sophisticated understanding", in which children also drop the honesty assumption. According to Sperber (1994), these interpretative strategies might not only correspond to stages in the development of pragmatics, but also be available in adulthood, and exploited differentially as a function of the conversational context.

To examine the way in which the child's assumption about the speaker's competence and honesty might affect the output of his interpretative process, let us consider the following set of examples. Imagine a context in which a child is looking for his bag of candies. Noticing this, the mother tells him: "They're all gone" (potentially followed by a positive proposition, such as, "But you can have some strawberries"). In this scenario, all the candies have indeed been eaten and the mother intends to inform the child of this state of affairs. In this case, even if the child lacks the ability to assess his mother's competence and honesty, he will be able to attribute to her the intended interpretation. All that is needed is for the child to reach the first interpretation that is relevant to him (e.g., one in which "They" refers to the candies he is looking for) and to attribute it to the mother as the intended one. The child can assume that the speaker communicates information which is worth his attention and that the speaker does so in such a way that retrieving that information would not cause any unjustified or gratuitous effort.

This interpretative strategy yields an adequate output whenever the speaker is indeed competent and honest. However, speakers often fail to realize what is relevant to the interpreter

at a certain time and produce stimuli whose intended interpretation might not be the most easily accessible one for the interpreter. Or, they lack relevant pieces of information and produce utterances which are false. In all of these circumstances, the success of communication relies on the interpreter's ability to take the speaker's competence into account. This requires a more advanced interpretative strategy, one in which the child is aware that the speaker may fail in her attempt to be as relevant as possible.¹ Consider again the previous example. This time, imagine that the child has gone to the market with his father and that they bought more candies (which the father put in the cupboard without the mother knowing it). When the mother tells him "They're all gone", the child can still infer that she wants to communicate that there are no more candies, even if he knows that this is not the case. This requires dropping the assumption of speaker's competence and looking for an interpretation that the speaker *could have thought* would be relevant to the child.

Finally, in order to deal with deceptive intentions, the child needs to employ an even more advanced interpretative strategy, one in which both competence and honesty assumptions are dropped. This means that the child does not take competence and honesty for granted (as defaults), but rather evaluates them with respect to the specific interlocutor. This strategy is linked to the understanding that the communicator's goals may go against the addressee's interests. For instance, the speaker may want to communicate a piece of false information when this benefits some of her (non-communicative) goals. Let us modify our scenario as follows. Imagine that the mother does not want the child to eat more candies and she hides the remaining ones in the cupboard. Without the mother realising it, the child saw her putting the candies away and is thus aware that there are some left (and that his mother knows it). If the child behaves as a sophisticated interpreter, he would infer that she intended to communicate that *the candies are all gone*, despite knowing that there are candies left and that the mother is aware of it. Note that in cases like this, if the interpreter assumed that the speaker was honest, he would be prone to interpret the utterance as a joke or to look for an interpretation compatible with her epistemic state (as he would take it that she could not have intended to convey that there are no more candies while knowing that this is false).

This set of examples illustrate the way in which the child can refine his pragmatic understanding by dropping the assumptions that the communicator is competently and honestly attempting to get her message across. This begs the question—addressed in Sections 3 and 4—

¹ We use the term "relevant" here in a non-technical way. More technically, the child expectations could be described as expectations of "actual optimal relevance". For a definition of the notion of optimal relevance within the relevance-theoretic framework, see Wilson and Sperber (2004, p. 612).

of whether this three-stage developmental trajectory is empirically valid: Naïve optimism, then cautious optimism, and finally sophisticated understanding.

Before turning to the developmental literature to address this issue, it is worth noting that recognizing the role of competence and honesty assumptions in interpretation leaves open the following two additional questions: (i) “*How* do these assumptions affect the choice of interpretative hypotheses?”, and (ii) “*When* do they do it?”

With regard to (i), we can identify two distinct contributions to the process of selecting which interpretative hypothesis is to be attributed to the speaker as the intended one. On the one hand, considerations about the speaker’s competence and benevolence may *filter out* interpretative hypotheses that are incompatible with the speaker’s abilities and goals. This happens whenever the most salient interpretation for the interpreter could not have been expected by the communicator (e.g., *the candies are all gone* if the mother does not even know that the father bought candies). On the other hand, they allow the interpreter to *retain* interpretative hypotheses that are irrelevant (e.g., because they are false) but compatible with the communicator’s abilities and goals (as in the example of deception discussed above).

With regard to (ii), there are three distinct stages where considerations about the speaker’s competence and honesty could have a decisive effect in the interpretative process. First, they can affect the process of “hypothesis formation” (first stage), either by restricting or by enlarging the range of interpretative hypotheses that are accessed (see Jary, 2010). For instance, interpretative hypotheses that are incompatible with the speaker’s epistemic states can be prevented from entering the competition as candidates for the intended speaker meaning. The experimental literature on reference resolution seems to provide strong evidence for this early effect (e.g., Samson, Apperly, Braithwaite, Andrews, & Bodley Scott, 2010; Brown-Schmidt & Hanna, 2011). As shown by Nadig and Sedivy (2002), even children display sensitivity to common-ground information from the very initial stages of language processing. For instance, when presented with a referential expression, “Pick up the glass” (in a context where the child sees two glasses), which is ambiguous from their perspective but not from the perspective of the speaker, five-year-olds exclusively focus on the mutually visible glass within 760ms after the word “glass” is uttered. That is, they immediately exclude from the range of potential candidates for the relevant referential expression, the glass that is in their privileged ground.

Second, considerations about the speaker’s competence and honesty can contribute to the process of “hypothesis evaluation” (second stage), by providing the background against which interpretative hypotheses are checked before being attributed to the speaker. This

checking process results in accepting interpretative hypotheses that are compatible with the speaker's abilities and goals and rejecting those that are incompatible with them (see Mazzarella, 2014, 2016). Indeed, this seems to be the stage where Sperber (1994) places the contribution of these assumptions. For instance, while discussing cautious optimism, he claims:

Suppose the interpretation that first occurs to the hearer is relevant enough to him. His next step will be to evaluate this interpretation in the light of what he knows about the speaker. Could she have expected this interpretation to occur to him? Would she have seen it as relevant enough to him? Only if the answer to both questions is yes will this interpretation be retained. Otherwise, the next accessible interpretation will be tested in the same way. (Sperber, 1994, p. 11).

However, in our proposal, this represents only one of the three possible stages at which considerations about the speaker's competence and benevolence can enter the picture. The third one is represented by the process of metalinguistically evaluating the output of pragmatic interpretation, and it corresponds to a post-interpretation stage (see also Wilson, 2009). Children can revise their initial interpretation when new information about the speaker's competence or benevolence becomes available to them. For instance, the child might initially interpret the mother's utterance "They are all gone" as referring to the candies the father bought at the market that day and the child is currently looking for. However, he might revise this initial interpretation when the mother later adds "We didn't buy any candies recently, you should ask your father to get some" (thus revealing her ignorance about the current state of affairs).

These three *logically* distinct stages may also be *temporally* distinct. To look for evidence, albeit indirect, of such a distinction, it is possible to turn to the psycholinguistics literature on perspective taking evoked above. This literature is characterised by a vigorous debate on the time course of the integration of the speaker's perspective, a debate that is fuelled by conflicting findings (see Brown-Schmidt & Heller, 2018 for a review). The distinction between the first and the second stages ("hypothesis formation" vs. "hypothesis evaluation") might indeed capture some of these conflicting findings. On the one hand, studies that show integration of the speaker's perspective from the earliest time windows suggest that considerations about the speaker's perspective *can* affect stage the very first stage of hypothesis formation (as in Nadig & Sedivy, 2002). On the other hand, studies that, in virtue of their egocentric favouring paradigm, show a later integration of the speaker's perspective indicate that considerations about the speaker's perspective *can* correct an initial interpretative

hypothesis at a later stage of hypothesis evaluation (as in Keysar, Lin & Bar, 2003; see Rubio-Fernandez, 2008 for a critical discussion). Finally, evidence for the distinction between the stage of hypothesis evaluation and the third stage of re-interpretation can be found in studies in which the provision of new information about the speaker's competence, not available at the time of the interpretation, is meant to trigger a process of re-evaluation of the interpretation attributed to the speaker. For instance, in Luchkina, Corriveau and Sobel (2018), 3.5 to 6.5-year-olds were capable to retrospectively re-evaluate word meanings for unfamiliar objects upon learning that the speaker who had introduced the label was unreliable (see also Schmid, Mani & Behne, 2018).

While we do not suggest that contributions at these three different stages would necessarily correspond to developmental steps, it seems plausible to assume that the latter would be the latest to emerge as it involves advanced metalinguistic abilities. This stage requires the ability to explicitly represent the output of the interpretative process and compare it with that of possible alternative forms (e.g. syntactic, semantic, etc.). For this reason, it should involve a capacity to reflect on language and its use, or "metalinguistic awareness" (Doherty & Perner, 1998), which is clearly present around the age of four (although aspects of it may be present earlier, see, e.g., Clark, 1978). Typically, children pass tasks involving metalinguistic skills at a later age than when they pass non-metalinguistic versions of the same tasks (see, e.g., Bernicot, Laval & Chaminaud, 2007).

3. COMMUNICATOR'S COMPETENCE AND PRAGMATIC INTERPRETATION

In this section, we review some relevant experimental literature concerning the ability to track the communicator's competence and to consider it in the process of interpreting her utterance. To begin with, it is of the foremost importance to shed light on the notion of competence. We maintain that this notion encompasses a variety of ways in which a communicator can be competent, which are arguably all relevant to our discussion. We propose an analysis of the notion of competence, which breaks down into the following three components:

- (a) *Perceptual competence*: The communicator has perceptual access to the relevant objects/scene.
- (b) *Epistemic competence*: The communicator possesses the relevant world or circumstantial knowledge.

(c) *Communicative competence*: The communicator is able to anticipate which interpretation would be the most relevant for the addressee.

In what follows, we review the literature on the emergence of the ability to assess each of these components of the communicator's competence and use them in communication.

3.1 Perceptual competence

Let us start by focusing on the capacity to assess the “perceptual competence” of the communicator, that is, her perceptual access to the relevant object or scene. The development of the understanding of visual perception has its roots in the infant's ability to follow the gaze of other people, which emerges in the first half of their first year of life (see, e.g., Scaife & Bruner, 1975). As early as 12 months of age, infants understand that others *see* things where they look and move behind barriers to follow others' gaze (Moll & Tomasello, 2004). Furthermore, they understand that barriers may impede other people having visual access to the objects that are placed behind them (see, e.g., Butler, Caron & Brooks, 2000; Caron, Keil, Dayton & Butler, 2002).

These abilities are the precursors of Level 1 visual perspective taking, that is, the understanding that the *content* of what you see may be different from the content of what another person sees in the same situation (see Flavell, 1977) for the level-based classification of perspective taking abilities). While an *implicit* ability for Level 1 perspective taking may be already present at 14 months of age (Luo & Baillargeon, 2007; Sodian, Thormer, & Metz, 2007), it is only after 2.5 years of age that young children successfully pass explicit Level 1 perspective-taking tasks (Flavell, Shipstead & Croft, 1978; Masangkay, McCluskey, McIntyre, Sims-Knight, Vaughn & Flavell, 1974). Finally, the emergence of Level 2 perspective taking is attested around three years of age. At that age, young children begin to appreciate that *how* another person sees a thing may be different from the way they see it (e.g., if the adult is looking at the same object they are looking at but through a colour filter, Moll & Meltzoff, 2011a, 2011b).

Interestingly for our purposes, it appears that young children begin to adjust their interpretation of a referential act to the visual perspective of the speaker after their second year of life. For instance, in a study using a search paradigm, Moll and Tomasello (2006) show that 24-month-olds—but not 18-month-olds—appreciate that others may not see what they see and are more likely to hand to the experimenter an object that is not in her visual field rather than a

competitor in her visual field upon request (“Where is the other toy? Where is it? I cannot find it! Can you give *it* to me?”).

Furthermore, it is worth noting that, at least by the age of five, children integrate visual perspective information in reference resolution without exhibiting any delay. As mentioned earlier, Nadig and Sedivy (2002) show that early on-line use of visual perspective information is available to children as well as to adults (at least when this information is in no direct contrast with other sources of information).²

Overall, while infants display early abilities to track perceptual competence, the available evidence suggests that perceptual competence modulates pragmatic interpretation only after the age of two and it is fully integrated into the comprehension process by the age of five.

3.2 Epistemic competence

A growing body of evidence suggests that infants are able to track others’ world or circumstantial knowledge and false belief from very early on. The age threshold of 15-month-olds set by the seminal work of Onishi and Baillargeon (2005) has since then been constantly reduced. Following studies have shown that infants possess the ability to compute an agent’s beliefs online and to entertain them as early as seven months of age (Kovács, Téglás, & Endress, 2010; Surian, Caldi, & Sperber, 2007).³

The question that arises is when mental state assessment becomes available for pragmatic reasoning. While infants can assess the epistemic states of others, can they consult them while interpreting a communicative act? This question has been addressed by a series of studies which focused on infants’ and children’s capacity to adjust their expectations about the speaker’s referential intent to the speaker’s ignorance or false beliefs (Carpenter, Call & Tomasello, 2002; Happé & Loth, 2002; Nurmsoo & Bloom, 2008; Papafragou, Friedberg & Cohen, 2017; Southgate, Chevallier & Csibra, 2010). These studies demonstrate that as early as 17 months of age they can exercise this capacity in a variety of tasks involving reference resolution and word learning.

² The development of perspective-taking continues in late childhood and adolescence (see Symeonidou, 2018).

³ For the recent debate about the replicability and interpretation of some of these findings on very early development of theory of mind (ToM), see Dörrenberg, Rakoczy and Liskowski (2018); Kammermeier and Paulus (2018); Kulke and Rakoczy (2018); Kulke, Reiß, Krist and Rakoczy (2017); and Kulke, von Duhn, Schneider, and Rakoczy (2018). This set of systematic replication studies reopens the question of infant ToM and calls for further empirical research.

For instance, Southgate et al. (2010) ran a series of studies based on a false-belief referential task, which required infants to interpret novel labels and pronouns in accordance with the speaker's false beliefs. Seventeen-month-olds were introduced by the experimenter to two novel objects, placed in different boxes. When the experimenter left the room, an accomplice changed the position of the objects. The experimenter then returned and pointed towards one of the boxes. The pointing gesture was accompanied by the following utterances (in the new label-version of the study): "Do you know what's in here? There's a *sefo* in the box! There's a *sefo* in the box! Can you get *it* for me?" The assignment of the correct referent to the new label "sefo" and to the pronoun "it" requires the infant to take into consideration the fact that the speaker holds a false belief about the location of the two objects. To pass the test, the infant needs to realize that the experimenter intends to refer to the object that is in the box that she has not pointed to, and act accordingly. Most of the infants passed the test.

This body of evidence shows that infants—as early as 17 months of age—can resolve reference assignment in a way that is compatible with the speaker's epistemic state, by selecting the interpretation that the speaker *could have thought* would be relevant to them.

3.3 Communicative competence

From extremely early on, infants do not assume that communicators are aware of what is in their mind. That is, they do not expect the speaker to always be "communicatively competent" and produce utterances that are as relevant as possible, taking into account what is at the centre of the child's interest. This is clearly exemplified by a study run by Moll, Richter, Carpenter and Tomasello (2008), in which 14-month-olds display the ability to track what they have shared or not shared with two different adults ("experiential perspective taking") and use this information to resolve a referential ambiguity in an adult's utterance. In the experimental condition, the infant shares three objects with an adult, but only one of them in an excited way (because the object appears unexpectedly in several locations). Later, the same adult (experimental condition) or a different adult (control condition) reacts with excitement to a tray containing the three objects and ambiguously requests the infant to hand *it* to her. The results show that the infants in the experimental condition chose the target object more often than the distractors, and more often than in the control condition. To appreciate the relevance of this result, it is worth focusing on the observed distinction between the experimental and the control condition. While in the experimental condition, infants (as a group) are significantly more likely to choose the target object than the distractors, in the control condition they are at chance. This difference can be interpreted in two ways, both supporting the claim that infants are capable of

interpreting the speaker's utterance without assuming that the speaker's interest will match with their own. If we assume that infants are at chance in the control condition because they do not have any preference towards the target object over the distractors, then their preference in the experimental condition can only be explained by assuming that infants are considering the speaker's interest. If, alternatively, we assume that infants prefer the target object over the distractor in the experimental condition simply based on their own interest towards the object, then their lack of preference in the control condition can only be explained by assuming that infants are estimating that the speaker has no reason to share their interest. Whatever interpretation is given, the same conclusion stands: 14-month-olds do not assume their interlocutor to be as relevant as possible, given their own interest or lack thereof. This contrasts with a naively optimistic behaviour: A naively optimistic interpreter would assume that each adult informs them about what *the child wants* to do with the object.

A further study by Liebal, Behne, Carpenter and Tomasello (2009) shows that 14-month-olds and 18-month-olds can interpret the same pointing gesture towards the same object and in the same context differently depending on the shared experience they had with the communicator. In one study, infants shared a clean-up game with one experimenter. When, at the end of the activity, the experimenter or a third party pointed to the same object, infants were more likely to clean-up the object when the experimenter pointed to it than when the third party (with whom they had not shared the clean-up game) did. The authors conclude that: "[I]nfants were not interpreting the pointing gesture from an egocentric perspective in terms of what was most relevant for them at that moment but rather based on the shared experience they had previously had with the particular adult who pointed" (Liebal et al., 2009, p. 267). This suggests that infants were capable of assuming that each adult informed them about what she wanted the child to do with the object, and not about what the child wanted to do with it.

These two studies belong to a larger body of evidence that indicates that, already by the age of 14 months, infants do not interpret communication from an egocentric perspective (naïve optimism), and they are able to overcome their own current interest and activity in favour of a shared perspective (see also Ganea & Sailor, 2007; Moll, Carpenter & Tomasello, 2007, 2014; Moll & Tomasello, 2007; Tomasello & Harberl, 2003).

3.4 Discussion

The literature reviewed above suggests that while the ability to assess the communicator's competence improves with age, infants already display an early sensitivity to the perspective, epistemic state, and experience that constrain the communicator's referential intentions. That

is, there appears to be no developmental stage in which pragmatic interpretation operates under a default assumption of speaker's competence. For this reason, we suggest that there is no categorical shift from a naïve mode of interpretation to the acquisition of a more advanced strategy that allows children to attune their interpretation to the speaker's competence. The shift, if anything, can be conceived in terms of a progressive refinement of the child's capacity to take the speaker's epistemic states into consideration when interpreting her communicative acts. In Sperber's (1994) terms, the development is all internal to a "cautiously optimistic strategy", and no stage corresponding to "naïve optimism" is clearly identifiable.

This development requires not only the emergence of different mentalizing skills (visual perspective-taking, experiential perspective-taking, false belief understanding, etc.), but also the development of a suite of cognitive skills that allows children to *incorporate* information about the speaker's competence in their communicative behaviour (see Nilsen & Fecica, 2011, for a discussion). This includes, for instance, executive function skills such as working memory, inhibitory control and cognitive flexibility (see Nilsen & Graham, 2009 for a review). The capacity to integrate the building blocks involved in the assessment of the communicator's competence *in a reliable way* when interpreting a communicative act is thus crucial to the display of a more advanced interpretative behavior. Because of this, this integration is likely to be affected by processing factors (strength of the evidence, ease of retrieval, etc.) as well as the (un)availability of further cues, such as shared experience. The variability of these factors across contexts can thus explain why infants behave as more or less competent interpreters under different communicative circumstances (and experimental settings), and might occasionally display naive interpretative behaviours.⁴

4. COMMUNICATOR'S HONESTY AND PRAGMATIC INTERPRETATION

In what follows, we discuss the emergence of advanced pragmatic abilities that appear to involve the capacity to adjust one's interpretation of the speaker's utterance to her (perceived) honesty. Honesty is intended here as the communicator's sincerity towards the propositions, as well as the attitude she communicates by means of her utterance. We begin by reviewing the recent literature on the emergence of epistemic vigilance towards deception. The capacity for epistemic vigilance relies on a suite of cognitive mechanisms targeted at the risk of accidental

⁴ While to make this argument in Section 3 we mostly discuss examples of reference assignment (where the development of epistemic vigilance has the most direct visible implications), we nevertheless take these conclusions to extend to other pragmatic phenomena such as implicatures and figurative expressions, as well.

or intentional misinformation (Sperber et al., 2010). Vigilant addressees evaluate the reliability of the source of information and the plausibility of its content and moderate the acceptance of the message as a function of this epistemic assessment. While this capacity was traditionally thought of as a late acquisition in the child's cognitive development, the last two decades of research in this field have shown that children are not as gullible as initially assumed (for reviews, see Harris, 2012, and Robinson & Einav, 2014). By two to four years of age, children are able to detect different cues of reliability and to adjust their preferences towards informants that display them: Past accuracy, expression of confidence, true knowledge (Einav & Robinson, 2011; Koenig & Harris, 2007; Matsui, Rakoczy, Miura & Tomasello, 2009). Despite this, children's gullibility towards deceit seems to persist until the age of five to six. In Section 4.1 we review the stepping stones of this developmental trajectory, before turning to the question of the role of epistemic vigilance towards deception in pragmatic development (Section 4.2).

The relevance of this question has been acknowledged in the literature: For instance, Sperber and colleagues have suggested that, "the abilities for overt intentional communication and epistemic vigilance must have evolved together, and must also *develop together* and be put to use together" (Sperber et al., 2010, p. 360; *our emphasis*). However, the co-development of these capacities remains to be investigated. Mazzarella (2015, 2016) provides a theoretical framework within which to carry out this investigation. Specifically, she proposes that the development of the capacity for epistemic vigilance might bring about the shift towards a more advanced interpretative strategy, one in which the expectations that guide the comprehension process might be downgraded as a function of the speaker's perceived honesty: Sophisticated interpreters are epistemically vigilant interpreters, and assess rather than presuppose the communicator's reliability.

4.1 The emergence of epistemic vigilance towards deception

Children's capacity to recognize deception emerges relatively late in comparison to their ability to detect ignorance or incompetence, and crucially not earlier than five years of age. Much evidence shows that, before this age, children have difficulties treating information from an uncooperative source as false (Heyman, Sritanyaratana & Vanderbilt, 2013; Jaswal et al., 2010; Mascaro & Sperber, 2009; Vanderbilt et al., 2011). These difficulties are not overcome by making the deceptive intention overt (e.g., by explicitly describing the informant as a "liar" or as "mean"), consistent across repeated trials, or explicitly motivated by strategic concerns (Couillard & Woodward, 1999).

Crucially, while children struggle with mistrusting deceptive communicators, they are able to discriminate them from benevolent informants in selective trust tasks from very early on. For instance, pre-verbal infants display a preference for helpers over hinderers by eight months (Hamlin et al., 2013), and are sensitive to the distinction between intention and outcome in their social evaluations (Hamlin, 2013). Furthermore, children selectively learn from benevolent informants rather than from malevolent ones (Doebel & Koenig, 2013; Hamlin & Wynn, 2012; Lane, Wellman & Gelman, 2012). The difference in success rate across these different kinds of task seems to be due to the presence of one informant as opposed to two informants. In the former set of tasks—which Mascaro and Morin (2014) call “false communication tasks”—the child needs to mistrust the information conveyed by a single informant, as well as infer that the opposite is true.

It is worth mentioning here that there is an interesting asymmetry between the production and the interpretation of lies. While the interpretation of lies as intentional emerges around five years of age, children do lie well before this age (e.g., see Evans, & Lee, 2013 for spontaneous lies in two-year-olds). Furthermore, they can also engage in other forms of complex deceptive behaviors. For instance, Grosse, Scott-Phillips and Tomasello (2013) show that three-year-olds can intentionally conceal their communicative intentions to transfer certain information without being recognized as doing so (“hidden authorship”). This evidence is in striking contrast with children’s apparent naiveté in the interpretation of deception, and makes its explanation an interesting challenge for developmental psychology.

Recent work from Mascaro, Morin and Sperber (2016) demonstrates that children’s naiveté in false communication tasks cannot be reduced to a deficit in one or more of the cognitive capacities which jointly make it possible to be vigilant towards deception. In fact, there is growing evidence that two to three-year-olds already possess all of them.⁵ First, they display the capacity to represent communicated information as false, for instance by understanding denial (Austin, Theakston, Lieven & Tomasello, 2014; Mascaro & Morin, 2015) and disagreement (Fusaro & Harris, 2012). Second, they have already paved their way to becoming skilled mindreaders since infancy (as discussed in Section 3, for reviews see Baillargeon, Scott & He, 2010; Perner & Roessler, 2012). Pre-linguistic infants have an incipient understanding of how communication affects beliefs, for example, by correcting false

⁵ It is worth noting that some of these capacities develop later in comparison to those that constitute the building blocks of epistemic vigilance towards the communicator’s competence. As reviewed above (see Section 3), infants do display some perspective taking abilities and false belief understanding. In contrast, the building blocks of epistemic vigilance towards deception are not part of the cognitive resources of the child until the age of two or three.

beliefs or producing new ones (Song, Onishi, Baillargeon & Fisher, 2008; Knudsen & Liszkowski, 2012; Liszkowski, Carpenter & Tomasello, 2007). Finally, they possess sufficient executive functions to resist assertions that contradict their perception or memory (Jaswal, 2010; Lyon, Quas & Carrick, 2012; Clément, Koenig & Harris, 2004). For these reasons, gullibility in false communication tasks cannot be explained by any of these factors. Crucially, Mascaro et al.'s (2016) studies reveal that "children's difficulties with deceptions come from a disposition to look out for opportunities to inform and be informed" (p. 19). This disposition has profound implications for children's trust towards communication and communicators. Children approach communication with a robust stance of trust that prevents them from acknowledging the possibility of being misled in many contexts.

In line with this, the emergence of epistemic vigilance towards deception might be rooted in changes in the social environment of the child. Mascaro and Morin (2011) describe these changes as part of a gradual move from a social world dominated by interactions with caregivers to a "society of peers", whose risks and strategic advantages are dramatically new to the child. For instance, with peer-to-peer interaction progressively occupying a more central role in the life of the child, the child might become more attuned to opportunities for deceit. In this new social world, deceiving can be systematically exploited to pursue diverging individual interests. This change brings about a revision of the child's baseline assumptions concerning the reliability of communicators and communication (Morin & Mascaro, 2014). Children become increasingly aware of the fact that communication can serve the purposes of communicators' interests, and that these are not always aligned with their own. That is, they acquire a new *social* competence, thanks to their immersion in a new social environment. This achievement allows children to approach communication in a more sophisticated way, capitalizing on a cognitive apparatus to do so that is already in place. Revising the robustness of the stance of trust is essential for evaluating the reliability of incoming information and filtering out what is misleading. However, this has also important consequences with regard to the process of pragmatic interpretation. As discussed above, the recognition of the deceptive communicative intention is essential to interpreting a lie as such. Crucially, children cannot distinguish a lie from a mistake until they understand that a speaker can intentionally communicate false information. This achievement comes later than the understanding that a speaker can accidentally communicate false information, and it appears to involve a clearer-cut break in terms of age. In the next section, we explore the implications of the emergence of vigilance towards deception for pragmatic interpretation beyond the case of lies. Specifically, we focus on the phenomenon of irony understanding and suggest a new explanation of its

developmental trajectory that is rooted in the interplay between epistemic vigilance capacities and pragmatic abilities.

4.2 Irony comprehension

Irony understanding represents an interesting puzzle for any theory of pragmatic development. It is a puzzle because it develops later than the understanding of any other type of non-literal use of language (Pouscoulous, 2013). Despite the growing evidence concerning pre-schoolers' ability to understand metaphor, hyperbole, metonymy, and jokes, children keep struggling with irony at least until they are six (see Matthews, 2014, for a review). This age threshold appears to be insensitive to task manipulations that typically allow children to pass other pragmatic tests, as in implicit or act-out tasks, which do not require any metalinguistic judgment and minimize processing demands. In fact, these manipulations have consistently shown that children possess more advanced pragmatic abilities than previously thought. For instance, three to four year-olds show understanding of scalar implicatures (Katsos & Bishop, 2011; Pouscoulous, Noveck, Politzer & Bastide, 2007), ad hoc scalar implicatures (Stiller, Goodman & Frank, 2015), relevance implicatures (Schulze, Grassmann, & Tomasello, 2013), and presuppositions (Berger & Höhle, 2012), as well as of various figurative uses of language: Metaphor (Özçaliskan, 2005, 2007; Pearson, 1990; Pouscoulous & Tomasello, 2020; Stites & Özçaliskan, 2013; Waggoner & Palermo, 1989), hyperbole (Deamer, 2013), and metonymy (Falkum, Recasens & Clark, 2017; Rabagliati, Marcus, & Pylkkänen, 2010).

The delay in irony comprehension has been traditionally attributed to its reliance on sophisticated mindreading abilities (Happé, 1993), such as second-order theory of mind, that is, the capacity to attribute beliefs about someone else's beliefs. Irony comprehension tends to correlate with success in second-order false belief tasks, as evidenced by a number of studies, which focus on pragmatic impairment in autism, Asperger's syndrome, schizophrenia and right-hemisphere damage (Smith & Tsimpli, 1995; Winner, Brownell, Happé, Blum & Pincus, 1998; McDonald, 1999, 2000; Dennis, Purvis, Barnes, Wilkinson & Winner, 2001; Langdon, Davies & Coltheart, 2002; Adachi et al., 2004; MacKay & Shaw, 2004; Brüne, 2005; Shamay-Tsoory, Tomer & Aharon-Peretz, 2005; Wang, Lee, Sigman, & Dapretto, 2006; Chevallier, 2009). Interestingly, though, success in standard second-order false belief tasks goes with the ability to cope with lies and deliberate deception (Evans, Xu, & Lee, 2011; Cheung, Siu & Chen, 2015; Polak & Harris, 1999; Talwar, Gordon, & Lee, 2007; Talwar & Lee, 2002a, 2008), and a few studies support the correlation between the latter and irony understanding (Winner & Leekam, 1991; Sullivan, Winner & Hopfield, 1995; Winner et al, 1998). In what follows, we maintain

that the development of irony crucially depends on the emergence of vigilance towards deception. First, we review some relevant experimental literature pointing in this direction. Second, we provide theoretical arguments in support of this claim.

In discussing the developmental trajectory of irony understanding, it is particularly insightful to analyze cases of unsuccessful interpretation of ironical utterances. That is, it is worth considering how children interpret ironical utterances before they master the capacity to attribute the ironical communicative intention. With respect to this, Winner (1988/1997) offers some interesting remarks:

Irony presents the child with a blatant contradiction: The speaker is saying something that he neither believes nor means. Faced with this contradiction, young children either distort the belief to fit the statement (resulting in an interpretation of irony as an error) or fail to acknowledge that the speaker means to convey something different from what he says (resulting in an interpretation of irony as deception). (Winner, 1988/1997, p. 147)

Faced with ironical utterances, young children tend to interpret them as errors or mistakes. When the utterance is incongruent with the situational facts, they tend to discount the facts and interpret it as sincere, or override their awareness of the speaker's competence about the facts and interpret the utterance as wrong but sincere (Ackerman, 1981; Demorest, Silberstein, Gardner, & Winner, 1983). Only later are children able to understand deliberate falsehoods as such and to make sense of the incongruity between utterances and facts. Demorest, Meyer, Phelps, Gardner and Winner (1984) shows that even nine-year olds tend to interpret ironical utterances as lies and that the capacity to distinguish irony from cases of deceptive communication is not reliable until 13 years of age (see also Winner & Leekam, 1991). Despite more recent studies indicating that (at least some component of) verbal irony can be grasped from the age of six (see Filippova & Astington, 2008, for a discussion), the developmental trajectory of irony miscomprehension is worth investigating further.

The evidence suggests that children first mistake irony for errors, then for lies, and only subsequently learn to recognize the ironical intention of the communicator. This in turn suggests that the emergence of epistemic vigilance towards deception might play an important role in the development of irony comprehension. Specifically, irony seems to require the audience to assess the honesty of the ironical speaker in order to rule out the possibility of deception. The honesty of the speaker cannot simply be assumed. Rather, it needs to be actively evaluated in

the process of attributing the ironical interpretation to the speaker. This is because, when children become vigilant towards the possibility of deception, they first tend to resolve the incongruity between the ironical statement and the situational facts by attributing to the speaker the intention to deceive. As suggested by Filippova and Astington (2008, p. 127), at this stage they are not yet “fully aware of the intentional use of such falsehoods”.

This developmental trajectory might appear *prima facie* paradoxical. The emergence of epistemic vigilance towards deception around the age of five might explain why irony is often mistaken for a lie until late in development. When children revise their expectations about the honesty of the communicator, they acquire the capacity to resolve the incongruity between what is said and how the world is by attributing to the speaker an intention to lie. However, we are still missing an explanation for why children younger than four, who do take for granted the sincerity of the speaker, are not able to understand ironical meanings.⁶ In order to address this question, we now turn to a more fine-grained analysis of verbal irony and its interpretative demands.

Most theoretical accounts of verbal irony maintain that irony comprehension relies on the ability to recover the *dissociative attitude* that the ironical speaker intends to convey with respect to the proposition expressed and those who might endorse it (Sperber & Wilson, 1981; Clark & Gerrig, 1984; Kumon-Nakamura, 1995). This feature of verbal irony is acknowledged by competing theoretical approaches, such as *echoic* or *pretence* accounts of verbal irony. In fact, both approaches attribute a central role to the expression and recognition of a mocking, scornful or contemptuous attitude. Following Wilson (2013), we assume that the ironical speaker intends to distance herself from a thought (a belief, an intention, a norm-based expectation) which she considers ludicrously false or blatantly irrelevant and that she attributes to some source other than herself at the current time. For instance, consider the utterance “That went well” (*after a chaotic lecture*). An ironical speaker might use this utterance with the intention to convey a mocking attitude towards the hope or expectation that the lecture would have gone well. This expectation could be attributed to a specific individual (e.g., herself at a previous time), a specific group (e.g., her encouraging and supportive friends) or to people in general, depending on the context of use. In all these cases, the speaker is dissociating herself from an expectation attributed to another source. Crucially, the ironical speaker is “honest”: She intends the addressee to recognize the falsity (or irrelevance) of the proposition expressed, as well as her dissociative attitude towards it. This raises the puzzle at issue: Irony

⁶ Thanks to Olivier Mascaro for raising this point.

understanding is a form of honest communication but appears to rely on epistemic vigilance towards deception. Therefore, it falls beyond the scope of the pragmatic abilities of children who assume—but do not actively evaluate—the honesty of the speaker.

In what follows, we put forth a tentative answer to this *prima facie* puzzle. The aim is two-fold: To provide the theoretical ground for the developmental trajectory described above, and to suggest new directions for future empirical research. Our proposal focuses on an arguably underinvestigated aspect of verbal irony: that is, its triadic nature. Verbal irony overcomes the dyadic relation “ironical speaker-addressee” by introducing a third element: the “ironical source”. The ironical source corresponds to the source to which the ironical speaker attributes the thought she is dissociating from.

To begin with, it is worth noting that the expression of a dissociative attitude requires the exercise of epistemic vigilance. Specifically, it involves the exercise of epistemic vigilance towards the content as well as epistemic vigilance towards the source. While the former allows the speaker to evaluate the believability of a given propositional representation in the abstract, the latter modulates the acceptance of this representation on the basis of consideration of source reliability. By dissociating herself from a certain propositional content, the ironical speaker makes her epistemic vigilance manifest. That is, the ironical speaker makes it manifest that she can entertain a thought attributed to a different source (the “ironical source”) and critically evaluate it. Crucially though, the ironical speaker does not simply make her epistemic vigilance manifest, but she also communicatively intends to make it manifest: “[Irony] not only exploits the epistemic or metalingual abilities required for filtering out false or misleading information, but brings them within the scope of the communicator’s intentions” (Wilson, 2009, p. 220). Irony comprehension requires the audience to attribute to the ironical speaker the intention to convey her dissociative attitude towards the proposition at issue.

In light of this, irony comprehension appears to rely on a cognitive capacity that has no counterpart in any other figurative or non-literal use of language: that is, the ability to be vigilant towards the capacity to be vigilant of the speaker herself.⁷ Our proposal is that the exercise of what we call “second-order epistemic vigilance” lies at the core of irony understanding and explains (at least partially) its late emergence in the child’s pragmatic development. Irony

⁷ Following Wilson (2017, p. 204), we maintain that the goal of a pragmatic theory is “to identify *mechanisms* and see what range of phenomena they explain”. This leaves it open the possibility that distinct mechanisms, like irony and pretense, may occasionally combine. We argue, though, that irony involves communicating a dissociative attitude towards a thought that is attributed to a source, and that it is this constitutive feature of irony (which is *a fortiori* present in cases of *ironical* pretense or *ironical* jokes) which is underpinned by ‘second-order’ epistemic vigilance. For a discussion on the distinction between irony and jokes or banter, see Wilson (2017).

understanding requires the child to exercise the capacity to evaluate others' capacity to be vigilant towards misinformation. That is, to understand irony, the addressee needs to display the ability to attribute to the ironical speaker the ability to judge the reliability of the ironical source (and dissociate from it). This attribution of epistemic vigilance ability allows the addressee to recognize that (i) the ironical speaker is dissociating herself from the proposition attributed to the ironical source (recognized as unreliable) and (ii) the ironical speaker is communicating her dissociative attitude. This involves an extra-metarepresentational step, which might have important implications in explaining the developmental trajectory of irony. First, the involvement of more complex metarepresentations adds an inherent cognitive cost that is not required by other pragmatic phenomena. This is likely to delay its emergence, which is conditional on the parallel development of executive functions like working memory. Second, the involvement of a "second-order" degree of epistemic vigilance might well explain the correlation between irony understanding and second-order false belief tasks found in the literature (Happé, 1993).

Importantly, this suggestion is open to further empirical investigation, as it generates some clear empirical predictions. For instance, it predicts that irony understanding would be facilitated when the "ironical source" is perceived as unreliable, or is easily identifiable. These predictions, that are compatible with the echoic account of irony understanding that we endorse, come directly from the recognition of the role of epistemic vigilance in irony comprehension.

5. CONCLUSIONS

The last twenty years have seen a rapid proliferation of research on the development of the communicative capacity in children. This research suggests that children are skillful communicators and interpreters even before they learn language. For instance, pre-linguistic infants use pointing with the intention of helping (by informing) or sharing emotions and attitudes in a communicative context (e.g., Tomasello, Carpenter & Liszkowski, 2007), and they are able to interpret an action differentially as a function of whether they recognize the presence of a communicative intention (e.g., Egyed, Király & Gergely, 2013). An equally prolific field of research in developmental psychology has focused on the emergence of the child's capacity to track the communicator's competence and honesty. This research shows that children display the ability to assess the competence of the speaker very early on and that they are successful in discriminating among more or less reliable sources of information on the basis of a variety of cues of speaker's reliability (e.g., Koenig & Harris, 2007). Despite this, their

ability to cope with intentional deception appears later, and it is only around the age of five that lying becomes a matter of strategic concern. The aim of this paper was to take stock of these two lines of research and create bridges between them.

The research question at the core of our investigation concerned the role of epistemic vigilance in the development pragmatic competences. Our hypothesis is that the development of the capacities to evaluate the speaker's competence and honesty contributes to the scaffolding of increasingly advanced interpretative strategies. We assessed this hypothesis against the available experimental literature in developmental psychology and linguistics. The picture that emerged is the following. As soon as they engage in communicative interactions, infants display some capacity to track the speaker's competence and integrate it in their interpretation of the communicative act. They interpret communicative signals taking into consideration the speaker's perceptual access (see Section 3.1), her epistemic states (see Section 3.2), as well as her interests (see Section 3.3), which may all diverge from the infant's own. While the infant's capacity to integrate these pieces of information in pragmatic comprehension certainly improves with age, it appears to be there (at least in some rudimentary form) from the very beginning. This has some important implications for theories of pragmatics. First, it shows that pre-linguistic infants are not as egocentric as it was previously assumed (e.g., Sperber, 1994), and that they do not interpret other people's utterances under the assumption that they would match their own expectations of truthfulness or relevance by default. Second, it highlights the importance of looking at which factors facilitate the successful integration of the speaker's competence in utterance interpretation. Besides ease of retrieval, the literature suggests that shared experience might play an important role (e.g., Liebal et al., 2009), but a systematic investigation of these factors still need to be carried out.

While children are able to effectively assess and use information about the speaker's competence from very early on, the ability to recognize the speaker's dishonesty emerges only around the age of five. The acquisition of this capacity appears to mark a dramatic turning point in the child's pragmatic development. It is only around this age that children begin appreciating the complex intention layering that underpins deceptive communication. Children can now recognize that the speaker can intentionally deceive them: that is, that the speaker can intend them to believe something that she knows to be false. The child will now infer that the speaker intends her utterance to *seem* relevant to him, even when the child knows that the speaker knows that it is false. The increased sophistication of the pragmatic inference involved in the interpretation of deceptive utterances testifies to the *qualitative shift* that epistemic vigilance towards deception introduces in pragmatic development. This shift represents the precondition

for the emergence of further pragmatic abilities beyond the capacity to recognize lies. In Section 4.2, we argued that the development of epistemic vigilance plays a crucial role in irony understanding. Specifically, we suggested that the capacity to assess the epistemic vigilance of the ironical speaker is required in order to recognize the dissociative attitude that is the quintessential ingredient of irony. That is, we argue that irony requires a form of epistemic vigilance, a “second-order” epistemic vigilance, that is not involved in the comprehension of other pragmatic phenomena and whose specific developmental trajectory still needs to be investigated.

This paper argues for the importance of looking at pragmatic development through the lens of its interplay with the epistemic vigilance capacity and discusses the ways in which the latter can shed some light on the former. This investigation, which is far from being completed, will require the joint efforts of developmental and social psychologists, as well as researchers in the field of linguistics, in the attempt to pursue an integrated approach to the study of the development of communication.

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