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Scalar implicature comprehension across neurodevelopmental profiles

Abstract

Scalar implicatures are pragmatic inferences that enrich the literal meaning of an utterance by strengthening a weaker term (e.g., *some*) into a more informative interpretation (e.g., *some but not all*). Their computation requires the integration of semantic content with contextual information, as well as the ability to infer the speaker's communicative intentions. For this reason, scalar implicatures represent an informative domain for investigating the development of pragmatic competence in childhood. Studying their acquisition is especially relevant when comparing typically developing children with children presenting different neurodevelopmental profiles, as a single phenomenon may manifest differently across clinical and non-clinical populations. While Autism Spectrum Disorder is characterized by pragmatic impairments, Developmental Language Disorder and Developmental Dyslexia are not primarily defined by pragmatic deficits. Developmental Language Disorder is characterized by difficulties in language that may affect comprehension, production, or both, across spoken and written modalities; hence, the nature and severity of these difficulties vary considerably across individuals. By contrast, Developmental Dyslexia is a learning disorder mainly characterized by persistent impairments in accurate and/or fluent word recognition. Nevertheless, both conditions may give rise to secondary pragmatic disorders.

The present chapter examines the comprehension of scalar implicatures in typically developing children compared to children with

Autism Spectrum Disorder, Developmental Language Disorder, and Developmental Dyslexia, to explore how this complex pragmatic ability develops across different populations.

Keywords

Scalar Implicatures, Autism Spectrum Disorder, Developmental Language Disorder, Developmental Dyslexia, Language Acquisition.

Riassunto

Le implicature scalari sono inferenze pragmatiche che arricchiscono il significato letterale di un enunciato, rafforzando un termine più debole (ad esempio *alcuni*) in un'interpretazione più informativa (*alcuni ma non tutti*). La loro derivazione richiede l'integrazione del contenuto semantico con le informazioni contestuali, nonché la capacità di inferire le intenzioni comunicative del parlante. Per questo motivo, le implicature scalari rappresentano un ambito particolarmente informativo per lo studio dello sviluppo della competenza pragmatica in età evolutiva.

Inoltre, lo studio della loro acquisizione è particolarmente rilevante quando si confrontano bambini con sviluppo tipico e bambini con profili neuroevolutivi diversi, poiché un singolo fenomeno può manifestarsi in modo diverso tra popolazioni cliniche e non cliniche. Mentre il Disturbo dello Spettro Autistico è caratterizzato da difficoltà pragmatiche, il Disturbo Evolutivo del Linguaggio e la Dislessia Evolutiva non sono primariamente definiti da deficit pragmatici. Il Disturbo Evolutivo del Linguaggio è caratterizzato da difficoltà nel linguaggio che possono compromettere la comprensione, la produzione, o entrambe, sia nel linguaggio parlato che scritto; al contrario, la Dislessia Evolutiva è un disturbo dell'apprendimento caratterizzato principalmente da difficoltà persistenti nel riconoscimento accurato e/o fluente delle parole. Tuttavia, entrambe le condizioni possono dare origine a deficit pragmatici secondari.

Il presente capitolo esamina la comprensione delle implicature scalari in bambini con sviluppo tipico rispetto a bambini con Disturbo

dello Spettro Autistico, Disturbo Evolutivo del Linguaggio e Dislessia Evolutiva, al fine di esplorare come questa complessa abilità pragmatica si sviluppi in diverse popolazioni.

Parole Chiave

Implicature Scalari, Disturbo dello Spettro Autistico, Disturbo Evolutivo del Linguaggio, Dislessia Evolutiva, Acquisizione del Linguaggio.

1. Introduction

Pragmatic competence in childhood has become a central focus of interest in linguistic research over the past decades. Experimental studies in this area have examined both typically developing children and children with neurodevelopmental disorders. This chapter aims to explore a specific aspect of pragmatic development, namely the comprehension of scalar implicatures in typically developing children compared to children with Autism Spectrum Disorder, Developmental Language Disorder, and Developmental Dyslexia.

Scalar implicatures are pragmatic inferences that allow listeners to derive meanings that go beyond the literal content of an utterance. Their comprehension requires the ability to infer the speaker's intended meaning by enriching the basic semantic content of an utterance, while taking into consideration contextual information. Moreover, the derivation of scalar implicatures relies on a broader range of cognitive processes, including working memory, executive functions, and Theory of Mind. As such, studying their acquisition offers insights into how a single phenomenon may manifest differently across clinical and non-clinical developmental profiles.

The present chapter is organized as follows. Section 2 provides a general overview on Autism Spectrum Disorder, Developmental Language Disorder, and Developmental Dyslexia; Section 3 introduces the theoretical framework of scalar implicatures and the cognitive mechanisms underlying their derivation; Section 4 reviews the developmental literature on scalar implicature comprehension in typical-

ly developing children, while Sections 5, 6 and 7 discuss empirical findings from children with Autism Spectrum Disorder, Developmental Language Disorder, and Developmental Dyslexia, respectively. Finally, the conclusion section integrates these findings, highlighting cross-disorder comparisons and implications for theory and intervention.

2. Autism Spectrum Disorder, Developmental Language Disorder, and Developmental Dyslexia: An overview

Autism Spectrum Disorder, Developmental Language Disorder[1], and Developmental Dyslexia are three major neurodevelopmental conditions that, while distinct in their diagnostic criteria and primary domains of impairment, exhibit complex patterns of overlap at the cognitive, linguistic, and neurobiological levels.

According to the DSM-5-TR framework (APA 2022), Autism Spectrum Disorder (ASD) is primarily characterized by persistent deficits in social communication and social interaction, alongside restricted and repetitive patterns of behavior, interests, and activities. Crucially, language impairment is not a necessary diagnostic criterion, yet it is highly prevalent and manifests in heterogeneous forms across the spectrum. As highlighted by Georgiou and Spanoudis (2021), a significant proportion of autistic individuals – estimated at around 63% – show language impairments affecting both structural components (phonology, morphology, syntax, semantics) and, more distinctively, pragmatic impairments, that is, difficulties in using language appropriately within context. Pragmatic deficits constitute a hallmark of ASD and are deeply intertwined with broader socio-cognitive impairments, particularly those involving Theory of Mind and the attribution of mental states, which are essential for interpreting communicative intentions. In this sense, ASD can be understood, within the framework of clinical pragmatics, as a paradigmatic case of

1 In this chapter, we adopt the term Developmental Language Disorder (DLD), following the CATALISE consensus (Bishop, 2017; Bishop *et al.* 2017), which replaced the earlier term Specific Language Impairment (SLI).

primary pragmatic disorder, where impairments in the use of language to achieve communicative purposes derive from underlying cognitive dysfunctions rather than solely from structural linguistic deficits. As argued by Cummings (2009), pragmatic competence is not reducible to performance but constitutes an integral component of linguistic competence itself, encompassing the ability to produce and interpret speech acts, manage discourse, and infer implicatures within socially situated interactions. The disruption of these abilities in ASD thus reflects a fundamental alteration in the architecture of communicative cognition.

Developmental Language Disorder (DLD), formerly known as Specific Language Impairment (SLI; Bishop *et al.* 2004; Bishop 2017; Bishop *et al.* 2017), represents a condition in which children exhibit persistent difficulties in the acquisition and use of language across modalities (spoken, written, or sign), in the absence of identifiable biomedical causes such as hearing loss, neurological damage, or intellectual disability (Tomblin *et al.* 1997; APA 2022). As detailed by Georgiou and Spanoudis (2021), DLD is characterized by impairments in structural aspects of language, including phonology, morphology, syntax, and semantics, as well as, in some cases, pragmatic difficulties (Leonard 2017). The disorder is inherently heterogeneous, encompassing both expressive and receptive deficits, and its symptomatology often persists beyond early childhood, impacting academic achievement and social functioning, although early intervention may support recovery, with some children reaching levels comparable to those of typically developing peers over time (Bishop and Edmundson 1987). From the perspective of clinical pragmatics, DLD is particularly interesting because it frequently involves secondary pragmatic disorders: that is, difficulties in language use that arise as a consequence of underlying structural impairments rather than from primary deficits in socio-cognitive processing. As Cummings (2009) notes, an individual may possess intact pragmatic knowledge – such as understanding the need for politeness or indirectness – but lack the syntactic or lexical resources necessary to realize these communicative intentions. This

distinction between primary and secondary pragmatic deficits is crucial for differentiating DLD from ASD, even in cases where observable communicative behavior appears similar.

The relationship between ASD and DLD has been the subject of extensive debate, particularly regarding the extent to which their language profiles overlap (Whitehouse *et al.* 2008; Williams *et al.* 2008). Empirical evidence suggests the existence of an intermediate subgroup – often referred to as ASD with Language Impairment – in which individuals on the autism spectrum exhibit structural language deficits comparable to those observed in DLD (Georgiou and Spanoudis 2021). This overlap has led to competing theoretical models: one positing that ASD and DLD are distinct disorders with superficial similarities, and another suggesting that they represent different manifestations along a continuum of language-related neurodevelopmental dysfunction. The review by Félix *et al.* (2022) further complicates this picture by emphasizing the role of comorbidity and shared developmental pathways, arguing that similar genetic or neurobiological perturbations can give rise to diverse phenotypic outcomes depending on developmental dynamics and environmental interactions. Reindal *et al.* (2021) contribute to this discussion by demonstrating that both structural and pragmatic language impairments frequently co-occur in children evaluated for ASD, and that pragmatic deficits are particularly pronounced in this population, even when structural language skills are relatively preserved. This finding supports a dimensional view of language impairments across neurodevelopmental disorders, in which different components of language – form, content, and use – interact in complex and variable ways.

In contrast, Developmental Dyslexia (DD) is primarily defined as a specific learning disorder with impairment in reading, characterized by difficulties in accurate or fluent word recognition, poor decoding, and deficits in spelling, which cannot be explained by general intellectual disability, sensory deficits, or inadequate educational opportunities (Snowling 2000; APA 2022). The literature reviewed by Félix and colleagues (2022) emphasizes that dyslexia must be un-

derstood within a broader neurodevelopmental framework in which linguistic processing – particularly phonological representation and processing – is central (but see also the experimental study by Ramus *et al.* 2003). Dyslexia is traditionally associated with deficits in phonological awareness, rapid automatized naming, and grapheme-phoneme mapping, suggesting a disruption in the interface between oral language and written code (Snowling 1981; Ziegler and Goswami 2005; Wolf and Bowers 1999). However, contemporary approaches highlight that dyslexia may also involve broader language-related and cognitive deficits, including temporal processing and working memory difficulties, with potential impact on syntax and pragmatics, albeit to a lesser extent than in ASD or DLD (Pagliarini *et al.* 2015; Pagliarini *et al.* 2020; Félix *et al.* 2022; Taha *et al.* 2025). Importantly, the notion of comorbidity plays a central role: individuals with dyslexia often exhibit co-occurring language impairments that blur the boundaries between diagnostic categories. This aligns with a growing body of evidence suggesting that neurodevelopmental disorders should not be conceived as discrete entities but rather as overlapping phenotypic expressions emerging from partially shared genetic and neurocognitive substrates (Benítez-Burraco 2020; Félix *et al.* 2022).

In sum, ASD, DLD, and DD can be conceptualized as distinct yet overlapping configurations within the broader domain of neurodevelopmental language disorders. ASD is primarily characterized by profound impairments in the pragmatic use of language rooted in socio-cognitive dysfunction; DD by deficits in phonological processing and written language acquisition; and DLD by pervasive structural language impairments that may secondarily affect communication. However, while the boundaries between DLD and DD are porous, ASD occupies a qualitatively distinct position within this landscape. A comprehensive understanding of these disorders thus requires an integrative framework that recognizes the interplay between linguistic structure, cognitive processes, and communicative function, and that moves beyond rigid categorical distinctions toward a more dynamic and multidimensional model of neurodevelopment.

The following sections will specifically address the nature of communicative competence in individuals with ASD, DD, and DLD, with particular emphasis on pragmatic abilities. More precisely, we will focus on the comprehension of scalar implicatures as a key component of context-sensitive language use.

To situate the discussion, a brief theoretical grounding is required. To this end, the next section introduces the notion of scalar implicature and its underlying mechanisms of derivation; readers already familiar with this framework may wish to proceed directly to the review of empirical findings in typically developing and clinical populations.

3. Scalar implicatures: A theoretical background

The term *implicature* was first introduced by Grice (1975; 1978) to refer to meanings that are conveyed by speakers but are not explicitly encoded in the literal content of their utterances. The author distinguished between *what is said* – i.e., the literal meaning of an utterance, and *what is implicated* – i.e., a meaning that goes beyond what is stated literally, which does not affect the truth-conditional meaning of the utterance. Grice termed this additional, implicated meaning *implicature*, which arises because speakers are expected to adhere to the Cooperative Principle and its associated conversational maxims (Grice, 1975; 1989).

Building on Grice's framework, Horn (1972) observed that a subclass of implicatures originates from the lexicon, rather than from sole adherence to the Cooperative Principle and the conversational maxims. Consider, for instance, the example in (1a). Upon hearing this utterance, the hearer infers that *not all* of Picasso's works are original, as reported in (1b).

(1) a. Some of Picasso's works in this museum are original.
b. Not all of Picasso's works in this museum are original.

Inferences of this kind, known as *scalar implicatures*, are trig-

gered by lexical items belonging to linguistic scales. These scales are formally defined sets of lexical alternatives, ordered by degree of informativeness or semantic strength, as illustrated in (2), whereby the logically stronger element of the scale – i.e., the rightmost – asymmetrically entails the weaker one, but not vice versa. For instance, if the sentence 'All of Picasso's works in this museum are original' is true, then it necessarily follows that *some* of them are. However, the reverse does not hold: if some of Picasso's works in the museum are original, it does not imply that *all* of them are.

(2) <some, all>
<or, and>
<might, must>
<sometimes, always>

Within the Neo-Gricean framework (Horn 1972; Gazdar 1979; Levinson 2000), scalar implicatures are derived through a reasoning process whereby the hearer draws inferences about the speaker's communicative intentions. To illustrate, consider the quantifier scale <some, all> and the sentence in (1), reported in (3a) below for convenience. The derivation of the scalar implicature proceeds through the following reasoning steps: when (3a) is uttered, the logically stronger alternative containing *all*, in (3b), is activated. The speaker is expected to obey the Cooperative Principle and the conversational Maxims of Quality and Quantity, which require him to be cooperative and provide truthful information. Therefore, if the speaker was in a position to utter the logically stronger alternative in (3b), they would have done so. Since the speaker did not utter (3b), the listener infers that (3b) does not hold. The negation of the informationally stronger alternative in (3b) leads to the derivation of the scalar implicature in (3c). Given the basic meaning of the sentence in (3a) and the derived implicature in (3c), the hearer concludes that *some but not all* of Picasso's works in the museum are original. This final step is called *prag-*

matic enrichment, whereby the basic meaning of the sentence is enriched with what is conversationally implicated.

(3) a. Some of Picasso's works in this museum are original.
[Basic meaning of the sentence]

b. All of Picasso's works in this museum are original.
[Logically stronger alternative]

c. It is not the case that all of Picasso's works in the museum are original.
[Scalar implicature]

d. Some but not all of Picasso's works in this museum are original.
[Pragmatic enrichment]

Although Grice (1975) never considered whether implicature derivation entails any cognitive cost, neo-Gricean approaches have sparked a debate on the cognitive mechanisms driving scalar implicature and the processing effort they demand. Two main theoretical frameworks have been proposed: the default account and the non-default framework.

On the one hand, the default account (Levinson 2000) holds that scalar implicatures are generated automatically, as part of the lexicalized meaning of scalar expressions, and are only cancelled when contextual information contradicts them. Within this view, the pragmatic interpretation is the cognitive default, while cancellation incurs a processing cost. On the other hand, non-default and relevance-theoretic approaches (Sperber and Wilson 1986; 1995; Noveck and Sperber 2012) argue that pragmatic interpretation is context-sensitive and requires cognitive effort, making the literal interpretation the default, and implicature derivation a cognitively costly process.

These opposing predictions have been experimentally tested across different populations and languages. Scalar implicatures are typically assessed by presenting participants with underinformative

sentences (i.e., sentences that are literally true but pragmatically infelicitous if the implicature *not all* is derived), such as 'Some parrots are birds', in which the stronger scalar term *all* would be warranted, given our world knowledge. Participants are asked to evaluate the sentence as either 'True' or 'False'. 'True' answers are taken to reflect a logical interpretation, compatible with *Some and possibly all parrots are birds*. By contrast, 'False' responses are taken as evidence of scalar implicature derivation, compatible with the pragmatic interpretation *Some but not all parrots are birds*.

Empirical evidence for processing costs associated with implicature derivation was first provided by Bott and Noveck (2004), using the experimental paradigm described above and adapted from Noveck (2001). When participants were asked to judge the truth of underinformative sentences, they were slower in giving the pragmatic 'False' response than the logical 'True' one. This asymmetry was interpreted as evidence that implicature derivation is not automatic but requires additional cognitive effort. Subsequent studies employing a range of methodologies – including eye-tracking and self-paced reading – have largely converged on this conclusion, although results have remained mixed across different contextual conditions and task designs (Breheny *et al.* 2006; Huang and Snedeker 2009; Grodner *et al.* 2010; Bott *et al.* 2012; Marty and Chemla 2013; Degen and Tanenhaus 2015; a.o.). Taken together, these findings have important implications for scalar implicature acquisition. If their derivation is indeed associated with a processing cost, as the experimental evidence suggests, then individuals with more limited cognitive resources, like children, would be expected to compute them less frequently than adults. On the other hand, children's difficulty with such inferences might stem from other sources, such as limited lexical access, difficulties in generating scalar alternatives, or weaker pragmatic reasoning abilities. Understanding the typical developmental trajectory of scalar implicature comprehension in children is therefore crucial, as it provides a baseline to interpret patterns

observed in clinical populations. The following section reviews the main findings on scalar implicature development in typically developing children.

4. The comprehension of scalar implicatures in typically developing children

Research with typically developing (TD) children has yielded mixed findings regarding rates of scalar implicature derivation. Percentages of pragmatic response vary substantially within and across studies – from low (< 50% in Noveck 2001; Horowitz and Frank 2015), to intermediate (55%–65% in Freeney *et al.* 2004; Foppolo *et al.* 2021, Experiment 1), to high (> 75% in Guasti and Foppolo 2005; Freeney *et al.* 2004, Experiment 2) – depending on the scalar term tested (e.g., quantifiers vs. numerals), the experimental task (e.g., truth-value judgment vs. reward-based paradigms), and children's age. Despite this variability, two consistent patterns have emerged: (i) children typically derive scalar implicatures at lower rates than adults, though the magnitude of this difference and the factors driving it remain subjects of debate, and (ii) children's rates of scalar implicature derivation follow a developmental trajectory and increase with age, with younger children until age of 5 struggling more.

Noveck (2001) was among the first to investigate implicature derivation in TD children. In his Experiments 1, 68 English-speaking children from different age groups (Range = 5;1–9;5) and a control group of adults were tested in a sentence evaluation task involving the scale <might, must>. Participants were presented with scenarios containing three boxes – e.g., one box contained only a toy parrot, a second box contained both a toy parrot and a toy bear, and a third box was covered. They were told that the covered box had the same content as one of the visible boxes – i.e., either a parrot only, or a parrot and a bear. A puppet then uttered an underinformative statement such as 'There might be a parrot in the box', and participants were asked to judge whether the puppet was right or wrong. Given the setup, there must necessarily be a parrot in the covered box, since both visible

boxes contain one. If participants interpreted the sentence pragmatically as *might but not must*, they should judge the puppet as wrong; if they interpreted it logically as *might and possibly must*, they should accept the statement as right. Noveck (2001) found that 5-year-olds gave the majority of logical responses, as did 7- and 9-year-olds, with rates ranging across age groups between roughly 69% and 80%. By contrast, the adult control group gave only 35% logical responses. This child-adult asymmetry in implicature derivation rates was replicated by subsequent research (Papafragou and Musolino 2003; Pouscoulous *et al.* 2007, a.o.).

High rates of logical responses were found by Noveck (2001) for another scalar trigger, the French quantifier *certains* ('some'). In his Experiment 3, the author assessed 61 TD French-speaking children (Range = 7;4–11;7) and a control group of adults using a sentence evaluation task (adapted from Smith 1980). Participants were presented with sentences such as 'Some giraffes have long necks', which are literally true but pragmatically infelicitous. Results showed that both 7–8-year-olds and 10–11-year-olds gave overwhelmingly logical responses, while adults did not. These findings led Noveck to propose that children exhibit a developmental delay in pragmatic competence, with adult-like pragmatic interpretation emerging gradually over the course of middle childhood.

Similar findings for the scale <some, all> were replicated in Modern Greek-speaking children by Papafragou and Musolino (2003). The authors investigated whether different scalar terms are treated uniformly by young children – that is, whether implicature derivation rates vary as a function of the specific scalar term involved. To address this question, they tested 30 children (M = 5;3) and a control group of adults in a truth-value judgment task involving three different scalar terms: *meriki* ('some'), *dio* ('two'), and *arxizo* ('start'). Participants were presented with stories followed by an underinformative sentence uttered by a puppet, in a context where the more informative alternative would be warranted. For instance, in one scenario, all horses jumped over a fence, yet the puppet said: 'Some of the horses

jumped over the fence'. Participants were asked to judge whether the puppet's statement was acceptable. Results showed that children were overwhelmingly logical responders, though not uniformly across scales. Children gave very low rates of pragmatic responses for *start* and *some*, but performed markedly better with *two*. By contrast, adults were overwhelmingly pragmatic responders across all scalar terms. In Experiment 2, three methodological refinements further facilitated pragmatic responding: (i) training to enhance awareness of pragmatic anomalies; (ii) stronger narrative focus on the character's performance; and (iii) explicit prompting for the puppet to comment. These modifications substantially increased pragmatic responses across all scalar terms, with *two* again yielding near-ceiling performance. These findings suggest that children's difficulty with scalar implicatures in standard experimental paradigms may reflect specific task demands rather than a delay in pragmatic development. When the communicative context is more felicitous, even young children demonstrate substantially improved performance.

These findings align with those from Guasti and Foppolo (2005), who assessed 40 Italian-speaking children (M = 5;4) in a truth-value judgment task (Crain and Thornton 1998) compared to a control group of adults. They found that adults derived scalar implicatures at ceiling across different scalar items. By contrast, children derived implicatures at substantially lower rates with respect to adult controls: 75% for *some* in object position, 70% for *some* in subject position, and 97.5% for *two*. Although the children tested by Guasti and Foppolo (2005) derived implicatures with *some* more often than those tested by Papafragou and Musolino (2003), both studies revealed a difference in children's implicature derivation as a function of the scalar term, with numerals consistently yielding high to at-ceiling proportions of pragmatic responses. These findings challenge Noveck's (2001) hypothesis of a generalized pragmatic delay. If children's difficulty with scalar implicatures reflected a domain-general deficit in pragmatic reasoning or maturational pragmatic constraint, they should show comparable difficulty across all scalar terms. Instead, the dissociation observed

between numeral and non-numeral scales suggests that TD children's performance is modulated by scale-specific factors, calling for more nuanced explanations of the developmental trajectory of implicature derivation.

In a subsequent study, Papafragou and Tantalou (2004) tested whether TD children's difficulty with scalar implicatures reflects a delay in pragmatic development (Noveck 2001) or stems from task-specific demands that obscure their pragmatic abilities. To do so, they used a more naturalistic reward-based paradigm, assessing the comprehension of the scalar term *meriki* ('some'), in which children decided whether animal characters deserved a prize for completing assigned tasks. In each trial, the animal was given a task (e.g., coloring four stars) and then completed it out of sight (e.g., inside a dollhouse), so that children could not directly observe the outcome. The animal then reported what it had done using an underinformative sentence such as 'I colored some'. Children then decided whether to reward the animal: assigning the prize reflected a logical interpretation of *some* (*some and possibly all*), whereas withholding it reflected the derivation of the scalar implicature (*some but not all*), indicating that the task was judged as incomplete. In Experiment 1, children overwhelmingly withheld the prize, suggesting sensitivity to scalar implicatures in this pragmatically supportive context.

These results, however, were not replicated by Foppolo *et al.* (2021, Experiment 1), who directly compared the performance of 58 TD Italian-speaking children (M = 5;2) across two different experimental tasks assessing the scalar term *alcuni* ('some'): a truth-value judgment task (adapted from Foppolo *et al.* 2012) and a picture selection task (modeled after Stiller *et al.* 2015). The two tasks yielded similar results: children gave 55.6% pragmatic answers in the truth-value judgment task and selected the pragmatic answer 57.6% of the time in the picture selection task, with no statistically significant difference between the two.

Other studies, by contrast, provide evidence that children can derive implicatures at rates comparable to adults, particularly when

tested at older ages. Feeney *et al.* (2004), for instance, tested 24 TD children (Range 7;3–8;3) and 32 adults in the sentence evaluation task by Noveck (2001). Their results showed that children and adults derived implicatures at almost identical rates: 66% and 65%, respectively. These adult-like implicature rates are consistent with a developmental trajectory in which scalar implicature derivation improves with age: the children tested by Feeney *et al.* (2004) were approximately two to three years older than those in Papafragou and Musolino (2003) and Foppolo *et al.* (2021), who showed considerably lower pragmatic response rates. In their second experiment, Feeney *et al.* (2004) examined whether high rates of pragmatic responding in children could be observed in a context where the implicature associated with some was highly relevant, without the training procedure employed by Papafragou and Musolino (2003). Children gave only a few logical responses to statements, with *some* in this pragmatically rich context – a much lower rate of logical responding than was found by Papafragou and Musolino (2003, Experiment 2) when they trained participants on pragmatic felicity. This suggests that when context is made highly accessible and relevant, older children demonstrate adult-like performance in implicature derivation.

The developmental literature reviewed thus far establishes that while TD children show variability in scalar implicature comprehension depending on task demands and scalar terms, they generally follow a clear developmental trajectory toward adult-like pragmatic performance. These findings raise important questions when we turn to clinical populations. Given that children with ASD are widely reported to experience pervasive difficulties in pragmatic language use, one might predict systematic difficulties in deriving scalar implicatures. The following section examines whether this prediction is borne out by empirical evidence.

5. The comprehension of scalar implicatures in children with Autism Spectrum Disorder

The current literature on scalar implicatures in ASD presents

a puzzle. As already discussed, ASD children are widely reported to exhibit pragmatic difficulties in everyday conversation (Dennis *et al.* 2001; Loukusa and Moilanen 2009; Angelieri *et al.* 2016). If they struggle with pragmatic reasoning broadly, as clinical observations suggest, they should derive scalar implicatures less frequently than their TD peers. However, empirical findings over the past two decades – although limited in number – have yielded a more complex picture. Some studies have found that ASD children derive fewer implicatures than TD children (Pastor-Cerezuela *et al.* 2018; Mazzaggio *et al.* 2021; a.o.), others report no significant differences (Su and Su 2015), and one study has documented higher rates of pragmatic responding in ASD compared to TD children (Schaeken *et al.* 2018, Experiment 1). This section reviews the key empirical findings from research assessing scalar implicatures in ASD children.

Among the first to assess scalar implicature derivation in ASD children (but see Chevallier *et al.* 2010 for a previous research on ASD adolescents), Su and Su (2015) investigated the interpretation of the Mandarin scalar triggers *youxie* ('some') and *mei...huozhe...* ('every... or...') in 28 Mandarin-speaking ASD children compared to 28 TD peers matched by chronological age. Children were divided into two age groups: 14 younger ASD group (M = 6.6) and 14 older ASD group (M = 11.7). All participants were assessed using a computer-based truth-value judgment task. In this task, participants were presented with short illustrated stories that concluded with an underinformative sentence containing either *some* – such as 'Some children found sea snails' in a context depicting 4 out of 4 children holding a sea snail – or *every...or...* – such as 'Every child got a sea star or a shell' in a scenario where all 4 children had both a sea star and a shell. If children interpreted the scalar terms as compatible with the stronger alternatives *all* and *and* respectively, they were expected to accept such scenarios. By contrast, rejection of underinformative statements in such scenarios was taken as evidence of pragmatic interpretation – i.e., *some* meaning *not all* and *or* meaning *not both*. Results showed that for underinformative sentences with some, younger ASD children gave more logical

responses than younger TD children, whereas this difference disappeared in the older groups. Crucially, underinformative sentences with *every...or...* yielded higher rates of logical responses in both ASD and TD children, but with an opposite pattern: younger ASD and TD children performed similarly (around 65% of logical responses), whereas older ASD children gave notably higher rates of logical responses compared to older TD children. While the authors did not find significant differences between ASD and TD groups overall, they found a developmental trend, with both older ASD and older TD children providing fewer logical responses than younger ones. This difference in rates of logical responses was statistically significant in both ASD and TD children for underinformative sentences with *every...or...*.

By contrast, a significant difference between ASD and TD children was found in a subsequent study by Pastor-Cerezuela *et al.* (2018). The authors assessed three groups of Spanish-speaking children using the *Generalized Conversational Implicature Test*, which consists of 15 items assessing different types of generalized implicatures, including scalar implicatures. The ASD group (n = 22; M = 10.92 years; linguistic age = 8.28 years on the Peabody test) was compared to a TD group matched by chronological age (n = 22; M = 10.89 years) and a TD group matched by linguistic age (n = 22; M = 8.35 years; linguistic age = 8.64 years on the Peabody test). On scalar implicature items, ASD children performed worse than TD children matched by both age and linguistic abilities. Moreover, overall results showed that the ASD group obtained worse performance than the other two groups for each implicature type.

These results were corroborated by subsequent studies with Italian-speaking and Thai-speaking autistic children by Mazzaggio *et al.* (2021) and Chanchaochai (2021), respectively. Mazzaggio *et al.* (2021) assessed 26 Italian-speaking ASD children (M = 7;3) and a control group of 26 TD children (M = 7;1) matched by chronological age using a picture selection task (adapted from Foppolo *et al.* 2021). The task required participants to point to the requested target (out of four possible pictures) after listening to a sentential prompt,

such as 'Guess which my cake is, I give you a clue: on my birthday cake, some of the candles are burning'. Results showed that TD children's performance improved with age: while younger TD children performed poorly, their accuracy improved from age 6 onward. A less consistent pattern was observed in ASD children, as their performance did not appear to improve with age. Moreover, the gap between TD children and ASD children persisted throughout primary school: while TD children from age 6 performed at ceiling in all conditions, some of the older ASD children showed persistent difficulty in computing pragmatic inferences. As argued by the authors, these data suggest a delayed emergence of the ability to compute scalar implicatures in ASD children, possibly linked to the development of other linguistic and cognitive skills.

The findings of Mazzaggio *et al.* (2021) were confirmed by a more recent study on Mandarin-speaking children by Su and Jiang (2023). As noted by the authors, Mandarin lacks morphological inflection, requiring speakers to derive scalar implicatures solely through lexical and contextual cues. This absence of grammatical marking makes Mandarin a particularly stringent test of pragmatic competence in autism, as it places greater demands on contextual reasoning and alternative generation. Su and Jiang (2023) assessed 22 autistic children (M = 5;7) and 19 TD peers matched on age, receptive vocabulary, and non-verbal IQ using a picture selection task. The task included underinformative sentences with two scalar triggers: the quantifier *some* and the numeral *three*. Results showed that TD children gave significantly more pragmatic responses than ASD children for both scalar triggers (numeral: TD 98.7% vs. ASD 56.8%; quantifier: TD 51.3% vs. ASD 6.8%), suggesting that ASD children struggled more in deriving scalar implicatures at this stage of their language development. Crucially, however, both groups showed the same pattern across scale types: pragmatic response rates were higher for numerals than for quantifiers in both TD and ASD children. These findings replicate the scale-specific asymmetry found in TD children by previous research (Papafragou and Musolino 2003; Guasti and Foppolo 2005), thus

extending the autistic population. Moreover, these data indicate that the source of difficulty in ASD children is at least partially scale-specific: if ASD children had a domain-general pragmatic deficit, they should show uniformly reduced performance across all scalar terms. Instead, experimental findings suggest that scale-related factors modulate scalar implicature derivation in autism just as they do in typical development.

While the studies reviewed thus far converge on reduced scalar implicature derivation in ASD children, not all findings align with this pattern. Schaeken *et al.* (2018, Experiment 1) reported an opposite pattern, finding higher rates of pragmatic responses in Dutch autistic children compared to two groups of TD children. They employed a classic statement evaluation task, presenting children with underinformative utterances containing *sommige* ('some'), such as 'The elephant pushes some of the trucks' in a scenario in which the elephant pushed 5 out of 5 trucks. In Experiment 1, children had to express their judgment using a binary option: 'I agree' vs. 'I disagree'. Sixty-six Flemish-speaking children were tested: 22 autistic children (M = 10.18 years), a group of 22 TD children matched by IQ (Intelligence Quotient) scores (M = 11.16 years), and an age-matched group of 22 TD children (M = 10.23 years). Results showed that the ASD group gave fewer logical answers than the other groups, a difference that turned out to be statistically significant.

Taken together, these findings reveal a complex and inconsistent picture. While most studies report that ASD children derive fewer scalar implicatures than TD children (Pastor-Cerezuela *et al.* 2018; Mazzaggio *et al.* 2021; Su and Jiang 2023), this pattern is not consistent across studies. Moreover, even when group differences emerge, they are modulated by multiple factors, such as the experimental task, the chronological age of participants, and the scalar term tested, with numerals consistently eliciting higher pragmatic response rates than quantifiers, mirroring patterns observed in typically developing children. This suggests that ASD children's difficulty with scalar implicatures, when present, is not a monolithic pragmatic deficit but

rather reflects the same scale-specific sensitivities observed in typical development, albeit with an overall reduction in pragmatic responses.

The heterogeneity of findings in ASD raises broader questions about the mechanisms underlying pragmatic difficulties in neurodevelopmental disorders. As already discussed, while the profile in ASD appears to involve primary pragmatic impairments, other neurodevelopmental disorders present different patterns of linguistic deficits. In particular, children with DLD and DD exhibit language impairments that may secondarily affect pragmatic competence, including the ability to derive scalar implicatures.

6. The comprehension of scalar implicatures in children with DLD[2]

The comprehension of scalar implicatures has emerged as a significant area of inquiry in the study of DLD and DD. Despite their pervasiveness in everyday language, scalar implicatures place considerable demands, as they require the simultaneous computation of both logical and pragmatic meaning. Children with DLD and DD, whose language difficulties extend beyond morphosyntax and phonology, may therefore face challenges in this domain. The following sections synthesize key empirical studies investigating scalar implicature comprehension in children with DLD and DD, examining the extent to which their difficulties reflect broader cognitive limitations, such as working memory and processing speed constraints, as well as the role of contextual and lexical factors that modulate performance.

Surian *et al.* (1996) is one of the earliest studies to investigate Gricean maxims in children with DLD. Eight English-speaking children with DLD (M = 11;10) judged puppet statements violating maxims of quantity, quality, relation, and politeness. Children with DLD performed above chance with statements violating maxims of quantity and at overall comparable levels to language-matched controls,

2 Although the studies reviewed here were originally conducted within the SLI diagnostic framework, the term DLD is used throughout this chapter in line with current terminology (cfr. Footnote 1).

leading the authors to conclude that DLD does not entail exceptional difficulties with Gricean maxims. However, performance specifically on the quantity maxims was at chance for DLD.

Katsos *et al.* (2011) represent an important contribution to the field of DLD research, as it was one of the first studies to systematically examine whether Spanish-speaking children with DLD show difficulties with the pragmatic maxim of informativeness and the logical meaning of quantifiers in this population. The study included 87 participants across three groups (n = 29 each), divided into a group of DLD (M = 6;6); a group of age-matched TD controls (AM-TD; M = 6;4); a group of younger language-matched TD controls (LM-TD; M = 4;7). The experiment consisted of a quantifier comprehension task (Spanish adaptation of Katsos and Smith 2010) in which children judged statements using *todos* ('all'), *ninguno* ('none'), *algunos* ('some'), *algunos...no* ('not some'), *la mayoría* ('most of'), and *no todos* ('not all') against visual displays. For example, children heard 'Algunos de los relojes están dentro de las cajas' ('Some of the clocks are in the boxes') while viewing a display in which all five boxes contained a clock – a logically true but pragmatically underinformative statement that a competent speaker should reject. The conditions tested logical truth, logical falsity, and pragmatic under-informativeness. The results showed that children with DLD underperformed their age-matched peers on both logical and pragmatic conditions, but performed comparably to the language-matched group, suggesting their difficulties are proportionate to their overall language delay rather than constituting a disproportionate pragmatic impairment.

Arosio *et al.* (2017) investigated whether semantic and pragmatic abilities are spared in Italian-speaking children with DLD who exhibit severe morphosyntactic deficits, using the same *Cavegirl and Boxes* paradigm as Katsos *et al.* (2011). The study was explicitly designed to address methodological limitations of the earlier Spanish study, particularly its wide age range and heterogeneous language profiles. The experiment included 48 monolingual Italian-speaking children across three groups (n = 16 each): a DLD group (M = 7;4),

an age-matched TD group (M = 7;4), and a grammar-matched TD group (M = 5;4). All children with DLD scored at least 2 SDs below the mean on a standardized grammatical comprehension test (TCGB; Chilosi and Cipriani 2006) and on a clitic pronoun production task, confirming a severe and homogeneous morphosyntactic deficit at both receptive and expressive levels. The design of the experiment consisted of a shortened version of the Katsos *et al.* (2011) quantifier comprehension task, testing *tutti* ('all') and *qualche* ('some') in logically true, logically false, and pragmatically underinformative conditions. The results showed that children with DLD performed at ceiling on the logical meaning of both quantifiers (above 96%), performing comparably to both control groups. However, they were significantly worse than age-matched controls in the underinformative condition, that is, in deriving the scalar implicature triggered by *qualche* ('some'), while performing comparably to the grammar-matched group – with DLD children giving 60% pragmatic responses compared to 89% in the age-matched group and 75% in the grammar-matched group. Crucially, performance in the pragmatic condition correlated positively with age and with scores on simple sentence comprehension, but not with non-verbal IQ or vocabulary. The authors interpret this as suggesting that scalar implicature derivation is still developing in children with DLD and is linked to the maturation of basic syntactic operations, rather than being permanently impaired.

Ryder *et al.* (2008) investigated pragmatic language comprehension in English-speaking children with DLD using a Relevance Theory framework, with the dual aim of characterizing the nature of pragmatic difficulties in this population and developing a cognitive assessment tool capable of identifying a subgroup of children with Pragmatic Language Impairment from within a broader DLD group. The study included 99 monolingual English-speaking children across three groups: 27 children with DLD (M = 8;4), of whom 9 were clinically diagnosed with Pragmatic Language Impairment; 32 TD children aged 5–6 (M = 5;7); and 40 TD children aged 7–11 (M = 8;4). All children attended mainstream schools in the same area and were of similar

socioeconomic status. The design of the study included three tasks of increasing contextual support: a Point-to-Picture task (PTP), in which the answer was visually available; a Verbal-only task, with no pictorial support; and a Storybook task, with partial pictorial support. Within the PTP and Storybook tasks, three question types of increasing pragmatic complexity were tested: reference assignment, semantic enrichment, and implicature recovery, the last being the most pragmatically demanding. The findings revealed that children with DLD performed comparably to the 5–6-year-old TD group, and significantly below their age-matched peers, on enrichment and implicature questions, indicating a developmental delay in pragmatic comprehension rather than a qualitatively distinct impairment. Crucially, performance on implicature questions was heavily modulated by contextual support: when the answer was pictorially available (PTP task), children with DLD performed comparably to their age-matched peers, but they performed significantly worse than both TD groups when only verbal context was available. Within the DLD group, children with Pragmatic Language Impairment performed significantly more poorly than those without on implicature questions across all three tasks. The study also found moderate correlations between implicature performance and receptive grammar, suggesting a relationship between structural language ability and pragmatic comprehension.

Davies *et al.* (2016) investigated referential communication in Spanish-speaking children with DLD, examining production, comprehension, and metalinguistic judgment of referring expressions within the same participants. The study aimed to clarify whether pragmatic difficulties in reference stem from structural language deficits, from an additional pragmatic impairment, or from some combination of the two, and to test the predictions of the pragmatic tolerance account (Katsos and Bishop 2011) in this population. The authors tested 36 monolingual Spanish-speaking children, comprising 18 children with DLD (M = 7;4) and 18 TD controls (M = 7;6), pairwise matched for chronological age, gender, and non-verbal reasoning abilities. The two groups did not differ significantly on age or non-verbal IQ but

showed significant differences on all language measures. Notably, the groups did not differ on false belief task performance, indicating comparable social cognitive abilities. The design of their experiment included three tasks: a production task, a comprehension task, and a judgment task. The results showed that children with DLD produced significantly more underinformative referring expressions than their age-matched peers and made more errors in comprehension, with both types of difficulty strongly correlated with structural language measures, particularly receptive grammar and vocabulary, rather than with social cognitive abilities. On the judgment task, children with DLD assigned lower penalties to underinformative utterances than TD peers, but within-group analyses revealed that they were nonetheless sensitive to the pragmatic infelicity, penalizing underinformative expressions more than optimal or over-informative ones. This pattern, that is detecting yet not fully penalizing pragmatic violations, is consistent with the pragmatic tolerance account by Katsos and Bishop (2011), whereby children with DLD behave similarly to younger TD children in tolerating pragmatic infelicity rather than lacking pragmatic awareness altogether. The authors conclude that structural language ability is the primary driver of difficulties in DLD, and that pragmatic deficits in this population are unlikely to reflect impaired social cognition.

The studies reviewed here converge on the finding that children with DLD show difficulties in deriving pragmatic inferences, performing below age-matched TD peers but comparably to younger language-matched controls. This pattern, documented across Spanish (Katsos *et al.* 2011; Davies *et al.* 2016), Italian (Arosio *et al.* 2017), and English (Ryder *et al.* 2008), suggests that pragmatic difficulties in this population are proportionate to their overall language delay rather than constituting a disproportionate or independent impairment. Importantly, both Katsos *et al.* (2011) and Arosio *et al.* (2017) demonstrate that the logical meaning of quantifiers is largely preserved in children with DLD, indicating a specific vulnerability in the pragmatic enrichment of scalar terms rather than a more general failure of quantifier comprehension. The evidence further points to structural langua-

ge ability, and syntactic competence in particular, as a key predictor of pragmatic performance across tasks and modalities, underscoring the close relationship between grammatical and pragmatic development (Arosio *et al.* 2017; Davies *et al.* 2016; Ryder *et al.* 2008).

A recurring theme across the studies reviewed is the role of context and task demands in modulating pragmatic performance in children with DLD. Ryder *et al.* (2008) demonstrated that children with DLD were able to derive implicatures when pictorial context reduced the processing load, but struggled when required to integrate verbal context alone, suggesting that their difficulties reflect processing constraints rather than a fundamental absence of pragmatic competence. This interpretation is consistent with the pragmatic tolerance account (Katsos and Bishop 2011), which proposes that children with DLD are sensitive to pragmatic infelicities but less likely to penalize them as severely as TD age-matched peers, a pattern confirmed by Davies *et al.* (2016) in the domain of referring expressions. Taken together, these studies challenge the traditional view of pragmatics as a relative strength in DLD, while at the same time arguing against the existence of a pragmatic deficit that is independent of structural language. Rather, they suggest that pragmatic difficulties in DLD are best understood as a downstream consequence of impaired grammatical and lexical development.

7. The comprehension of scalar implicatures in children with Developmental Dyslexia

The comprehension of scalar implicatures has been extensively investigated in populations with dyslexia, particularly regarding the acquisition of the quantifier some. Much of this research has been inspired by the pioneering work of Katsos and colleagues (2011) on pragmatic inference and the felicity judgment paradigm. The bulk of this literature shows that children with dyslexia perform more poorly than their age-matched peers, a difference often attributed to working memory limitations and the high cognitive costs associated with implicature computation. While most studies report pragmatic difficul-

ties in dyslexia, one notable exception is Arosio *et al.* (2016). They found intact semantic–pragmatic competence in 24 Italian children with DD (M = 9;3), who performed comparably to two groups of TD controls: 24 children matched on chronological age (±6 months; CA control group) and 24 matched on vocabulary level (±5 points on the Peabody test; VA control group). The study examined the comprehension of sentences containing quantifiers in subject position, a focus shared by most previous research on this topic. The experimental task was a shortened version of Katsos *et al.*'s (2011) *Cavegirl and Boxes* task. Specifically, comprehension was tested for sentences containing the quantifiers *tutti* ('all'), as in 'Tutte le mele sono nelle scatole' ('All apples are in the boxes'), and *qualche* ('some'), as in 'Qualche mela è nelle scatole' ('Some apples are in the boxes'). The results showed that all three groups of children performed at ceiling in their comprehension of the logical meanings of *all* and *some* statements, as well as in their interpretation of underinformative *some* statements. Moreover, there was no effect of age on comprehension accuracy. These findings suggest that children with DD have no difficulty understanding quantified sentences and, like their TD peers, appropriately reject underinformative *some* statements.

In contrast, the studies reviewed below present more consistent evidence of difficulties with scalar implicature computation in children with DD. Stoicescu *et al.* (2011) investigated the computation of scalar implicatures and the comprehension of quantifiers in Romanian-speaking children with dyslexia. The data were collected using a pragmatic felicity judgment task originally developed by Katsos *et al.* (2011) and adapted to Romanian within the Crosslinguistic Language Diagnosis (CLAD) project. The task tested children's understanding of the quantifiers *cîteva* ('some'), *nu toate* ('not all'), *niciun* ('none'), and *toate* ('all'). Participants included 25 children with DD (M = 8;11) and 25 TD age-matched peers (M = 8;11), all Romanian native speakers. Overall, the dyslexic children performed significantly worse than their TD peers, with scalar implicature items eliciting the lowest rate of target responses (57.3% for DD children vs. 88.7% for TD peers).

The *some*-true, *not all*-true, and *none*-true conditions were also more problematic for the dyslexic group. Interestingly, the distribution of scores among the dyslexic participants was bimodal, mirroring patterns observed in younger TD children (Foppolo *et al.* 2012; a.o.). The poorest performance was observed with quantifiers denoting subset situations (*some* and *not all*). In contrast, participants showed comparatively good understanding of *all* and were able to reject logically false *some* items at high rates; scores for *none* were also relatively high, though still below those of controls. In sum, dyslexic children showed significantly lower performance on scalar implicature computation compared to their age-matched peers, a difficulty that Stoicescu *et al.* (2011) attributed to the working memory load imposed by reference-set computation.

Hu *et al.* (2019) investigated the derivation of scalar implicatures in Chinese children with reading difficulties (RD). Twenty-four children with RD (M = 9;8), 20 age-matched typical readers (M= 9;10), 20 six-year-olds, and 20 five-year-olds were tested on their comprehension of sentences containing the scalar items *yixie* ('some') and *suoyou* ('all'). The performance of children with RD resembled that of the six-year-old group but differed from that of age-matched typical readers, particularly in the comprehension of sentences with *yixie* that were pragmatically underinformative in context. Furthermore, many children with RD and younger children who accepted underinformative *yixie*-sentences, rejected sentences with *yixie* that were true in contexts supporting the literal (semantic) interpretation. These results suggest that the computation of scalar implicatures may be impaired in children with RD, likely due to an interplay of factors including limited lexical knowledge of the scalar term and processing or pragmatic constraints.

Vender *et al.* (2020) investigated the computation of scalar implicatures in Italian children with dyslexia (M = 10.6 years) and compared their performance to that of 18 age-matched controls (M = 10.7 years) and 18 adults (M = 24.5 years). Two quantifiers were tested, *alcuni* (a cardinality quantifier) and *qualche* (a proportional quanti-

fier), both corresponding to the English some. The results revealed that children with DD showed a stronger tendency to avoid deriving scalar implicatures. The authors attributed this finding to the processing limitations characteristic of dyslexia and to the high cognitive costs associated with implicature computation.

Taken together, the studies reviewed here present a largely consistent picture of scalar implicature difficulties in children with DD, with the notable exception of Arosio *et al.* (2016), whose Italian-speaking participants performed comparably to both age-matched and vocabulary-matched controls. Across the remaining studies, children with dyslexia systematically underperformed their age-matched TD peers in deriving scalar implicatures, a pattern documented in Romanian (Stoicescu *et al.* 2011), Chinese (Hu *et al.* 2019), and Italian (Vender *et al.* 2020). A recurring explanation across these studies is that implicature computation places particularly high demands on working memory and processing resources – capacities that are known to be constrained in dyslexia – rather than reflecting a fundamental deficit in pragmatic competence *per se*. Consistent with this interpretation, difficulties appear to be most pronounced for subset quantifiers such as *some* and *not all*, which place the greatest demands on reference-set computation. The bimodal distribution of scores observed by Stoicescu *et al.* (2011), mirroring patterns found in younger TD children, further suggests that scalar implicature acquisition may follow a delayed rather than deviant trajectory in this population. Future research should systematically examine the role of working memory, lexical knowledge of scalar terms, and task demands in modulating performance, in order to disentangle processing-based from competence-based accounts of these difficulties.

8. Discussion and conclusions

The present chapter has examined the comprehension of scalar implicatures in typically developing children compared to children with Autism Spectrum Disorder, Developmental Language Disorder, and Developmental Dyslexia. Taken together, the reviewed expe-

rimental findings show that in typically developing children, scalar implicature comprehension follows a clear developmental trajectory, with increasing rates of pragmatic responses over time. However, performance is highly variable and strongly modulated by task demands, contextual support, and the specific scalar term involved, suggesting that children's difficulties cannot be reduced to a simple delay in pragmatic competence.

Findings from clinical populations further support a non-unitary view of pragmatic development. In Autism Spectrum Disorder, results are mixed but generally point to reduced rates of implicature derivation, consistent with the presence of primary pragmatic impairments, although modulated by scale type and experimental task. In contrast, children with Developmental Language Disorder and Developmental Dyslexia tend to show difficulties that are better accounted for in terms of processing limitations and structural language deficits, rather than a primary impairment in pragmatic knowledge. In these populations, pragmatic difficulties appear to be secondary and closely tied to broader linguistic and cognitive constraints.

Overall, the comparison across developmental profiles reveals that a single pragmatic phenomenon can manifest in qualitatively different ways depending on the underlying cognitive and linguistic profile of the child. This has meaningful implications for both theory and intervention. From a theoretical standpoint, it argues against treating pragmatic competence as a monolithic capacity and supports frameworks that distinguish between the knowledge of pragmatic principles and the processing resources required to deploy them in real time. From an applied perspective, these findings serve as a reminder that similar surface-level difficulties may call for different clinical responses and therefore that effective assessment and intervention cannot be uniform across populations. Children with ASD may require approaches that directly address pragmatic knowledge, whereas children with DLD or Developmental Dyslexia may be better served by interventions targeting the processing and linguistic constraints that indirectly impede pragmatic performance.

Acknowledgements

F.L. acknowledges the financial support of a PhD fellowship (DM 118/2023) funded by the European Union NextGenerationEU, under the National Recovery and Resilience Plan (PNRR), and granted by the Italian Ministry of University and Research (MUR).

E.P. acknowledges the financial support of Grant CNS2025-166503 (Consolidación Investigadora 2025) funded by MICIU/AEI /10.13039/501100011033 and of Grant RYC2021-033969-I (Ramón y Cajal 2021) funded by MCIN/AEI/10.13039/501100011033 and by European Union Next-GenerationEU/PRTR.

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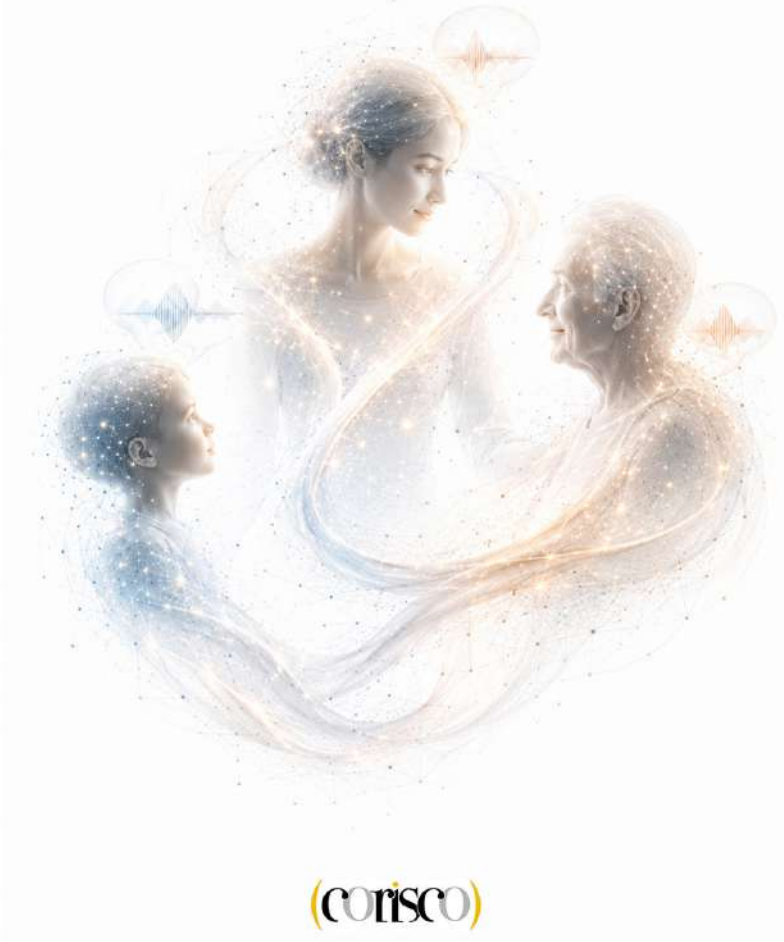

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ISBN: 978-88-98138-52-4

Paola Pennisi

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