UNIVERSITÀ DEGLI STUDI

DI MODENA E REGGIO EMILIA

Dottorato di ricerca in Scienze Umanistiche

Ciclo XXXIII

Pragmatic abilities and their relationship with Theory of Mind, Executive Functions and psychological health.

An investigation in children with typical development, children with different neurodevelopmental disorders, and adults with Specific Learning Disorders.

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ABSTRACT

Despite the importance of the pragmatics skills in the interactions with other people and in the communicative exchanges, little research focused on these abilities and on their relationships with psychological well-being and other cognitive domains in typically developing (TD) children and in individuals with Specific Learning Disorders (SLD).

Previous works focused mainly on pragmatic abilities in patients with neurological and psychiatric disorders, Autism Spectrum Disorder (ASD), Developmental Language Disorders (DLD) and Schizophrenia. In these clinical populations, the studies reported close relationships between pragmatic abilities and both quality of life (QoL) and behavioural problems. Surprisingly, the link between pragmatic skills and psychological health in TD children is still underinvestigated. Studying more in depth the relationships between pragmatics and psychological health in TD children appears as a central issue to better understand the child's development and prevent later behavioural and emotional difficulties.

Moreover, in Italy, the instruments for the identification of pragmatic difficulties in children are still limited and the discrimination between children with various language difficulties into different diagnostic profiles remains a major challenge in clinical settings.

Regarding clinical populations, little is known about pragmatic abilities in individuals with (SLD). Studying pragmatic abilities and their relationships with other cognitive domains, i.e. Theory of Mind (ToM) and Executive functions (EFs) in patients with SLD could contribute to define their cognitive functioning and plan an effective support.

Guided by this evidence, three studies were designed.

Study 1 aimed at analysing the relationships between pragmatic abilities, school well-being and behavioural problems in a group of 66 TD children. The data collected suggested a strong relationship between pragmatic skills and both school well-being and children behavioural features.

Study 2 evaluated and compared pragmatic skills in children with TD (n = 26) and with different neurodevelopmental disorders: ASD with good intellectual functioning (n = 19), SLD with associated DLD (n=23) and SLD without linguistic impairments (n = 21). The findings contributed to discriminate the pragmatic profile between these clinical populations. We investigated and confirmed the validity of the Children Communication Checklist (CCC-2) as screening measure for pragmatic skills as well.

Study 3 assessed the pragmatic comprehension abilities in 26 young adults with SLD and in 30 adults from the general population. We studied the relationship between pragmatics, QoL, ToM and EFs as well. Our results showed that pragmatic abilities were compromised in young adults with SLD. In this clinical population we found also a link between pragmatic comprehension and ToM. Independently from the presence of SLD, pragmatics abilities were in relationship with QoL.

Overall, this work contributes to shed light on the relationships between pragmatic abilities and other psychological and cognitive domains in both typically developing individuals and clinical samples, SLD in particular. Moreover, our data suggest that pragmatic difficulties should be considered as a possible risk factor for emotional and behavioural problems during development. Thus, an early identification of pragmatic difficulties, even in children without evident psychopathological symptoms, may prevent psychological problems that could occur later in the development.

To date pragmatic abilities still appear underestimated and rarely evaluated in clinical settings. Our results highlight the importance of including the evaluation of these abilities in the clinical assessment of children and adults with SLD, in order to better define their cognitive profile and plan an intervention.

ABSTRACT

Nonostante l'importanza delle abilità pragmatiche nelle interazioni sociali e negli scambi comunicativi, pochi studi hanno indagato tali abilità e il loro rapporto con il benessere psicologico e con altri domini cognitivi in soggetti a sviluppo tipico (ST) o in presenza di Disturbi Specifici dell'Apprendimento (DSA).

I lavori si sono concentrati principalmente su pazienti con disturbi neurologici e psichiatrici, in particolare Spettro dell'Autismo (ASD), Disturbi Specifici di Linguaggio (DSL) e Schizofrenia. In queste popolazioni cliniche, è stata descritta una relazione tra pragmatica, qualità della vita (QdV) e problemi comportamentali. Sorprendentemente, il legame tra abilità pragmatiche e benessere nei bambini a ST è ancora poco indagato. Studiare la pragmatica e la sua relazione con la salute psicologica nei bambini a ST e con disturbi del neurosviluppo è importante non solo per comprendere in modo più approfondito il loro sviluppo psicologico e cognitivo, ma anche per prevenire successive difficoltà comportamentali ed emotive.

In Italia, gli strumenti per l'identificazione delle difficoltà pragmatiche nei bambini sono ancora limitati e la discriminazione tra i profili linguistici di bambini con diversi disturbi rappresenta un'attuale sfida in ambito clinico.

Per quanto riguarda le abilità pragmatiche in popolazioni cliniche, in letteratura sono presenti pochi studi riguardanti i DSA. Valutare le capacità pragmatiche e le loro relazioni con altri domini cognitivi, in particolare Teoria della mente (ToM) e Funzioni esecutive (FE), rappresenta un obiettivo primario al fine di meglio definire il profilo di funzionamento e pianificare un supporto efficace.

Guidati da queste evidenze, per il presente lavoro sono stati progettati tre studi.

Nello studio 1 è stata analizzata la relazioni tra le abilità pragmatiche, il benessere scolastico e i problemi comportamentali in un gruppo di 66 bambini a ST. I dati raccolti suggeriscono una forte relazione tra abilità pragmatiche e le variabili psicologiche/comportamentali indagate.

Nello studio 2 sono state valutate e confrontate le abilità pragmatiche in 4 gruppi di bambini: a ST (n = 26), con ASD e buon funzionamento intellettivo (n = 19), con DSA con associato un DSL (n = 23) e con DSA senza disturbi linguistici (n = 21). Dalle analisi sono emersi profili pragmatici differenti a seconda del disturbo considerato. Inoltre, è stata indagata, e confermata, la validità della Children Communication Checklist 2 (CCC-2) come misura di screening per le abilità pragmatiche.

Nello studio 3 sono state valutate le capacità di comprensione pragmatica in 26 giovani adulti con DSA e in 30 adulti a sviluppo tipico. È stata indagata anche la relazione tra pragmatica, QdV, ToM ed FE. Le abilità pragmatiche sono risultate compromesse nei giovani adulti con DSA. Inoltre, in questa popolazione clinica, è stato trovato un legame tra la comprensione pragmatica e la ToM. Infine la pragmatica è risultata in stretta relazione con la QdV indipendentemente dalla presenza di diagnosi di DSA.

Nel complesso, il presente lavoro ha contribuito a definire le relazioni tra la pragmatica e altri domini psicologici (QdV) e cognitivi (ToM e FE) sia nella popolazione generale che in gruppi clinici, in particolare nei DSA. Inoltre, i dati suggeriscono l'importanza di considerare le difficoltà pragmatiche come possibili fattori di rischio per problemi emotivi e comportamentali durante lo sviluppo. Pertanto, un'identificazione precoce delle difficoltà pragmatiche, anche nei bambini senza evidenti sintomi psicopatologici, potrebbe prevenire problemi psicologici a esordio tardivo.

Ad oggi, le capacità pragmatiche appaiono ancora sottovalutate e raramente valutate in ambito clinico. I risultati evidenziano la necessita di includere queste abilità nella valutazione clinica di bambini e adulti con DSA, al fine di definire meglio il loro funzionamento e pianificare un intervento.

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1 INTRODUCTION

1.1 Focusing on language pragmatics

"Language can be no more removed from emotion, than flour can be removed from an

already baked cake."(Lindquist, 2009, p. 16)

Language is a crucial tool for children development and their well-being. The desire to build and

maintain positive relationships is considered one of the most basic and universal needs of humans

(Baumeister & Leary, 1995) and language abilities are fundamental for social interaction.

Language is a complex domain and it includes both structural aspects (syntax, morphology, phonology

and semantics) and pragmatics. This latter term refers to the proper use of language in interactions and

to the correct interpretation of the message in social contexts and in communicative exchanges (Tager-

Flusberg, 1999; Milligan et al., 2007).

The development of structural language is one of the most important milestone in our life; it contributes

to efficiently convey a message. However, the structural language alone is not sufficient and higher

order processes are needed in social exchanges. In fact, interlocutors are often required to go beyond

the literal words and to use their knowledge and experiences to construct meanings. Therefore,

pragmatic abilities seem to be crucial as they are involved in the understanding of a message and in

social communication.

The development of language pragmatics begins from the first months and progresses until adulthood.

From the preschool period, children are able to comprehend the interlocutor's intentions and begin to

fully deal with deceit and lies. During primary school, pragmatic abilities assume a central role in

social exchanges. Interactions with peers become more frequent and language pragmatic is crucial to

establish positive relationships. For this reason, at this stage, pragmatic abilities are strongly related to self-esteem, happiness and avoiding peer rejections (e.g. Van Agt et al., 2011). Pragmatic skills continue to develop until young adulthood and also in this period individual differences in pragmatic abilities seem to have consequences for all arenas of social life (Matthews et al., 2018).

Recently the literature on pragmatics has flourished, underlining the importance of its role in communicative exchanges (Cocquyt et al., 2015; Veneziano, 2010). Two areas of research have characterized studies on pragmatics: the first concerns how children acquire conversation rules and the use of utterances in different contexts (Ninio & Snow, 1996), the second focuses on the comprehension of utterances and speaker's intentions, such as irony and metaphor (Angeleri & Airenti, 2014; Van Herwegen et al., 2013). Previous studies have mainly focused on children and adults with neurodevelopmental or psychiatric disorders, such as Autism Spectrum Disorder, Developmental Language Disorders and Schizophrenia (Davies et al., 2016; Kim et al., 2014). To the best of our knowledge only few studies investigated children with Specific Learning Disorders (Cappelli et al., 2018; Lam & Ho, 2014). This clinical condition is characterized by difficulties in reading, writing and spelling; however children with Specific Learning Disorder could present problems in language abilities as well. In children with Specific Learning Disorder, those with Developmental Dyslexia in particular, phonology is often compromised (Bishop & Snowling, 2004). Weaknesses in other aspects of language including vocabulary, morphology, syntax, and discourse were also found (e.g. Adlof & Hogan, 2018; Snowling et al., 2003). Considering structural language difficulties in children with Specific Learning Disorder, the study of pragmatic abilities in this clinical population seems to be an important challenge.

Moreover, literature about pragmatic abilities and their relationships with both psychological aspects and other cognitive domains is still lacking. Pragmatics is required in social exchanges and it supports communication. Therefore, being able to use language correctly in social context and to understand the

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message could help children in making friends and maintaining relationships with peers. In contrast, pragmatic difficulties may determine lower self-esteem, anger and therefore an increase of internalizing and externalizing behaviours. Considering that children spend almost half a day at school, the analysis of the relationship between pragmatics and well-being in class and with peers seems to be of particular interest.

Finally, in line with previous studies finding that behavioural problems and lower well-being associated to pragmatic abilities are lifelong and tend to persist in adolescence (Helland et al., 2014) the evaluation of pragmatic skills also in typically developing children is a fundamental challenge to define an early support.

1.2 Purpose of the present research

The present work was guided by three research questions regarding pragmatic abilities and their relationships with well-being and other cognitive domains, namely Theory of mind and Executive functions. We focused on individual from the general population and with different neurodevelopmental/psychiatric disorders (Autism Spectrum Disorder, Developmental language disorder and Specific Learning Disorder).

The first study was designed to examine the relationship between pragmatic abilities and school well-being in a group of typically developing primary school children from the point of view of mothers and teachers. Well-being refers to a wide range of domains including physical, psychological, cognitive, social and economic outcomes (Pollard & Lee, 2003). According to Konu and colleagues (Konu et al., 2002) school well-being is composed of four categories: school conditions (e.g. school organization, punishments), social relationships (e.g. teacher-student relationships, peer relationships), means of self-fulfilment (e.g. value of student work), and health status (e.g. psychosomatic symptoms). In a recent

study, Tobia (Tobia et al., 2019) underlined the importance of considering school well-being as a multi-dimensional concept that includes psychological, cognitive and social components. Considering that peers' and teachers' relationships are based mainly on language and communicative exchange, pragmatic and social abilities seems to have a crucial role in feeling well at school. To the best of our knowledge, no studies have investigated the relationships between pragmatic abilities and school well-being. However, in line with the evidence of implications of pragmatic language abilities in establishing relationships and social exchanges, we expected close associations between pragmatics and school well-being in our group of typically developing children.

Secondly, we investigated the potential associations between language pragmatic abilities and psychological health in typically developing children. Language is an important tool for social interaction (Helland et al., 2014) as it contributes to regulate one's own and others' emotions and behaviours. An association between language impairments and behavioural problems has been described in several studies (Hill & Coufal, 2005; Mackie & Law, 2010). The relationship seems to be bidirectional; in fact, children with language impairments frequently experience behavioural problems and conversely, many children with behavioural problems show language impairments (Gallagher, 1999; Hartas, 2012; Ketelaars et al., 2010).

Among language domains, pragmatic language deficits are clinically relevant and may play a crucial role on behavioural problems. According to Gilmour and colleagues (Gilmour et al., 2004) pragmatic language impairments are associated with both conduct disorder and antisocial behavior. Similarly, Donno (Donno et al., 2010) argued that pragmatic language deficits represent a possible contributory factor to behavioural problems in primary school children.

To the best of our knowledge, the data on pragmatic abilities and behavioural difficulties in typically developing children are still limited and mixed. According to previous clinical literature, we hypothesized an associations between pragmatic abilities and behaviours in typically developing

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children as well. In particular, we hypothesized a link between pragmatics and internalizing and externalizing behaviours.

Considering the potential role of pragmatic abilities on behavioural problems and school well-being, the main aim of the second study concerns the description of pragmatic difficulties in different neurodevelopmental disorders in order to better discriminate the profiles and plan early interventions. The study involved the parents of children with neurodevelopmental disorders (Autism Spectrum Disorder; Developmental Dyslexia and Developmental Dyslexia with Developmental Language Disorder) and of typically developing children. In particular, our research interest was focused on children with Developmental Dyslexia as, to the best to our knowledge, only few studies investigated pragmatic abilities in children with this disorder. Recently, Lam and Ho (2014) found significant difficulties in pragmatics and social competences in children with Developmental Dyslexia compared to typically developing peers. Impairments in the comprehension of metaphors were described in a sample of children with Developmental Dyslexia as well (Cardillo et al., 2018). According to these findings, we hypothesized mild difficulties in pragmatics in Developmental Dyslexia and Developmental Dyslexia associated with Developmental language disorder groups. The second aim of the study concerns the investigation of the validity of the Children's Communication Checklist (CCC-2; Bishop, 2003) in discriminating pragmatic and social difficulties in children with different neurodevelopmental disorders. In fact, even if the evaluation of language pragmatic abilities seems to be an important challenge in the clinical setting, the assessment of these abilities is still debated. The identification of children with language impairments is mainly based on psychometric tests that allow clinicians to observe different aspects of language in a standardized setting. However, standardized tests may miss specific clinically important features of language impairments and they also might identify some children who performed poorly because of their lack of concentration or motivation but do not have a language disorder (Bishop & McDonald, 2009). Given the difficulties in observing

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pragmatic performance in a clinical setting the second instruments used to identify language impairments are questionnaires completed by the parents. The role of parental report in detecting language difficulties has been widely described for toddlers and preschool children (Dale, 1997). On the contrary, parent report has been used much less extensively with school-age children. However, parental report may be better than formal testing in detecting communication problems, in particular when the latter are relatively rare or difficult to elicit with a standardized assessment and setting (Bishop & McDonald, 2009).

In Italy there are many well-standardized tests for structural language abilities. Instead, the instruments for the identification of pragmatic difficulties are limited. The new version of the CCC-2 is a well-validated qualitative scale that could identify children at risk of language impairments. Even if it is not intended to be used as a diagnostic instrument, it indicates the presence of language and pragmatic impairments and it has rapidly become the instrument of choice for identification of pragmatics impairments (Adams, 2002; Norbury, 2014). Recently, the use of the CCC-2 has increased but to our knowledge there are no systematic studies about the reliability of the scale in discriminating the different linguistic and communicative disorders in the Italian population. In particular, from the clinical work arises the need to better understand and differentiate the similar linguistic profiles that characterize different neurodevelopmental disorders such as Developmental language disorder and Autism Spectrum Disorder. In line with these considerations, we hypothesized good reliability of the CCC-2 questionnaire in detecting pragmatic skills and impairments. Moreover, we expected different profiles according to the different investigated disorders. In particular our main hypothesis was that children with Autism Spectrum Disorder would total a lower score in the items evaluating pragmatics, social relations and interests, compared with the other clinical groups (Developmental Dyslexia and Developmental language disorder) and with typically developing peers. Finally, we assumed differences in social functioning between children with Developmental Dyslexia and with

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Developmental Dyslexia associated with Developmental Language Disorder. Even if in both groups we expected relative adequate abilities in social skills, such as relations and interests, children with Developmental Dyslexia associated with Developmental language disorder would have lower skills according to their more severe language difficulties.

The first and the second study contributed to clarify the role of pragmatic abilities in typically developing children and in clinical population and they underlined the importance of and early evaluation of pragmatics in order to better define the cognitive and emotional profile of the child and plan an efficient intervention to prevent or reduce later behavioural and psychological problems.

 Based on the data found in the first and second study, a third work was designed in order to explore pragmatic abilities in young adults. We investigated the link between pragmatics, quality of life and other cognitive domains (Theory of mind and Executive functions) as well. We selected these two cognitive abilities in line with a recent study (Martin & McDonald, 2003) in which the authors explained the three main theoretical position on pragmatic functioning and its deficits. The first theory, the Weak Central Coherence hypothesis, postulated that pragmatic deficits are caused by the inability to use context to derive meaning. Moreover, this hypothesis argued that the understanding and use of pragmatic language are based on the integration of the different elements of discourse. If this process does not work efficiently, pragmatic difficulties may arise. Social Inference is the second theory and it is grounded on the assumption that social inferences are always required when we attempt to explain or predict the intentions, thoughts and behaviours of our interlocutors. The last theory, the Executive Dysfunction Account, postulated that Executive functions and frontal lobe activation have been linked to pragmatic abilities and to social behaviour as they are involved in planning, monitoring and inhibiting the behaviour in discourse and in social exchanges. Recently, Poletti (2011) introduced a new neurocognitive model based on the interaction of Executive functions and Theory of mind and their influence on pragmatic language abilities. The model considers the role of each single component on

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pragmatic language and includes both Executive functions (working memory and inhibitory control) and Theory of mind.

In the present study, we focused on adults with Specific Learning Disorder as, even though pragmatics represents a domain of potential difficulties for this clinical population, to the best of our knowledge only two studies have investigated pragmatics impairments in this adults with Specific Learning Disorder (Griffith, 2007; Cappelli et al., 2018). These studies showed differences in pragmatic tasks between university students with dyslexia and the control group, with dyslexics performing worse than their non-dyslexic peers. Indeed, dyslexic students showed a lesser performance in the tasks requiring inferences from figurative language. Considering these results, it seems that pragmatic issues in dyslexic young adults are linked to the abilities typically impaired in the disorder: phonological awareness, verbal short term memory and pseudo-word repetition (Cappelli et al, 2018). However, these findings are still few and not conclusive.

Furthermore, pragmatic competences in young adults with Specific Learning Disorder have never been correlated with their quality of life. Studies regarding the psychological impact of pragmatic disorders in adults showed that impairments in pragmatic skills, which appear in childhood, have a long-term impact on relationship formation (Whitehouse et al., 2009), employability (e.g. Eaves & Ho, 2008), and behavioural, social, and emotional problems (e.g. St Clair et al., 2011).

Addressing gaps in existing literature about adults with Specific Learning Disorder, the last work had three main goals. First, we examined pragmatic abilities in young adults with Specific Learning Disorder. In line with the literature, we focused on pragmatic comprehension rather than production. We hypothesized difficulties in pragmatic abilities young adults with Specific Learning Disorder compared to the control group.

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Secondly, we investigated relationships between pragmatics and other cognitive abilities, namely Theory of mind and Executive functions. We expected cognitive variables to affect pragmatic abilities in the two group.

Finally, we analysed the possible relationship between pragmatics and quality of life. We hypothesized a link between pragmatics and Theory of mind both in adults with Specific Learning Disorder and in the control group.

2   PRAGMATICS

2.1 Language pragmatics

An efficient communication is based on the intention of the speaker and the interlocutor to be involved in a social exchange. Communication includes verbal and non verbal acts that convey a message. To plan and understand the communication, both structural language and language pragmatics are fundamental.

Structural language is a complex domain that includes several components regulating specific aspects: syntax, morphology, phonology and semantics (American Speech-Language-Hearing Association [ASHA] 1993). Altogether these language components regulate grammatical rules, combinations of sound units and the meaning of words. The pragmatics of language is the ability to use language properly in interactions with other people and to interpret language correctly in social contexts or in communicative exchanges (Milligan et al. 2007; Tager-Flusberg, 1999). Pragmatics includes both linguistic functions, such as register (altering one's speech depending upon whom one is speaking to), negotiation of turn-taking, and the choice of referential expressions (''a'' versus ''the''), as well as non-linguistic functions, such as eye contact, body language and facial expressions. Turn-taking and politeness have a key role in the organization of a conversational exchange. The first coordinates the activity of the speaker and the listener during a conversation and it is considered to be a universal mechanism displayed by both sign and verbal language (Domaneschi & Bambini, 2020). Previous research evidences that turn-taking skills are effected by Executive functions and join attention and they develop early in childhood during the first verbal exchanges with the mother. Politeness mechanisms are acquired with specific instructions from the parents (or other adults) and they increase progressively during the development. Interestingly, politeness is linked with Theory of mind and this two domain seem to have a symmetric developmental trajectory (Airenti & Angeleri, 2011). During a

communicative exchange, the speaker has to be aware of and to respond to the social status, knowledge, interest, motivation, and other qualities of the listener (Eigsti et al., 2011).

Expanding on a classical proposal advanced by Bates (1976), Lorusso (2009) identified many components of linguistic pragmatics: 1) speech acts including the possible functions of a message (for example warning or thanking) or the communicative purpose that determines the meaning of words used in language (Searle, 1975); 2) linguistic and conversational codes or styles appropriate to the context; 3) conversational skills and speech regulation, namely the abilities to start a conversation, answer to a communicative exchange and take turns (Adams, 2002); 4) inference, referring to the ability of interpreting occurrences in a story, for example, and filling in information that is not explicitly mentioned (Tompkins et al., 2013); 5) referential communication used to exchange information about an entity allowing the listener to recognize what the speaker is referring to (Asher, 1979).

Nevertheless, there is a lack of a coherent theory and the abundance of views makes referring to a unitary theoretical background of pragmatics rather difficult (O'Neill, 2012).

According to the Speech Act Theory (Austin, 1975) some sentences do not just describe or report information. Rather, they also carry out actions. The author describes three types of sentences: locutionary that refer to the act of saying a sentence, illocutionary referring to the speaker's purpose in saying that sentence, and perlocutionary that concern the effect of that sentence on a listener. Moreover, Austin divided the verbs into five categories:

- Verdictives verbs consist in the delivering of a finding, official or unofficial, upon evidence or reasons as to value or fact so far as these are distinguishable. Examples of verbs in this class are: acquit, hold, calculate, describe, analyse, estimate, date, rank,assess, and characterize.

- Exercitives verbs give a decision in favour of or against a certain course of action or advocacy of it. Some examples are: order, command, direct, plead, beg, recommend, entreat and advise.

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- Commissives verbs are used to commit the speaker to a certain course of action. Some obvious examples are: promise, vow, pledge, covenant, contract, guarantee, embrace, and swear.

- Expositives verbs are used in acts of exposition involving the expounding of views, the conducting of arguments and the clarifying of usages and reference. Among expositives verbs there are for example affirm, deny, emphasize, illustrate, answer, report, accept, object to, concede, describe,class, identify and call.

- Behabitives verbs include the notion of reaction to other people's behavior and fortunes and of attitudes and expressions of attitudes to someone else past conduct or imminent conduct.

Some examples are: apologize, thank, deplore, commiserate, congratulate, felicitate, welcome, applaud,criticize, bless, curse, dare, defy, protest, and challenge.

The taxonomy constructed by Austin was criticized by Searle in his work about the classification of illocutionary acts (1975). According to the author the classification of Austin is defective for several reasons, especially in the lack of clear criteria for distinguishing one kind of illocutionary force from another. Searle identified some weakness in Austin' taxonomy. First, not all of the verbs listed in the classification are even illocutionary verbs. For example, 'sympathize', 'regard as', 'mean to', 'intend', and 'shall'. Second, there is no clear or consistent principle or set of principles on the basis of which the taxonomy is constructed. Third, there are no clear principles of classification and there is a confusion between illocutionary acts and illocutionary verbs. These two aspects cause a overlap from one category to another and a great heterogeneity within some of the categories. Forth, within some of the categories there are quite distinct kinds of verbs. For example Austin listed 'dare', 'defy' and 'challenge', alongside 'thank', 'apologize', 'deplore' and 'welcome' as behabitives. Searle argued that verbs as 'dare', 'defy' and 'challenge' have to do with the hearer's subsequent actions. In fact they belong with 'order', 'command' and 'forbid' both on syntactical and semantic grounds. Moreover, when we look for the family that includes 'order', 'command' and 'urge', these are listed as exercitives alongside 'veto', 'hire'

and 'demote'; but , these are in two quite distinct categories. Finally, not all of the verbs listed within the classes really satisfy the definitions given.

Searle proposed a new classification of illocutionary acts dividing them into five categories: declaration (the acts that make the propositional content corresponds with the reality), representative (in these speech acts, the speaker's intention is to assert the speaker's belief, expressive (the acts that show the expression of the speaker via utterance), directive (the acts that aim to make someone else to do something that the speaker desires) and commissive (acts of committing to future actions).

Another theoretical framework for linguistic pragmatic is Gricean view (Grice, 1975). Grice distinguished between the sentence meaning and the utterer's meaning. The first refers to the conventional meaning of an expression that does not depend on the context and/or the circumstance of use. Sentence meaning is called also linguistic meaning and it is the timeless meaning of a type-expression socially determined within a community that share a common language. The uttere's meaning is conveyed by the linguistic meaning and it is the message that the speaker intends to communicate in a specific verbal interaction. Grice (1975) formulated the Principle of Cooperation that highlights the existence of certain implicit rules that govern the conversational exchange, the conversational maxims. These maxims enjoin speakers to ''say no more or no less than required for the purpose of the (talk) exchange'' (Maxims of Quantity), ''tell the truth and avoid statements for which there is insufficient evidence (Maxims of Quality)'', ''be relevant (Maxim of Relation)'', ''avoid ambiguity, confusion and obscurity (Maxims of Manner)'', and ''be polite'' (Maxim of Politeness). Traditionally, conforming to the maxims has been recognized as a key to conversational processes (Bates, 1976). Moreover, in Grice's theory, the communication is described as a cooperative act between the speaker and the listener. During the communicative exchange the speaker chooses utterances in order to convey an understandable message for the listener that interprets these utterances with the assumption of the cooperativeness in mind. Based on the maxims and the cooperative principle

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the listener can make inferences that go beyond the literal meanings. The non-literal interpretations computed through these inferences are called pragmatic implicatures. Language comprehension often is based on implicatures. Consider the following sample utterances (Yoon & Frank, 2019):

1. "I ate some of the cookies"

2. "I ate the chocolate chip cookies"

The first sentence implicate that the speaker ate some but not all of the cookies. Inference like this is an example of scalar implicature and it relies on the fact that "all of the biscuits" entails "some of the biscuits" as part of a lexical scale (Horn, 1972). The second utterance, asserted by a speaker in a context where two kind of cookies- cookies-chocolate chip and raisin- are available, implicates that the speaker ate the chocolate cookies but not both the chocolate chip and the raisin cookies. This type of inference is called ad hoc implicature and it is determined by the specific context. Scalar implicatures are more difficult for children than ad hoc implicature and their developmental needs a more sophisticated linguistic knowledge (Horowitz et al., 2018). The ability to make scalar implicatures develops only around 5 years of age whereas ad hoc implicatures emerge earlier from 3-4 years. The computation of implicatures is an important indicator of the pragmatic understanding (Yoon & Frank, 2019) and it indicates the ability to infer the intended message.

A fully articulated version of a post-Gricean approach is the Relevance Theory (Wilson & Sperber, 2012). According to the authors' view, communicative stimuli activate a specific interpretation process that is mediated by attribution of the speaker's informative intention to provide the addressee with a new beliefs. In contrast, a non communicative intentional behavior is linked to the intention to act.

The model proposed by Adams (2002) underlines the importance of Conversational Analysis, that is the coding of relatively concrete behaviours that occur during dyadic verbal interactions: responsiveness, initiation, repairs, turn-taking, cohesion, topic and coherence. This model poses a clear distinction

between pragmatics behaviours in interaction, and meta-pragmatic knowledge, i.e. the awareness of pragmatic rules (Lockton et al., 2016).

Interaction are responsiveness and initiation are two basic components of conversational: the proportions of total number of speech acts that define the talkativeness and responsiveness of children. These measures provide an index of conversational dominance, that is, a tendency to verbosity in the form of extended unsolicited talk in a single turn (Adams & Lloyd, 2005). Conversational repairs refer to a set of behaviours that occur in the talk immediately following a miscommunication. Many types of repairs may be distinguished. For instance, a) adequate response to a request for clarification, b) inappropriate response to request for clarification, c) asking for confirmation or repetition/clarification, d) self-repair. Turn-taking defines the opportunities to participate in conversation and it depends on the recognition by participants of a series of cues (prosodic, linguistic, non-verbal and visual) which indicate a speaker's intention to finish talking. Cohesion refers to a number of linguistic devices which help to link elements from different utterances in a conversation (e.g. use of pronouns, demonstratives, conjunctions). The correct use of cohesive devices closely interacts with language processing, for both syntactic construction and grammatical marking. Indeed, cohesion accuracy may be a specific area of underachievement for children with language disorders (Liles et al., 1995; Manhardt & Rescorla, 2002).

Dimensions of topic and coherence appear to be ephemeral aspects of language pragmatics (Adams, 2002). Consequently, researchers struggle to reach agreement on definition and assessment of both aspects. Topic can be described as the immediate concern of the conversation and provides a global description of the content of a sequence or utterance. It is usually considered via a series of categories such as topic introduction, topic continuation, topic shift and topic re-introduction. Coherence refers to the way in which a theme is built into discourse or interaction. Coherence, topic and inference skills contribute to the ability to sequence ideas in the conversational frame. In line with the general

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complexity in defining and assessing topic management and coherence, Bishop et al. (2000) developed the term "meshing" to describe the quality of fit between adult solicitations and child responses.

Finally, according to the Emergentist Approach (Perkins, 2010), pragmatic competence is not a unitary phenomenon. It requires the integration of a wide range of cognitive skills, including language (e.g. phonology, prosody, syntax), non-linguistic abilities (e.g. attention and Theory of mind) and sensorimotor elements (e.g. gesture, gaze and auditory perception). Impairment of any of these skills can result in pragmatic impairment, leading clinical subjects to a restriction of communicative choices than those enjoyed by typical speakers and compensatory adaptation mechanisms in both intrapersonal and interpersonal domains.

2.2 Figurative language: metaphors and irony

In every day discourse messages are conveyed both with direct and indirect way. Among figurative language, metaphor and irony are the two forms most used. According to Grice (1975) figurative language represents a violation of the Maxim of Quality as the speaker says consciously something false, leading to a conversational implicature.

Metaphors involve discrepancy between the encoded literal meaning of words and their occasion-specific use (Carston, 2010, Kalandadze et al., 2019). In a metaphor (e.g. ''crime is a disease'') information is transferred from a vehicle (e.g. ''disease'') to a topic (e.g. ''crime'') (Chiappe & Chiappe, 2007).

The "standard pragmatic" view assumes that all non-literal language must be more difficult to process compared to literal speech because the listeners could comprehend metaphors only in a series of steps (Grice, 1975). First, listeners analyse the literal meaning of the entire expressions. Secondly, they decide if the literal interpretation is appropriate for the specific context.

Third, whether the literal meaning is contextually inappropriate, listeners use the cooperative principle (Grice, 1975) to derive the intended metaphorical meaning. According to this view metaphors should be more difficult to comprehend than corresponding literal speech, as

metaphors require an additional processing step in which their literal meanings are rejected and their intended figurative meanings are subsequently inferred (Gibbs & Tendahl, 2006).

However, this view is in contrast with some studies that found a relatively quick understanding of figurative language, including metaphors, when these expressions are encountered in rich linguistic contexts (e.g. Gibbs, 1994; 2002). Gibbs (1994) argued that metaphors do not require special cognitive effort as they are fundamental to human cognition and they serve to map one conceptual domain to another.

The pragmatic accounts (e.g. Relevance Theory; Wilson & Sperber, 2012) assume that the comprehension of metaphors is based on series of conceptual operation that lead the hearer to derive the speaker's meaning. Opposite to Gibbs, in Relevance Theory the role of the cognitive effort is central to the utterances' analysis.

A more recent computation model, proposed by Kintsch (2001), gave an important contribution in the debate about the way pertinent vehicle properties are identified during metaphor comprehension. Kintsch's Predication Model includes two component: the first represents the

meanings of words (the LSA component), the second (the Construction-Integration component, CI) uses these representations to compute a contextually-appropriate interpretation of statements with a predicate structure (Chiappe & Chiappe, 2007). The LSA component, is based on Latent Semantic Analysis, and it is able to represent meaning of words in terms of their relations with other words in a 300-dimension semantic space. The semantic space is constructed by the LSA with the analysis of the co-occurrence of words in thousands of written texts. The position of a term in the semantic network is represented by a vector, and the semantic relatedness of words is indicated by the vectors (Chiappe &

Chiappe, 2007). LSA vectors are used by the CI component to construct interpretations of statements. CI selects features of the predicate that are appropriate for the argument and inhibits other inappropriate features associated with the predicate. The process is complex and involves different steps. The first step is the activation of the closest concepts in the semantic neighbourhood of the predicate. The semantic neighbourhood could be described as the distance of each term in the network from the term of interest. In the second step, the vector representing the predicate is modified to yield a contextually appropriate meaning. This process involved the activation of a self-inhibitory network that is made up of the predicate P, the argument A, and the m closest neighbours of P, each connected through positive and negative links. Properties strongly linked to the predicate but that cannot be associated to the argument are inhibited by those terms in the semantic neighbourhood of the predicate that can be attributed. From this process, the k terms with the greatest activation are used to compute the vector representing the meaning of the statement. Interestingly, in line with the processes describes in the Predication Model, individual differences in working memory and Executive functions (inhibitory control in particular) could affect the ability to process metaphors. Kintsch's Predication Model contributes to explain the difficult of people with limited working memory to interpret metaphors. It seems that people with low working memory capacity lack of resources to inhibit properties that are closely related to the predicate but that cannot be attributed to the argument. Consequently, if irrelevant properties are not adequately suppressed, individuals will have difficulty in constructing meaningful interpretations of metaphors.

The Kintsch's Predication Model was tested by Chiappe (Chiappe & Chiappe, 2007) that

examined if metaphor processing are predicted by individual differences in working memory. The authors found that participants who scored high on the Listening Span and who had good inhibitory control in the Stroop task were faster at constructing interpretations for metaphors, regardless of their difficulty. Moreover, evidences suggested a relationship between the Listening Span and the Retrieval

Fluency with the capacity to generate more apt vehicles for attributing properties to topics. Finally, comparing working memory task that requires managing interference more rigorously (Digit Span Reverse) with task that primarily requires temporary storage (Digit Span Forward), the authors found that the first process is the best predictor of the quality of metaphors. In the same experiment data showed that measures of vocabulary knowledge and exposure to print predicted metaphor quality. Indeed, people who could recognize more magazine titles, and those that had broader vocabularies, produced better metaphors.

The importance of Executive functions, in particular working memory and inhibition, in metaphors comprehension, was described also in a recent study conducted by Carriedo et al. (2016). The results revealed that by age 15 updating information in working memory and cognitive inhibition gave a significant contribution to metaphor interpretation. In younger children, aged 11, only variable related to verbal reasoning were related to metaphor comprehension. This could be explained considering the development trajectory of Executive functions that reach a good efficiency at the age of 15, but continues to progress until young adulthood. Unexpectedly the authors found that in young adults Executive functions continue to have a crucial role in the metaphor understanding but their influence decrease. A possible reason for this data is the tendency of young adults to use knowledge-based strategies because their higher reading abilities and/or more developed semantic knowledge (Carriedo et al., 2016).

Not only cognitive abilities, such as working memory and inhibition have a central role in metaphors comprehension but also other factors are involved. Familiarity and salience are considered two crucial variables that seem to facilitate the understanding of figurative language (Giora, 2003). Behavioural and neuroimaging evidences from different populations show different processing patterns according to familiarity and in particular the data suggest a facilitation for conventional and familiar metaphor compared to the novel one (Bambini et al., 2011; Rossetti et al., 2018; Varga et al., 2014). This findings

might be due to the different process activated; long term memory in the case of conventional metaphors and deeper pragmatic abilities for novel metaphors. Therefore, for the latter, the processing time is longer and more effort is required (Kalandadze et al., 2019).

In literature and discourse metaphors appear in various syntactic structures that play a role in the comprehension processing. In fact, metaphors could be express using noun, predicate and adjective. The cognitive effort required to solve the metaphor's meaning that could change according to the type of syntactic structure. For instance, nominal metaphors may be understood through comparison based on the assumption that metaphor conveys similarities between concepts (Gentner et al., 2001), with categorization that means the establishment of taxonomic relations between semantically distinct concepts (Glucksberg, 2003) or with both process simultaneously (Bowdle & Gentner, 2005). On the contrary, the comprehension of predicate metaphors seems to entail a process of highlighting core abstract conceptual features of verb (Chen et al., 2008). Finally, adjective metaphors involve categorization (Glucksberg et al., 2001) or a two stage categorization process (Utsumi & Sakamoto, 2011).

In addition to linguistic characteristics, context plays a crucial role in the understanding of metaphors as well. In real life, metaphors are usually used in sentences and both discourse and the context could represent cues for the interpretation. Several studies with typically developing children and with clinical populations suggest that the presence of a supportive context can facilitate the comprehension of metaphors (Pouscoulous et al., 2011).

Finally, the mode of the metaphor stimuli (i.e. auditory vs. visual) may also impact the ability to comprehend figurative language. In young children, verbal metaphors are more difficult to explain than metaphors presented with pictures; in older children it is not entirely clear whether and how stimulus modality impacts metaphors comprehension (Kalandadze et al., 2019).

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The variables described above make metaphor a challenge in acquisition. Recent studies (e.g. Lecce et al., 2019) reported evidence about the development of metaphor comprehension throughout childhood until adolescence; in particular the age of 10 is considered a crucial moment. At this age, children improve their ability to discern the meaning of figurative language. Interestingly, in the study conducted by Lecce and colleagues (2019) nine-years-olds performed lower that older children in the interpretations of mental but not physical metaphors. Moreover, at this age the authors found a strong link between metaphor interpretation and Theory of mind. Individual differences in interpreting mental metaphors were in a significant relationship with those evaluated with Strange Stories task; in contrast, no association was found between physical metaphor and Strange Stories. The study brought two crucial evidence. First, the results supported the hypothesis of a specific association between Theory of mind and metaphor comprehension that requires an inference on mental states. Secondly, the association between mental metaphors and Theory of mind seems to be stronger in earlier developmental phases and to change across development.

These findings are in accordance with recent studies reporting that the link between metaphor interpretation and Theory of mind in typically developing children loses strength from middle childhood to adulthood and other components, such as working memory, executive control and language assume a increasingly important role (Chiappe & Chiappe, 2007; Columbus et al., 2015). Opposite, previously studies on clinical population (Bosia et al., 2015; Happé, 1993) found a relationship between Theory of mind and metaphor comprehension. This data could indicate a different developmental trajectory between healthy population and clinical groups in metaphor comprehension.

Verbal irony is a class of non-literal utterances commonly used in conversation with the intention to communicate indirectly. Irony comprehension is a social cognitive development (Nilsen et al., 2011) with a practical relevance as children regularly encounter irony in their daily lives (e.g. at school, on TV, with parents). In adults, irony has a crucial role in social life and if irony is not interpreted as

intended then listeners could miss crucial social information. Gibbs (2000) reported that ironic remarks occurred on 8% of conversational turns in talk among friends. Moreover, adults that use irony are often considered funnier than adults that make literal remarks (Toplak & Katz, 2000).

Verbal irony includes two remarks, counterfactual and sarcastic, that could be interpret with the integration of various cues such as intonation and context. The first is used more frequently by children, the latter is the cue for choice for older children, adolescents and adults. Cappelli and colleagues (1990) found a difference between 8 year-old and 11 year-old children in the interpretation of irony. In fact, younger children used intonation alone to interpret a non-literally ironic statement; in contrast in 11 year-old children the interpretation was based on context only. Moreover, older children, are able to determine that a listener who is aware of the negative context will infer that the speaker is being critical more often than a listener who is unaware of the context (Nilsen et al., 2011). This performance is similar to that of adults that can use information to make judgement about the listener's inferences of the speaker's intention. Nilsen (Nilsen et al., 2011) found that 8- to 10-year-old children improve their sensitivity for the conversational partner's mental state. This ability is crucial for an effective communication that requires the modification of the own communicative behaviour accordingly to social, linguistic and contextual information.

The first developmental step of irony comprehension is around 6 years of age. At this age children can understand that an ironic speaker does not believe what he/she has literally stated (e.g. Glenwright & Pexman, 2010; Hancock et al., 2000) but they do not appreciate that the speaker is intending to be funny. The comprehension of humour begin to develop around 7 to 9 years of age (Harris & Pexman, 2003) but according to some authors at 13 years of age is still developing (Demorest et al., 1984). This data seem to suggest that children and adults see the pragmatic use of irony in two different way: children perceive the purpose of irony as criticism, whereas the adults include as additional function the humor. Moreover, 6 to 7 years old children have difficult in appreciate irony in third person perspective

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(Nilsen et al., 2011) and they do not take into account the listener's knowledge state when responding to questions regarding how the listener interpreted the statements. Only around 8 to 10 years of age, children show the ability to modulate the assessment of listener's comprehension based on his/her knowledge of context (Nilsen et al., 2011). This performance is similar but not identical to that of adults. In fact, children have less understanding of how the listener would interpret ironic beliefs and intentions and they use less cues from context compared to adults.

Interestingly, the develop of irony understanding and interpretation is strongly linked to the mentalizing ability. Previous research showed a relationship between Theory of mind and ironic language comprehension (Filippova & Astington, 2008; Nilsen et al., 2011); in particular children with a better mentalizing skills have a better comprehension of irony. Indeed, irony interpretation requires listener to represent the speaker's belief and intention. Evidence indicates that difficulties in the comprehension of figurative language, and irony in particular, are frequent in individuals with Autism Spectrum Disorder (MacKay & Shaw, 2004; Wang et al., 2006) and adults with Asperger's syndrome (Martin & Mcdonald, 2004). Saban-Bezalel and Mashal (2015) showed that adults with Autism Spectrum Disorder had poorer comprehension of ironic texts than typically developing adults matched in age, expressive vocabulary, and non-verbal IQ. Interestingly, Mackay and Shaw (2004) found that among six subtypes of figurative language, the most difficult to understand for individuals with Autism Spectrum Disorder was irony. However, the data are mixed and some studies do not report an inadequate ability to identify and comprehend irony in Autism Spectrum Disorder precipitants (Colich et al., 2012). In a recent study (Saban-Bezalel et al., 2019) the findings indicate that, even if Autism Spectrum Disorder and typically developing groups were matched on age, on scores from a second order Theory of mind task, as well as on their level of vocabulary and executive functioning, the understanding of ironic comic strips in children and adolescents with Autism Spectrum Disorder was lower than the performance of typically developing peers. Mixed results were found by Bosco and

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Gabbatore (2017) in a study concerning the relationship between age, first and second order Theory of mind and the ability of children to manage different communicative acts. The results revealed that first-order Theory of mind has a causal role in explaining children performance in tasks concerning sincere and deceitful but not irony. Moreover, the variance in pragmatic abilities explained by Theory of mind increased only between sincere and deceitful, but not between deceit and irony. These findings seem to suggest that Theory of mind could explain only partially the difficulties and the different trend in pragmatic tasks, in particular in irony comprehension and production.

Difficulty with irony understanding has been associated also with impaired Executive functions (Hala et al., 2010), mainly working memory, inhibitory control and cognitive flexibility. This latter, may facilitate the listener's ability to shift between the literal meaning of the utterance and the contextual cues, and to infer the intention of the speaker. Similar, working memory play an important role and it may favour the use of a listener's contextual knowledge as a cue to irony comprehension (Filippova & Astington, 2008). In doing this, children must suppress their own perspective and this process is possible with the activation of the inhibitory control mechanism.

In adults, the comprehension of irony were investigated with neuroimaging studies as well. Overall recent researches showed that the recognition of communicative intention during the comprehension of a speech act is a high level process that involves extended cerebral networks, in particular several fronto-temporal and fronto-parietal areas, as confirmed by meta-analyses (Bohrn et al., 2012; Rapp et al., 2012). In fact, the inferior frontal gyrus (IFG), the middle temporal gyrus (MTG) and the medial prefrontal cortex (MPFC) were found prominently activated during irony recognition (Uchiyama et al., 2006). More specifically, the activation in the mPFC was linked to mentalizing activity and MTG was considered as related to the semantic retrieval, selection and evaluation during sentence comprehension. The role of these regions in high-order linguistic processing was confirmed also by Shibata et al. (2010). Spotorno et al. (2012) found that irony comprehension was associated with

activity in several areas concerning the mentalizing network (Frith & Frith, 2006) such as the MPFC, temporal-parietal junction (TPJ) and the precuneus. Irony comprehension activated also the inferior frontal gyrus (IFG), the middle temporal gyrus (MTG) and dorsolateral prefrontal cortex (DLPFC). According to the authors, these last area was related to the high executive demands and integrative processes related to the comprehension of complex forms of language. Bosco (Bosco et al., 2017) explored the existence of a specific cerebral area involved in the recognition of irony and deceit. In line with other studies (Angeleri et al., 2008; Bosco & Bucciarelli, 2008) that described a more complex inferential processes in irony compared to deceit, Bosco hypothesized a specific pattern of activation in the comparison of the same speech act proffered with an ironic versus deceitful intention. The results confirmed the existence of a fronto-temporal network involved in the comprehension of non literal language, irony and deceit. This network includes the left middle temporal gyrus (lMTG), the left middle frontal gyrus (MFG), the (DLPFC) and the right cerebellum. Moreover the authors found that the recognition of an ironic versus a deceitful speech act also activated the lMTG, that seems to have a specific role in discriminating between the speaker's two different communicative intentions (deceitful or ironic) based on what is, or is not, shared by the participants in the communicative interaction (Bosco et al., 2017).

Interestingly, these data from neuroimaging studies, showing the involvement of the prefrontal area that continue to develop until late adolescence, are in line with the behavioural findings and the progression of irony development. In fact, the increasing ability to manage irony could be explained on the basis of the development of mentalizing ability and high order processes (e.g. Executive Functions) that complete their development in early adulthood and are related to the activation of frontal cortex as well (Shallice, 1988).

3 THE DEVELOPMENT OF PRAGMATIC ABILITIES AND COGNITIVE ASPECTS UNDERLING THEIR FUNCTIONING

3.1 Pragmatic abilities from childhood until adulthood

The development of communication skills and pragmatic abilities begins early in infancy and increases through the adolescence until the adulthood (Turkstra et al., 2017).

According to Clark (2014) the acquisition of pragmatics is related to the development of the first language. In these two processes, adults play an important role. In fact, in talking with their children, adults show the correct uses of language in a specific context, and offer extensive feedback on form, meaning, and usage, within their conversational exchanges. Clark identified different domains in which pragmatics interacts with language acquisition and contributes to this process: displaying language use, feedback, joint attention and conversational co-presence, common ground and finally convention, contrast, and cooperation.

During the communicative exchanges, adults use gesture and talk in order to convey a clear message (Iverson & Goldin-Meadow, 2005). As they interact with children, adults show also how to use words and non verbal language in a context. In doing this, they give to the children pragmatic directions about meanings and in turn, these new directions offer information about inclusion, classes and functions of words. Children are helped in producing words and phrases with adult's feedback and the immediate reformulations after errors. Once errors are corrected, children can identify a better form to convey the message, and use it in the next communicative interaction. The feedback provided by adults includes also requests of clarification such as "what?" or direct questions about the meaning intended that leads children to made some repair to their initial utterance. This process is efficient only if the adult and the child establish a join attention that is a process initially pertinent to the here-and -now but then extended to non-present objects or events. Moreover, with joint attention, the child is more certain

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about the meaning of a word and its use in a specific context. The information picked up by children during the communicative exchange with adults constitute the fundamental common ground shared by interlocutors. Children learn to organize the given information in their common ground and to add new information to other speakers. This skill emerges slowly because the child has to find out what his interlocutor can and can not understand in each interaction. In choosing the words, speakers have to observe the conventions of the language used in their community, as this social rule is what enables mutual comprehension.

Pragmatic abilities develop in several stages, long before an infant has sad his or her first word, until the adulthood. The knowledge of the principle developmental milestones assumes a critical role in clinical setting, both in the assessment and in interventions.

Newborns seem to be ready to make social connections that will form the foundation for their pragmatic communication skills. For example they prefer to look at human faces, including the eyes, and within a couple of months they begin to recognize and search familiar faces (Dupierrix et al., 2014).

At 3-4 months, infants begin to develop social cognition during the exchange with the adult. They become more responsive to social cues and to infer meaning of cues. For example, infants are able to gaze at adults for longer periods of time when adult shares a positive affect (e.g. smiles) (Striano & Stahl, 2005). The ability to follow the gaze of another person represents the first step of the development of join attention that is considered an important domain of pragmatic communication (Tomasello & Farrar, 1986). To succeed in joint attention, some processes are needed. The child must be able to engage attention by orienting to another person, sharing attention with the shift of the gaze between object and person and directing attention with gestures. These skills are crucial prerequisites to later conversational abilities such as initiation and topic management. In this stage, the adult's role is to help the infants in knowing when to take turn and encouraging the communicative exchange.

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Early infancy is a fundamental period for pragmatics development. Starting from 2,6 years of age, children begin to well understand both direct and conventional forms of indirect speech acts (Bosco & Bucciarelli, 2008). Moreover, during preschool period (between 3 and 5 years) children achieve new skills and different communication functions emerge: interpretative functions, logical functions, participatory functions and organizing functions. In this period, children improve their ability to deal with deceit and they are able to use lies with the specific intention of avoiding a disagreeable consequence (Leekman, 1992). The ability to manage lies evolves from pre-school to school period and children begin to consider the speaker's intention and the impact of lying. From the age of 4, children fully comprehend the speaker's intention of deceive as well. This ability has been explained on the basis of the development of Theory of mind (Ma et al., 2015). In particular, first-order Theory of mind has been described as crucial for the comprehension of another person's belief about a certain state of the world, while second-order Theory of mind involves the ability to infer what one person believes about another person's thoughts, meaning to understand nested mental states (Talwar et al., 2007).

Preschool period is also characterized by the emergence of narratives skills that will mature through the school-age years. In fact children begin to tell stories about their current or past activities and make stories related to their thoughts and wishes. Narratives allow the children to share decontextualized information as well, and are considered predictors of later success in social competences (Jones et al., 2015). In the communicative exchange, preschool-age children learn to use more communicative functions and to be more actively involved. Finally, these communicative abilities are sustained by the increase of the Theory of mind that allows the shift away from the egocentric thinking to the consideration of the perspectives of others.

Another relevant step for the development of pragmatic abilities is the formal school. Interactions with peers become more frequent and they assume a central role in the communicative actions. Opposite to adults, children have low tolerance for skill deficits and errors, and a refinement in pragmatics abilities

is crucial to establish positive relationships. Therefore, at this stage, pragmatic communicative abilities are strongly related to self-esteem, happiness and avoiding peer rejections. Moreover, during formal school, children refine their narratives abilities and the ability to examine the context and to make inferences in story telling.

In communicative exchange, children begin to use more consciously non figurative language and to recognize a discrepancy between literal meaning and speaker's intention.

The comprehension of irony develops over time and although preschool children may sometimes understand irony, the ability to provide a correct explanation on ironic speech acts starts at around 6 years of age. The understanding of simple ironic utterances continues to develop in childhood with a significant improvement in 7 years old children (Loukusa & Leinonen, 2008).

Bosco and colleagues (2013) investigated the comprehension and production of direct and indirect speech acts, deceitful and ironic communication in children ranging from 5 to 8,8 years. The results showed an increase with age in the ability to deal with standard communication acts and in manage deceitful and ironic utterances.

Similar to irony, metaphor comprehension develop from preschool period until adulthood (Van Herwegen et al., 2013). Even if it seems difficult to establish a precise sequence of "stages" in metaphor interpretation, some authors have tried to postulate a typical trajectory. The first main stage is around age 3 with the exclusively literal interpretation that develops to the onset of abstract relational verbal reasoning about metaphorical mappings around age 5 (Özçalişkan, 2005). However, recent studies suggested that metaphor comprehension starts to be accurate only at about 10 years of age (e.g. Lecce et al., 2019).

This trajectory has been related to the development of other cognitive skills: structural language (e.g Kalandadze et al., 2019), Theory of mind and Executive functions (mainly working memory and inhibition). These last two abilities seem to be associated in particular with metaphor comprehension.

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Lecce and colleagues (2019) described a parallelism between Theory of mind and metaphors development. They found a significant difference between the age of ten and to the age of nine both in Theory of mind and in the interpretation of mental metaphors. The data was confirmed in a recent study conducted by Del Sette (Del Sette et al., 2020). The authors concluded that in middle childhood Theory of mind and metaphor comprehension skills develop side by side and they are in a bidirectional supportive relationship. However, according to the study, Theory of mind and pragmatics do not completely overlap but they support each other during development.

The comprehension on figurative language, metaphors, demands great abstraction and attentional effort as well. Thus, Executive functions seem to play an central role in the comprehension of pragmatics. However, the findings about the link between Executive functions and pragmatic abilities in children are still mixed and the relationship between the two domains is not always confirmed. Some authors described a link between the quality of metaphor interpretation and working memory, others postulated the role of cognitive flexibility or inhibition (Gernsbacher et al., 2001; Johnson & Pascual-Leone, 1989). Recently, Carriedo and colleagues (2016) argued that Executive functions give and important contribution only in adolescents, at age 15. Indeed according to their analysis at the age of 11 children could not benefit from working memory process to understand metaphors, instead they use verbal reasoning. Only at age 15, when Executive functions are more consolidated, adolescents could benefit from working memory ability. Moreover, during adolescence conversational skills change and this period is characterized by refinements in topic maintenance, sustaining conversation for multiple turns and making transitions. Adolescents improve the ability to adhere to Gricean Principles of quality, quantity, relation and manner as well. Finally, in adolescence language could be used for complex functions such as advancing opinions, conveying criticism and persuading.

In adulthood the range of pragmatic abilities varies widely. Adult is expected to be a competent interlocutor in different context, namely to use structural language competently, choosing the correct

form depending on the settings, partners and situations. Figurative language and non verbal signals are fluidly used during conversational exchange and language assume different functions. Therefore, adults are able to use language and pragmatics to teach, assess, persuade, cooperate, mediate, summarize plan and in doing this they constantly update cognitive representations and draw on common ground to design and interpret utterances (Turkstra et al., 2017).

In order to comprehend the interlocutor's communicative intentions, adults recognize the stereotyped pattern of knowledge shared with the interlocutors. For example in the understanding of sincere communicative acts, the listener has to refer the speaker's utterance to the knowledge shared with him. Opposite, to comprehend and product ironic acts, more inferential processes are involved. Overall, these communicative exchange and the pragmatic abilities are expected to be completely developed in adulthood in general population.

3.2 Pragmatic abilities and cognitive processes underling their functioning

The complexity of pragmatics, involving language and social domains, and the heterogeneous range of deficits described in clinical populations (e.g Schizophrenia; Autism Spectrum Disorder; right hemisphere damage) may explain the different theoretical positions that have emerged to explain pragmatic functioning and its deficits. Martin (Martin & McDonald, 2003) examined three theories that have been considered the most valid to described pragmatic difficulties.

3.2.1 Weak central coherence (WCC) hypothesis

The WCC hypothesis postulated that pragmatic deficits are caused by the inability to use context to derive meaning. This theory was firstly applied to children with Autism Spectrum Disorder (Frith, 1989) in order to explain the failure in integrating the different sources of information. In fact, individuals with Autism Spectrum Disorder are less able to draw coherent inferences across a set of

statements (Jolliffe & Baron-Cohen, 1999) and to construct higher-level meaning in context (Frith & Happe, 1994).

According to WCC hypothesis, to understand and use pragmatic language the elements of discourse need to be integrated via inferences. If this process does not work efficiently, pragmatic difficulties may arise. In particular, a deficit in WCC could impair the use of contextual information to understand non literal meanings of communication (Poletti, 2011).

WCC theory was applied also to other clinical conditions such as right hemisphere damage. In fact, individuals with right hemisphere damage have difficulty in selecting a punch line to a joke that is consistent with the preceding story (Bihrle et al., 1986) and they failed in integrating different component parts of a discourse to infer the meaning. Therefore, it was postulated that in this clinical population the mechanism for representing structural relations in a coherent manner could be involved in pragmatic deficits.

Even if WCC hypothesis was developed to explain pragmatic deficits in Autism Spectrum Disorder, it introduced important concepts and it could be considered the first account that have attempted to bring different clinical conditions under the same theoretical domain in relation to social language difficulties.

3.2.2 Social inference theory

Social inference theory is based on the assumption that social inferences are always required when we attempt to explain or predict the intentions, thoughts and behaviours of our interlocutors. One facet of social inference is the mentalizing ability (Theory of mind), namely the ability to form representations of other people's mental states and to use them in order to judge utterances and behaviours (Brownell & Martino, 1998). Mentalizing is somehow considered as necessary for normal development of pragmatic language competence (Poletti, 2011). Theory of mind, and the second-order mental state

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attribution in particular, is required to distinguish a joke from a lie as the listener has to understand another person's beliefs (Winner et al., 1998) considering the speaker's statement as truth. In contrast, irony understanding is related to the assumption that the listener knows the truth and will not take the statement literally. Therefore, the interpretation of a statement as lie or a joke depends on the knowledge of the listener about the speaker's beliefs and intentions.

According to Social inference theory, Theory of mind and pragmatics are related and deficits in Theory of mind could compromise the ability to understand the speaker intention and his/her message in a precise context. However, the direction of the relationship between Theory of mind and pragmatics is still unclear, and whilst some authors argue that Theory of mind is a necessary precursor to social communication skills (Happe, 1993), others claim that pragmatics and social competences lead to the development of Theory of mind (Peterson & Siegal, 2000).

Social inference theory was verified in previous studies regarding the comprehension of non literal language both in typically developing children (e.g. Lecce et al., 2019) and in clinical population (Andrés-Roqueta et al., 2013; De Rosnay et al. 2014; Whyte & Nelson, 2015). In particular, the link between Theory of mind and pragmatics has been studied in individual with Autism Spectrum Disorder. Happe (1993) found that children with Autism Spectrum Disorder and with deficit in Theory of mind could understand similes but they could not explain metaphors that require the interpretation of the speaker's beliefs. By contrast, Norbury (2005) found that Theory of mind was not sufficient to ensure adequate metaphor comprehension, even if the understanding of the speaker intention may help the listener to interpret the metaphor in natural contexts. The link between Theory of mind and pragmatics has been studied in patients with right hemisphere damage and the results supported the role of Theory of mind, the second-order belief in particular, in pragmatic comprehension (Winner et al., 1998). Moreover, fMRI findings (Gallagher et al., 2000) strengthened this relationship, showing an activation of the prefrontal cortex, which is involved in Theory of mind tasks, during the understanding

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of metaphors. Relationships between pragmatics and representation of other people's mental states were found in schizophrenia as well (Janseen et al. 2003, Langdon et al., 2002). In line with these studies, Brüne (Brüne & Bodenstein, 2005) found that Theory of mind ability was the best predictor of proverb interpretation in schizophrenia.

According to Nilsen et al. (2011), among language pragmatic domains, irony seems to be the most strongly associated with Theory of mind as it requires higher-order Theory of mind, namely the understanding of the speaker's attitude. In contrast, other authors (Bosco & Gabbatore, 2016) found that Theory of mind alone did not explain the performance in sincere, deceitful and irony tasks in typically developing children. Regarding the link between Theory of mind and the production of narratives, the evidence is still mixed. Fernández (2013) found relationships between second-order Theory of mind and pragmatic skills in typically developing children but did not observe correlations with first-order Theory of mind. The literature also suggested that, when the formal language is controlled, Theory of mind measures explained a significant amount of the variance in pragmatic abilities, in contingent conversation and irony comprehension in particular (Matthews et al., 2018). Is evident that more research is needed to better explain the relationship between Theory of mind and pragmatics.

3.2.3 Executive dysfunction account

Executive function system is argued to play a role in adaptive behaviour and in responding to novel and challenging tasks. Executive functions include three main functions, i.e. inhibition, working memory and cognitive flexibility, and allows both self-regulation and the enactment of goal-directed behaviour, contributing to the coordination of different cognitive processes over time (e.g. Diamond, 2013; Miyake et al., 2000). According to a recent theory (False Tagging Theory, FTT) (Asp & Tranel, 2013), the prefrontal cortex is involved in these psychological processes by "false tagging" or doubting automatically believed representations during the associative activations (Asp et al., 2012). In

particular, the prefrontal cortex affixes false tags to perceptual and cognitive representations to negatively bias distractions, beliefs, judgements, and decisions. Therefore, a damage to the prefrontal cortex could lead to a "doubt deficit" and a tendency toward belief and credulity. Neuroimaging studies support the activation of the prefrontal cortex when doubt or disbelief must be employed. As reported by Asp (Asp et al., 2012), the prefrontal cortex is engaged in different situations: when learned associations are contradicted (Fletcher et al., 2001), when evaluating data inconsistent with plausible theories (Fugelsang & Dunbar, 2004), when automatic lexical associations are violated by visual stimuli (Kerns et al., 2004), when rare events occur (Braver et al., 2001), when incongruous visual stimuli are presented (Michelon et al., 2003), when visual expectations are breached (Nobre et al., 1999), and when real-world beliefs are violated by visual illusions (Parris et al., 2009).

EF and frontal lobe activation have been linked to pragmatic abilities and to social behaviour (Barkley, 2001) as they are involved in planning, monitoring and inhibiting of the behaviour in discourse and in social exchanges. For example, in production and understanding narratives the speakers have to hold in mind and update information, suppress one's self-perception and flexibly respond to the interlocutor (Matthews et al., 2018). Moreover, intact Executive functions system seems to be necessary to engage in motivated, adaptive and effective communication (Champagne-Lavau & Stip, 2010; Martin & McDonald, 2003). Among Executive functions, inhibitory control seems to be the process most involved in pragmatic functioning. In fact, the mechanism permits to suppress the superfluous information, automatically activated by the external environment, to consider the communicative partner's perspective. Therefore, executive dysfunction may result in a rigid and concrete elaboration of linguistic information and in comprehension of figurative language impairments (Poletti, 2011). Relationships between Executive functions and pragmatics were also confirmed by fMRI studies on health individuals (e.g. Lauro et al., 2008) showing that pragmatic language tasks activate prefontal areas usually involved in executive tasks.

However, evidences from studies on clinical adult population are still mixed and a consistent picture of the relationships between Executive functions and pragmatics in adults is yet to emerge. Moreover, the link between Executive functions and pragmatics seems to be bi-directional, and while some authors assume that executive problems cause pragmatic difficulties, the question if pragmatic impairments can explain executive deficits remains open (e.g Akbar et al., 2013).

3.2.4 An integrative neuropsychological approach

Considering the heterogeneous findings from different clinical populations, it seems that the three causal hypothesis (WCC, deficit of Theory of mind and deficit in Executive functions) of pragmatic deficits are not mutually exclusive.

Poletti (2011) introduced a new neurocognitive model based on the interaction between Executive functions and Theory of mind and their influence on pragmatic language abilities. The assumptions include both the role of each single component on pragmatic language and the relationships between functions (working memory and inhibitory control) and Theory of mind.

According to this model,Executive functions deficits, inhibitory control problems in particular, may impair the development of the pragmatic language ability through direct or indirect processes. The direct process assumes that inhibitory control effects on language determining difficulties in the mechanism of suppression. The indirect way considers the influence of Executive functions deficits on Theory of mind abilities and the consequent influence of Theory of mind on pragmatic language .

The model seems to be useful to explain the complexity of pragmatics and the differences in cognitive and social outcomes in individual with different clinical disorders and pragmatic difficulties.

4 PRAGMATIC ABILITIES IN NEURODEVELOPMENTAL DISORDERS

4.1 Language and pragmatic skills in children and adult with Specific Learning Disorders.

Specific Learning Disorders are typically defined in terms of difficulties with reading, spelling, writing and mathematics (American Psychiatric Association, 2013). Researches on Specific Learning Disorder have shown that these deficits are lifelong and difficulties in written word recognition and in several forms of phonological processing persist into adulthood (Swanson & Hsieh, 2009). Among these impairments Developmental Dyslexia is the most frequent and studied one.

Developmental Dyslexia is a neurodevelopmental disorder linked to both poor accuracy and poor fluency of decoding as well as weak spelling skills (DSM-5, American Psychiatric Association, 2013). The presence of language impairments in children with dyslexia is commonly recognized, although deficits in phonological processing have been described also in children without a diagnosis of language impairment (Catts et al., 2005). In particular, children with dyslexia are known to have poorly phonological representation. This causes limited phonological awareness and difficulties in non-word repetition and rapid automatized naming (Lyon et al., 2003; Melby-Lervag et al., 2012; Ramus et al., 2003; Ramus et al., 2013; Snowling, 2000; Snowling & Hulme, 1994). According to the literature phonological impairments are considered to be at the core of linguistic vulnerability in Developmental Dyslexia. In addition, children with Developmental Dyslexia show weaknesses in other areas of language: vocabulary, morphology, syntax and discourse (Catts et al., 1999; Scarborough 1990; Snowling et al., 2016; Frith, 2003). Bishop and colleagues (2009) showed that dyslexic children had limited vocabulary and were significantly disadvantaged in sentence repetition and in syntactic

comprehension compared with typically developing children. Children with Developmental Dyslexia also have grammatical language impairments often related to reading comprehension difficulties (Bentin et al., 1990; Xiao & Ho, 2014). Delays in syntactic processes may manifest in diminished accuracy in the use of syntactic structures (Leikin & Bouskila, 2004) for example constructions (Byrne, 1981), relative clauses (Arosio et al., 2017) and passives (Cardinaletti & Volpato, 2015). Vender (2011) compared a sample of Italian dyslexic children with an age-matched control group: children with Developmental Dyslexia showed weaknesses in the understanding of pronouns. Other studies found that children with Developmental Dyslexia had difficulties in using clitics that are morphemes with syntactic characteristics of a word, but they depend phonologically on another word or phrase. An example from Italian appears in the following dialogue using the third person feminine singular clitic (Leonard & Dispaldro, 2013):

Speaker 1: Non vedo Gemma, e siamo già in ritardo

(I don't see Gemma, and we are already late)

Speaker 2: La vedo adesso!

(I see her now!)

The main difficulties found in children with Developmental Dyslexia regard dative clitics and gender (Arosio et al., 2016).

Although some children with Developmental Dyslexia do not master phonology and morphosyntax, other language skills of dyslexic children remain extremely heterogeneous (Delage & Durrleman, 2018). For example, some studies reported adequate language skills in children with Developmental Dyslexia who do not have a diagnosis of Developmental Language Disorder (Eisenmajer et al., 2005; Fraser et al., 2010).

The co-occurence of Developmental Dyslexia and Developmental language disorder is still controversial: both dyslexic children with Developmental language disorder and dyslexic children

without Developmental language disorder frequently have language deficits outside the phonological domain (Adlof et al., 2018; Bishop et al., 2009; Eisenmajer et al., 2010; Kim & Lombardino, 2013; Ramus et al., 2013).

So far, there has been little research on the use of language in social contexts (Lam & Ho, 2014). According to some studies, students with dyslexia have difficulties in social interactions. For example, they misjudge social events (Chinn & Crossman, 1995), their speech content is disorganized, and their topic initiation is largely inappropriate (Riddick et al., 1997). These difficulties could be caused by limited pragmatic skills. In their study of pragmatics of language and Theory of mind in children with dyslexia, Cardillo and colleagues (2018) described deficits in different domains of the pragmatics of language, particularly in the understanding of metaphors. For the Metaphors verbal subtest in Language Pragmatic Abilities Medea battery (APL Medea, Maria Luisa Lorusso 2009) dyslexic children performed lower than the control group including children with typical development. Difficulties in language pragmatics pertained to appropriate initiation and correct use of context. Not only parents confirmed these difficulties, when asked to complete the Children's Communication Checklist 2 (CCC-2; Bishop 2003) (Lam & Ho, 2014), but well-compensated adults with dyslexia using self-reporting measures also did (Griffiths 2007). These findings suggested that language pragmatics in children with developmental dyslexia could be impaired.

Even though pragmatics represents a domain of potential difficulties for children and adults with Specific Learning Disorder , as far as we know, only two studies have discussed the pragmatic abilities in young adult with dyslexia (Griffith, 2007; Cappelli et al., 2018). These studies showed differences in pragmatic tasks between university students with dyslexia and control group, with dyslexics performing worse than their non-dyslexic peers. Indeed, dyslexic students showed a lesser performance in the tasks requiring inferences from figurative language. Interestingly, Cappelli and colleagues (2018) found also correlations between pragmatic performance and other cognitive abilities such as reading,

vocabulary and working memory in university students with dyslexia. By contrast, they did not find a link between pragmatic performance and both Executive functions and Theory of mind in this clinical population. Considering these results, it seems that pragmatic issues in dyslexic young adults are linked to the abilities typically impaired in the disorder: phonological awareness, verbal short term memory and pseudo-word repetition (Cappelli et al, 2018). However, these findings are still few and not conclusive.

4.2 Language and pragmatic skills in children with Developmental Language Disorder

Developmental Language Disorder is a neurodevelopmental disorder diagnosed from 4 years, likely to be stable over time and typically persisting into adulthood (American Psychiatric Association 2013). Developmental language disorder is a broad term and it refers to a heterogeneous population characterized by severe delays or impairments in the development of expressive or/and receptive language despite adequate cognitive, motor and sensory skills. Children with Developmental language disorder have mainly impairments in aspects of structural language such as phonology, vocabulary and syntax (Norbury & Paul, 2015).

One of the strengths of children with Developmental language disorder is the use of language for the purpose of social communication, even though some authors described delays in social cognitive understanding (Andrés-Roqueta et al., 2013). Other researchers found insufficient competences in the pragmatic domain (Norbury et al., 2004; Davies et al., 2016) and severe difficulties in pragmatic tasks related to the analysis of the linguistic context (Norbury 2005a and 2005b). The findings of Katsos and colleagues (2011) are interesting. Children with Developmental language disorder performed lower than a group of age-matched typically developing peers in pragmatic tasks. They displayed disproportionate difficulties in pragmatic meaning. However, no significant differences between the

groups were found with regard to the maxim of informativeness and the understanding of logical meanings of quantifiers. Moreover, there was similarity between the performance of the Developmental language disorder group and the performance of a control group of typically developing younger children. Therefore, difficulties in pragmatic language in Developmental language disorder is about keeping up with their overall language level.

Also, Norbury (2005a) found that children with Developmental Language Disorder are less skilled than age-matched typically developing peers at using contextual information to resolve lexical ambiguities and to understand metaphors due to their low vocabulary skills. Similarly, Katsos (Katsos et al., 2011) reported that children with Developmental Language Disorder were less likely than age-matched typically developing peers to reject under-informative quantifiers such as ''some of the bananas are in the boxes" when all of the bananas were in the boxes. Arosio and colleagues (2017) showed that children with Developmental language disorder had a weaker ability to generate scalar implicature (SI) triggered by the quantifier compared with age-matched controls. Children with Developmental language disorder had however similar abilities compared with a group of language-matched controls including children who were two years younger. These findings suggested that the ability to compute SI is not impaired in children with Developmental language disorder: in fact, it could be delayed and improved over time, in spite of severely impaired performance in morphosyntax. The authors concluded that language pragmatics, evaluated through SI, depends on grammatical operations which are still under development in Developmental language disorder.

Overall, according to previous findings, it seems that structural language abilities are a potential contributor to pragmatic difficulties that have been described as commensurate with the overall level of linguistic competence (Norbury et al., 2004).

Therefore, structural language skills are considered to be important variable in solving pragmatic language tasks and potentially in developing social pragmatic awareness.

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4.3 Language and pragmatic skills in children with Autism Spectrum Disorder

Autism Spectrum Disorder is characterized by persistent deficits in social communication and interaction, and restricted, repetitive patterns of behaviour, interests, or activities (American Psychiatric Association 2013, DSM-5). As diagnostic criteria show, social communication difficulties are one of the core features of Autism Spectrum Disorder. Recently the definition of 'persistent deficits' in Autism Spectrum Disorder has changed. The current diagnostic criterion (DSM-5) combines social interaction and communication. This is reasonable since social reciprocity is central in both verbal and non-verbal communication and, thus, there is no communication without social interaction (Hogg & Vaughan, 2014). Children with Autism Spectrum Disorder often are delayed in linguistic areas such as lexical and syntactic knowledge, phonology and morphology. However, these impairments are less severe than those related to pragmatic aspects of language (Lord & Paul 1997). Difficulties in language and communication exist already early in life (Landa, 2007; Rapin & Dunn, 2003); language acquisition in Autism Spectrum Disorder is characterized by dramatic delays, with first words produced at age 38 months, on average, compared to 8–14 months in typically developing (Eigsti et al., 2011). Although some findings suggested that grammatical development proceeds in a typical fashion (Tager-Flusberg et al., 1990), more recent studies reported that children with autism exhibit a greater degree of developmental scatter that is, they produce grammatical structures that are less predicted based on previous productions (Eigsti et al., 2007).

Difficulties in communication acts are typically considered life-long, whereas other language-related difficulties may disappear in some children when they mature (Rapin & Dunn, 2003). Studies focusing on preschoolers with Autism Spectrum Disorder revealed that at this age the preschoolers encounter deficits in the form, content and use of language, but when they grew older, difficulties related to pragmatics were the most severe (Rapin & Dunn, 2003). On the contrary, typically developing children

are able to communicate prior the use of their first words. Deficits in language components such as syntax, morphology and phonology can also affect pragmatic competence (Bara et al., 1999). Children with language problems before the age of three are at a higher risk to develop Autism Spectrum Disorder in early childhood (Miniscalco et al., 2006). Language impairments at the age of five, which continue during childhood and remain present in adolescence, can be considered predictive factors for attention and social difficulties in adolescence (Snowling et al., 2006). Expressive language problems seem to be more associated with difficulties in attention, while the combination of receptive and expressive language difficulties are more associated with social difficulties (Snowling et al., 2006). This suggests that different profiles of language skills and deficits are associated with specific impairments in other developmental domains later in life. Even though there is an increasing number of studies concerning social implications of language pragmatics in Autism Spectrum Disorder children (Dennis et al., 2001; Loukusa et al., 2007; Whyte & Nelson, 2015), further research is required to confirm the incidence and the core features of these implications. Many studies have focused on separate functions of social-pragmatic language such as understanding irony (Wang et al., 2006), humour (Emerich et al., 2003), metaphors (Happé, 1995; Rundblad & Annaz, 2010), idioms (Lee et al., 2015) and homographs (Hala et al., 2007; López & Leekam, 2003).

Metaphor is one of the most studied pragmatic speech acts in Autism Spectrum Disorder and typically developing as it widely used in every day communication. Previous studies had revealed that individuals with Autism Spectrum Disorder as a group exhibited more difficulties in metaphor comprehension then the individuals with typically developing (Kalandadze et al., 2018). However, as Kalandadze argued (Kalandadze et al., 2018), group-matching strategies could explain the between-study variation on figurative language comprehension. In particular, language abilities seem to have an important role. In fact, if Autism Spectrum Disorder and typically developing groups were matched for language ability, the groups have been found to not differ significantly on metaphor comprehension

(Norbury, 2005). Moreover, the large variation in the results across studies, could be related to the properties of the metaphor tasks (e.g verbal tasks vs pictures or open questions vs structured questionnaire). These variables should necessarily be taken into account when explaining the difficulties with metaphor comprehension in individuals with Autism Spectrum Disorder (Kalandadze et al., 2018).

Social perception, such as difficulties in recognizing emotions (Kuusikko et al., 2009; Loukusa et al., 2014) and difficulties in verbal Theory of mind (Durrleman & Franck, 2015; Loukusa et al., 2014) could affect metaphor comprehension as well. Compared to typically developing peers, children with Autism Spectrum Disorder showed specifically deficits in pragmatic inference associated with lower ability to infer the implication of an utterance and to make inferences from social scripts, metaphors, and speech acts (Dennis et al., 2001). Theory of mind skills are deeply investigated in Autism Spectrum Disorder and the literature revealed reliable associations between the process of understanding the ironic and metaphorical meaning of utterances and Theory of mind skills. For example, a relationship has been found between success with irony understanding and passing False Belief tasks both in children with Autism Spectrum Disorder and typically developing children (Happé, 1993; Filippova & Astington, 2008), as well as evidence that irony comprehension and Theory of mind processing activate the same neural regions in typical adults (Spotorno et al., 2012). However not all the findings supported the role of Theory of mind in pragmatic competence of children with Autism Spectrum Disorder. For example Norbury (2005) found that Theory of mind was not sufficient for metaphor understanding, but pragmatic abilities were related to grammar and vocabulary as well.

Regarding discourse abilities, several studies have found that individuals with Autism Spectrum Disorder are broadly impaired in this pragmatic domain (Eigsti et al., 2011); specifically, they fail to respond adequately to questions and comments (Capps et al., 1998). These conversational difficulties seem to be lifelong and to persist into adulthood (Eales, 1993). Children with Autism Spectrum

Disorder differ also from typically developing children in the amount of inferencing and intentionality required in a task. Loukusa and colleagues (Loukusa et al., 2007) showed that children with Autism Spectrum Disorder had difficulties in processing contextually complex utterances, such as detecting implicatures, but none in the comprehension of reference assignments, which were contextually less demanding. In addition, Kaland (2002) described more difficulties in the comprehension of mental states compared to the understanding of concrete evidences.

5 ASSESSMENT FOR LANGUAGE PRAGMATICS

Considering the complexity of language pragmatic that includes different behaviours and is influenced by linguistic, cognitive and cultural processes, the assessment of pragmatic abilities should be able to consider and evaluate various interconnected variables. It is therefore necessary to use an assessment based on theoretical bases that allow the clinicians to understand the failure in pragmatics and to detect factors, for example cognitive abilities, that have an effect on pragmatics.

Moreover, pragmatic abilities vary according to the age and the individual style of communication and these aspects need to be consider in the evaluation. Studies of pragmatic development have tried to define a typical trajectory and some milestone have been described (e.g Yont et al., 2000; Ferrier et al., 2000). According to the findings, early social exchanges revolve around objects with a rapid development of communicative acts between 14 and 32 months. At around 3-4 years, the range of speech expanded but it is continues to improve until 9 years or later. Moreover, in the preschool years, the recognition of rules in communication exchange and the employment of taking turn became more establish. In the same period, comprehension of inference and stories and the ability to generate narrative begin. Successively, during the school age, children develop the ability to be informative in communicative exchange, to use referential cohesive devices in discourse and to detect ambiguity in communication. In line with these knowledge, the assessment should focus on the pragmatic abilities expected to be achieved at a particular age.

5.1 Assessment for children

What we know about the typical development of pragmatic abilities should guide the evaluation process in children. Assessment could include direct observation of child with attention to different pragmatic domains, verbal and non verbal behaviour, and reports completed by parents or teachers. The combination of direct observation by clinicians with the use of checklists seems to be the most

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completed assessment able to revealed pragmatics skills in children. In fact, if a standardized test can not replicate the all the contexts in which the child need to communicate, on the other hand, direct observations do not always elicit the whole repertoire of the pragmatic abilities achieved.

The range of assessment used to evaluate pragmatic language ability in children can be divided into four categories (Adams, 2002): standardized tests, coding system for naturalistic assessment of interaction, checklists and assessment of the comprehension of language pragmatics.

5.1.1 Formal structured tests

Formal tests are clinical tools widely used for evaluating pragmatic abilities. One of the major strength of this assessment is the integration of pragmatic abilities, linguistic and cognitive skills. Language abilities are important requisites to solve pragmatic tasks that are usually based on language. Moreover, several tests for structural language abilities include pragmatic elements and vice-versa. Similarly, other cognitive skills (e.g. Theory of mind and Executive functions) are strongly related to pragmatics and it is fundamental to evaluate them to better define the competences of the child.

Of all tasks, narrative represents an important test for revealing pragmatic deficits. It measures the ability to convey a coherent sequence of events, provide the right information and use cohesive devices consistently. Moreover, narrative permits to notice unusual or bizarre comments that are often indicative of social communicative disorders such as Austim Spectrum Disorder (Norbury & Bishop, 2003). The direct assessment of pragmatic language with formal test is useful to evaluate inferencing, understanding of humour or figurative expressions and referential communication as well. In fact, formal tests could elicit some pragmatic abilities, for example the comprehension of metaphors and irony, that are difficult to evaluate in a naturalistic setting.

  However, standardized ways are not always efficient in evaluating social communication and pragmatic language abilities because of the strong link between pragmatics and the context and the

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dependence with others' responses that occur in dyadic exchanges. Social communication skills are also in relationship with cultural factors. Turn taking, interrupting, appropriate topic choices, use of eye contact and other non verbal strategies, comprehension of irony and humour are determined by cultural rules (Carter et al., 2005); for this reason, problems in communication and pragmatics do not always emerge in standardized situation. In line with these considerations, the only use of formal tasks is unlikely to reveal an accurate picture of the child's pragmatic competence during context dependent communicative exchanges and tests need to be associated with naturalistic observations (Adams, 2002).

5.1.2 Naturalist observation and coding system

According to the literature (e.g Adams ,2002; Norbury, 2014), the naturalistic observation in everyday life is the tool of choice in clinical setting to analyses the child's pragmatic abilities. In fact, the communicative exchange with peers or adults could provide a realistic picture of the child's skills, helping the examiner to better define the strengths and the difficulties. However, even if there is an accordance of using naturalistic observation, data that emerge from naturalistic assessment could have some limits. First, naturalistic observation are time consuming for clinicians to process and they often provide too few opportunities for observing certain speech of acts. If a child do not show a communicative behaviour one cannot assume that the child has never used it. This is particular true for the evaluation of the pragmatic comprehension (e.g implicatures) that often needed to be force to emerge in conversations. More direct and structured tests for pragmatic language ability could measure the understanding of humour, idiom, irony and figurative language, asking the child to clarify a message or ambiguous sentences.

Therefore, a structured observation or a semi-structured context could be a useful option to elicit and evaluate pragmatic abilities. In fact, the examiner can create naturalistic context accurately designed to facilitate the emergence of social communication behaviour. This conversational assessment could be

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used also for the evaluation of communicative behaviour prior to the advent of spoken language, investigating how infants and toddlers initiate and respond to interactions with adults (Norbury, 2014). Moreover, another strength of this assessment refers to the possibility to observe qualitatively different or unusual communication behaviours in a consistent context.

Adams (2002) proposed a coding system including six crucial variables that could be used to describe the pragmatic and communicative abilities in children.

The first aspects considered in the model are the communicative intents and the speech acts. Communicative intents indicate the purpose of the communicative act and are particularly used in longitudinal studies with infants in order to evaluate language pragmatics and its development. Taxonomies of communicative intent is also one of the most used type of coding system for pre-school children. Instead, speech acts refer to the acts that are done and have been used in the assessment with older children. They seem to be efficient in the description of communicative functions in terms of variety and in the different contexts. Fey (Fey et al., 1986) subdivided the speech acts into three types: requestive (e.g. request of information or clarification), assertive (e.g. comments or statements) and performative (e.g teasing and exclamations). According to this classification and to the prevalent acts used, a child could be defined as assertive or non responsive communicator. Finally, this coding system has been considered an appropriate tool to detect abnormalities of interactions such as persistent questioning (Bishop et al., 2000).

The second conversational behaviours described in the coding system are repairs and turn-taking. Conversational repairs include a set of behaviours that intend to modify and mend a communication when the information is inadequate and the message poorly planned or not understood. Taking turns is a behaviour that depends on the ability to comprehend the intention of the other speaker to initiate or conclude a conversation. It is based on a series of clues both linguistic and non linguistic shared by the interlocutors. Moreover, this skill is dependent on language comprehension that could help the child in

monitoring the interaction. Because of the huge variations in normal turn-taking skills it is quite difficult to categorized them in correct or abnormal except for the most extreme cases that cause the end of the communication.

Third behaviours described by Adams (2002) include exchange structures, namely responsiveness and initiation. Measures of these two behaviours are often used to evaluate talkativeness in children with communication impairments. Initiations indicate the begin of new communicative exchanges

that imply a response. Initiations are crucial skills in social context and can provide an index of conversational dominance of one partner over the other during conversation (Bishop et al., 2000). Responsiveness could refer to both verbal and non verbal domains and it is a measure of communicative behaviour and of the in interest in being involved in social exchange.

Cohesion is the fourth aspect proposed in the coding system. It includes to a number of linguistic devices that link the different utterances during a communicative exchange (Halliday & Hasan, 2014). Typical devices are pronouns and demonstratives that refer to some person, object or acts already introduced in the interaction. The cohesive devices reduce the redundancy in communication but they needed to be shared with the interlocutor in order to convey a message. Even if the number of linguistic devices is observable, their discriminatory potential is limited because of the wide variability in the use of cohesive devices in normal child population. Moreover, there no published assessments of cohesion and the clinician could only provide a total count of cohesive devices used in the conversational context.

Another import aspect to be considered in the coding analysis is topic. It has been defined as "a clause or noun phrase that identifies the question of immediate concern and that provides a global description of the content of a sequence or utterance" (Mentis & Prutting, 1991). As Brinton and colleagues (1997) argued, the evaluation of topic with formal testing is difficult, even impossible in some communicative

situations. In fact, the number of variables, both personal and contextual, are difficult to control and even if the topic seems to be easy to understand intuitively, it is difficult to described objectively.

The last aspect assessed with the coding system is coherence. It is considered a superordinate aspect of language pragmatics that concerns the organization of a discourse or interaction. Coherence is linked to topic, cohesion and inference. All these aspects contribute to the building of coherence in a conversation. The assessment of coherence includes judgement of how the events are connected, reported or retold. Moreover, irrelevance, topic drifting and lack of elaboration or events are evaluated. Coherence is usually assessed in older verbal children and because of the persistence of coherence problems in later developmental stages, it is considered an important language pragmatic aspect also adulthood.

5.1.3 Checklists and parent reports

Given the difficulties of evaluating pragmatic abilities in clinical settings and generalizing the revealed skills to what happens in everyday life, checklists and parent reports have become popular methods. They are structured tools that investigated pragmatic abilities and communicative behaviours in naturalistic context such as social exchange with peers or parents. They usually include qualitative questions about pragmatic competence, language use in social communication and non verbal behaviours. Checklists are useful to describe the behaviour of the child and even if the majority of them are not intended to be used as a diagnostic instruments, they could support hypothesis for a diagnosis and indicate aspects for further assessment or intervention. Children's Communication Checklist (CCC-2; Bishop, 2003) is on of the most popular checklist, widely used in clinical practice and research. The CCC-2 includes 70 items subdivided in 10 scales that investigate structural language, language pragmatics, social impairments and restricted interests. It does not provide a clear diagnosis but it is used to signpost difficulties and aspects of communication that should be deepen investigate. Even

though a checklist could provide important information about child's pragmatic abilities used in everyday life, a problem inherent in this tool is that informants may vary both in their ability to understand the items and in their subjective interpretations and biases (Bishop & McDonald, 2009). In fact, parents could have difficulties in understanding and in detecting some pragmatic behaviours that sometimes are overt, some of which must be inferred and others represent a sum of different levels of processing.

5.1.4 Pragmatic comprehension

Comprehension of pragmatics refers to ability to understand language in a communicative context, especially when there are limitations of shared knowledge. An important aspect of language comprehension is the understanding of what is being talking about. This is possible with the sharing of information between the listener and the speaker and using references and terms that clearly indicate persons, objects or events. The speaker's indication is an important cues that help the listener to infer what the intended meaning or implicature is. The assessment of pragmatic language comprehension has been typically carried with formal tasks testing how well the child can cope with exchange of information. These tests include pictures, messages or ambiguous sentences that the child is asked to explain. The artificially of this assessment is a limitation of the usefulness and pragmatic difficulties do not always emerge. However, story or picture contexts, followed by the explanation of what has been inferred, have a significant advantages in the assessment of inferences. First, with these tasks, the examiner could control some variables, for example context and linguistic input, secondly, the comparison to normative data is possible.

Another means of investigating the child's ability to understand language pragmatics and to infer meanings is to evaluate the interpretation of figurative language and opaque sentences that could be disambiguated by context o shared knowledge. Typical tasks are the comprehension of figurative

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language, metaphors or idioms. These assessment is able to identify problems with contextual comprehension but again, the tasks do not completely overlap with the naturalistic interactions.

5.2   Assessment for adults

The evaluation of pragmatic abilities in adults represents an important challenge for the clinicians in order to identify barriers in communication and support social needs. Pragmatic deficits are frequent in adults with degenerative and neurological disorders (e.g. Bosco et al., 2015), psychiatric disorder (e.g Bambini et al., 2016) or developmental disorders that continue to be manifest in adulthood. For this reason, the assessment of pragmatic abilities is usually a part of a broader assessment for speech, language and cognitive domains.

The clinical instruments could be divided in two categories, pragmatic assessment and functional assessment. The first is used to identify and measure single cognitive processes underlying a range of communication behaviours, in order to define profiles of impairment. The second evaluates the ability to communicate efficiently in real-life situations without directly identifying the componential abilities underlying communication.

In clinical practice the interview with the patient and the family members is an important source of data. In fact, it reveals changes in patient's communication abilities outside the clinical setting. Interview can be done with a formal questionnaire or more informally with specific questions regarding the personal situation of the patient. Few standardized questionnaire were designed with the specific aim of evaluating pragmatic abilities in adults with acquired communication disorders (Turkstra et al., 2017).

In clinical setting it may be possible to find information about pragmatic difficulties with questionnaires and rating scales that assess Executive functions ans social behaviour as well.

The last instruments that could be used in the evaluation of pragmatic are the standardized tests including tasks for the assessment of social skills and language pragmatic ability (e.g. speech acts and comprehension of figurative language). These tests are particularly useful when the patient has cognitive impairments and there is a real risk for cognitive- communication disorders.

In summary, a complete and efficient assessment of pragmatic difficulties in adults requests the integration of formal tests of individual speech, language and cognitive abilities with data collected by questionnaire or naturalist observations. In fact, everyday communication included different aspects, namely cognitive skills, emotional states, cultural and personal characteristics and social skills that interact and simultaneously support the communicative exchange.

6 PRAGMATIC ABILITIES AND ITS RELATIONSHIP WITH WELL-BEING, QUALITY OF LIFE AND BE-HAVIOURAL PROBLEMS

In the last four decades research on well-being has been focused on two different traditions grounded in ancient philosophical works (Sirigatti et al., 2009). The first model refers to the hedonic well-being (Kahneman et al., 1999) or Subjective Well-Being (SWB); the second to a eudaimonic well-being (Ryff, 1989; Ryff & Keyes, 1995), or Psychological Well-Being (PWB).

The hedonic tradition view grounded in ancient Greece, where Aristippus spend time in looking for experience that gave him the greatest possible pleasure. Instead, the concept of eudaimonia was introduced by Aristotle that was against the fulfilment of pleasures in and of itself, and described happiness as a condition based on the expression of virtues, and on living in accordance with one's damon (Waterman, 1993). More recently, SWB has been defined as a person's evaluation of his or her own life (Diener et a., 2002) considering two domains: the cognitive component that refers to the individual's evaluation of life satisfaction, and the affective component that take into consideration the presence of positive affect and lack of negative emotions over time.

Differently, PWB refers to the human potentials and resources to reach optimal functioning (Ryff, 1989; Ryff & Keyes, 1995). Ryff (1989) proposed a model of PWB that includes six different dimensions: self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life and personal growth.

More recently, Pollard (Pollard & Lee, 2003) described PWB as a concept that refers to a wide range of domains including physical, emotional, cognitive, social, and economic well-being.

Children's well-being has became a field of interest for many researches. However, in literature there is a lack of a unique and clear definition of children's well-being.

According to Camfield (Camfield et al. 2010) child's well-being is context-specific by nature. Therefore, it is fundamental to consider the role of the different contexts, of school in particular (Amerijckx & Humblet, 2014). In fact, school is not only a place for learning but also a setting of social and emotional experiences and a context in which children deal with adverse events such as peer rejection, bullying, poor relationships with teachers, etc. Konu and colleagues (2002) proposed a model of "school well-being", which included four components: school conditions (physical environment surrounding a school and the environment inside a school), social relationships (social learning environment, student–teacher relationships, relations with schoolmates, group dynamics, bullying, cooperation between school and homes, decision-making in school and the atmosphere of the whole school organization), means of self-fulfilment (the way in which the school offers means for self-fulfilment) and health status (the absence of disease and illness). Recently, Tobia and colleagues (2019), introduced a multi-informant approach that considers the students' school situation from both the point of view of the child and significant adults who are indirectly or directly involved in school life (i.e. parents and teachers). In this model, well-being, parents' and teachers' thoughts, education and achievements/learning are interconnected. Some research has shown how the parent's perception of their children affects the school performance and the self-concept of the children themselves. What parents think about their children's abilities can predict academic achievement and children's self-fulfilment (Frome & Eccles, 1998; Wigfield et al., 2006). Moreover, the presence of a supportive family is an important protective factor for child development and well-being (Scrimin et al., 2018). It is therefore essential to consider the parents' point of view with respect to both the child's academic skills and their feelings toward school.

In addition to the parents, the second category of adults who plays an important role in the pupils' lives are their teachers. The relationship between children and teachers appears to influence pupils' academic well-being. According to recent studies, dealing with stressed teachers can in turn worsen students'

experience (e.g. Breeman et al., 2015). These results underline the importance of investigating not only parent insight but also teachers' observations on children's school well-being and their personal experience in relation to children's school difficulties.

Recently psychological well-being has been linked to language skills as well. The studies are still limited but they reported a negative impact of speech and language disorders on well-being and daily life. In particular, receptive language impairments seem to have negative consequences for social functioning and day-life well-being (Van Agt et al., 2011). Interestingly, Van Agt (Van Agt et al., 2005) found that three years old children with language impairments had significantly difficulties in communication in social functioning as compared to children without language problems. Similar results were describes in older children as well (e.g Jerome et al., 2002).

Unexpectedly, studies about the link between language pragmatic abilities and well-being in different context, including school, are still limited.

Primary school is an important period for pragmatics' development and communication exchanges become even more important for establishing and maintaining social relationships (Hemphill & Siperstein, 1990). When children begin primary school, conversation and pragmatic skills becomes even more important for establishing and maintaining social relationships. The school context bring new settings, audiences, roles, and experiences that provide the motivation for further refinement of communication skills (Leonard et al., 2011). Improving pragmatic abilities, children become able to achieve their communication goals such as asserting, denying, sharing information, and bonding with others (Searle, 1975). To make friends and been accepted by peers the child is required to improve new communicative abilities such as describe, compare and contrast, explain, analyse, hypothesize, deduce, and evaluate (Hemphill & Siperstein, 1990). During the interaction with peers, children in primary school become more proficient at controlling pragmatic processing and they are able to maintain a topic of conversation; produce more topic continuations, topic invitations, and responses; produce

fewer silent pauses; and become more proficient at controlling the processes of planning, production, and comprehension. Interestingly, appropriate pragmatic communication skills have been described as critical not only in peer relationships but in academic tasks as well. In particular, Westby and Cutler (1994) argue the importance of pragmatic abilities in cooperative group learning and in school activities that require communicative exchanges (Bierman, 2004).

Although evidences of relationships between pragmatic abilities, social life and peer interactions, to the best to our knowledge there are no studies that have investigated the relationships between pragmatic skills and school well-being in both typically developing children and children with different neurodevelopmental disorders.

Finally, even if school seems to be one of the main context in which children exhibit their difficulties, the evaluation continues to be focused mainly on parents' reports and clinical indirect assessment. Teachers are rarely included in the assessment and diagnosis, although they are often the first professionals to notice symptoms and have the potential to play a very crucial role in the

early identification of behavioural and psychological problems (Martinez et al., 2015). In fact, teachers can provide early information about the child's behaviours in different settings and communicative exchanges (e.g. peers, with teachers or other adult staff). This information, collected by teachers, seem to be crucial as child's behaviours are not always accessible in a clinic setting only (Martinez et al., 2015). Despite the importance of including teachers in the assessment, studies including teachers' reports on both pragmatics and psychological health are still limited.

Psychological well-being has been recently related to quality of life, a multidimensional concept consisting at the minimum of the physical, psychological (including emotional and cognitive), and social health dimensions (FDA, 2006; World Health Organization, 1993).

Among general population, quality of life is a particularly appropriate multidimensional outcome measure of young adults and students (Zullig, 2005). In fact young adults face deal with multiple

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intrapersonal, interpersonal, academic and financial challenges, which may undermine their quality of life (Vaez & Laflamme, 2003; Zullig, 2005). For example, they must achieve new academic goals, they are away from home for an extended period of time, often for the first time (Vaez & Laflamme, 2002) and they try to combine academic responsibilities with peer pressure to engage in social and sporting activities. Social skills and success with peers represent two main variables that could influence the level of quality of life perceived. Therefore, pragmatic abilities are likely to be crucial.

According to Leonard (Leonard et al., 2011), an adequate pragmatic language is associated with higher social skills as pragmatic competences may contribute to the comprehension of contextual norms in communicative interactions. In a recent review, Matthews (Matthews et al., 2018) reported that individual differences in pragmatic ability have profound consequences for all arenas of social life, such as in peer popularity and contexts that require a collaborative-based learning.

The relationship between pragmatic abilities and quality of life has recently became a field of interest in clinical studies as well. Bambini and colleagues (2016) found relationships between pragmatics and quality of life in a sample of adults with schizophrenia. The analyses, conducted with a regression model, showed that the pragmatic abilities predicted the quality of life. This finding was of extreme interest. Indeed, as the authors underlined, in literature the correlation between pragmatic abilities and quality of life in adult patients is less examined relative to relation between pragmatics and the social well-being.

Thus, the investigation of the relationship between pragmatic abilities and other psychological and cognitive domains in people with neurodevelopmental disorders, seems to be an important challenge in order to better define an effective support.

Unexpectedly, to the best to our knowledge, pragmatic competences in children and adults with Specific Language Disorder have never been correlated with quality of life. However, the investigation of the relationship between pragmatic abilities and other psychological and cognitive domains in this

clinical population, seems to be important, considering that subjects with Specific Learning Disorder are at elevated risk of mental health problems (e.g. Dahle et al., 2011).

Pragmatic abilities and their relationship with psychological and behavioural problems have been studied mainly in neurodevelopmental disorders such as Specific Learning Disorder (Katsos et al., 2011), Autism Spectrum Disorder (Eigsti et al., 2011) and Attention Deficit and Hyperactivity Disorder (Fortea et al., 2018). The data from these clinical population suggest a close relationship between pragmatic abilities and behavioural problems such as antisocial behaviour, conduct disorders (Gilmour et al., 2004; Donno et al., 2010) and inattention/hyperactivity problems (Leonard et al., 2011). Rodas (Rodas et al., 2017) found that pragmatic abilities were linked with both anxiety and externalizing behaviours in Autism Spectrum Disorder children. Moreover, in a longitudinal study, Conti-Ramsden (Conti-Ramsden & Botting, 2004) found that the majority of the children with language difficulties initially studied at age 7 years, were experiencing social and behavioural problems at 11 years of age.

The relationship between language- and behavioural problems has been explained with several hypothesis (e.g. Hartas, 2012). First, language difficulties may cause frustration and anger resulting in increased problems with social behaviour and fewer opportunities to interact with peers. Secondly, behavioural problems, like inattention and hyperactivity, may contribute to language and literacy problems. Third, language and behavioural difficulties are co-existing problems and they reciprocally influence each other. Finally, language and behavioural problems share an underlying deficit that may explain the association between the two conditions (Hartas, 2012).

Recently, pragmatic difficulties have been also described in children with Developmental Dyslexia; specifically, these children showed difficulties in metaphors comprehension (Cardillo et al., 2018) and, according to the parents' reports, they also had difficulties in communication skills during social exchanges (Lam & Ho, 2014). To the best of our knowledge, no studies have investigated the link between pragmatic abilities and behavioural problems in children or adults with Specific Learning

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Disorder . However, considering that social disadvantages and psychological problems have been often described in people with Specific Learning Disorder (Konur, 2002; Harrison et al., 2010), this topic represents a new interesting field of research. Previous studies regarding psychopathological symptoms in subjects with Specific Learning Disorder focused mainly on children and adolescents. Overall, the findings showed a relationships between Specific Learning Disorder and multiple dimensions of psychopathology namely oppositional defiant disorders, conduct disorder, anxiety and depressive mood (Dahle et al. 2011; Scorza et al, 2018b). In adults, the presence of Specific Learning Disorder ,Developmental Dyslexia in particular, seems to determine a higher vulnerability to externalizing behaviours such as aggressive behaviours, delinquency, and risk-taking behaviours (e.g. McNamara et al., 2008), as well as to loneliness, stress, anxiety and depression (e.g. Feurer & Andrews, 2009; Nelson & Harwood, 2011; Wilson et al., 2009). Moreover, according with a recent meta-analysis by Klassen and colleagues (2013), adults with dyslexia and other Specific Learning Disorder had higher rates of internalizing symptoms than control groups, with no differences between dyslexics who were enrolled in university and those who were employed. To the best to our knowledge, only three studies explored the psychopathological problems in Italian adults with Specific Learning Disorder. Specifically, these studies focused on university students with dyslexia (Re et al., 2014; Ghisi et al., 2016; Scorza et al., 2018b) and the findings showed lower level of self-esteem and more depressive symptoms, somatic complaints, social difficulties and attentional problems in dyslexic students, compared to non-dyslexic students. Overall, these evidences supported the hypothesis of Specific Learning Disorder as a lifelong condition with psychopathological consequences persisting into adulthood, and underline the importance of evaluating both social and cognitive abilities in order to prevent possible psychological distress.

Unexpectedly, research concerning relationships between pragmatic skills and emotional/behavioural development in typically developing children are very limited as well. Considering that behavioural

problems and lower well-being associated to pragmatic abilities seemed to be lifelong and to persist in adolescence (Helland et al., 2014) the evaluation of pragmatic skills also in typically developing children is a fundamental challenge to define an early support. In fact, studies regarding the psychological impact of pragmatic disorders in adults showed that impairments in pragmatic skills, that appear in childhood, have a long-term impact on relationship formation (Whitehouse et al., 2009), employability (e.g. Eaves & Ho, 2008), and behavioural, social, and emotional problems (e.g. St Clair et al., 2011).

7 STUDY 1: THE ROLE OF PRAGMATIC ABILITIES IN SCHOOL WELL-BEING AND PSYCHOLOGICAL HEALTH IN TYPICAL DEVELOPING CHILDREN

7.1 The aims of the study

In the present study we focused on children, as primary school is an important period for pragmatic development (Hemphill & Siperstein, 1990) and communication exchanges become even more important for establishing social relationships and for succeeding in school activities that require communicative exchanges (Bierman, 2004). Thus, pragmatic difficulties could negatively impact social development in typically developing (TD) children (Matthews et al., 2018). Moreover, pragmatic abilities have been linked with behavioural problems in children with different neurodevelopmental disorders (e.g. Eigsti et al., 2011; Fortea et al., 2018). These relationship seems to be lifelong and to persist in adolescence (Helland et al., 2014); therefore the evaluation of pragmatic skills in children is a fundamental challenge to define early supports.

In this study we considered only TD children, as to the best of our knowledge the literature lacks studies about the relationship between pragmatic skills, school well-being and behavioural problems in this population.

The first aim was to examine the relationship between school well-being and pragmatic abilities in a group of typically developing (TD) primary school children from the point of view of mothers and in particular of teachers. We did not consider the children's opinions on their perceived well-being in line with previous evidence showing that children may struggle to describe their difficulties via a self-report measure (Varni etal., 2007) and underestimate their problems (Rotsika et al., 2011).

Since language pragmatic skills are very important in various well-being's domains, e.g. peer relationships and school activities, we hypothesized close associations between pragmatics and school well-being in our group of TD children.

Secondly, we investigated potential relationships between pragmatic abilities and psychological health. According to the previous literature, we expected a link between pragmatic abilities and both internalizing and externalizing behaviours.

7.2 Method

7.2.1 Participants

The sample included 60 TD children (31 boys, 29 girls) with a mean age of 8.9 years (SD = 0.76; range = 8-11 years) and their mothers and teachers.

Children were recruited according to the following criteria: (a) they spoke Italian as their first language; (b) they did not have any indication of major cerebral damage, congenital malformations, and neurological, visual or hearing impairment; (c) they did not have any indication of intellectual disabilities or psychiatric disorders; (d) they received adequate schooling as reported by teachers.

The typical development was verified by a psychologist using neuropsychological tasks. The non-verbal IQ was assessed with the Colored Progressive Matrices (CPM, Italian version by Belacchi et al. 2008). Language abilities were evaluated with standardized tasks assessing receptive grammar skills (TROG-2, Bishop 2003; Italian version by Suraniti et al. 2009), receptive vocabulary (Peabody Picture Vocabulary Test—Revised, Italian version by Stella et al., 2000) and expressive vocabulary (Boston Naming Test, Italian version by Riva et al., 2000). The MT 3 reading text (Cornoldi & Carretti, 2016), was used to measure reading speed and accuracy. We excluded children with a non-verbal IQ inferior than 85, with language impairments and with readings difficulties.

7.2.2 Procedure

Families were invited to participate through an advertisement in schools. The parents were informed in detail about the aims of the study, the voluntary nature of their participation, and their right to withdraw from the study at any time. Parents gave informed written consent for participation in the study, data analysis, and data publication. The questionnaires were distributed to the mothers by the teachers. The Teacher's version of the questionnaire about school well-being was completed by the coordinating teacher of the class. The decision to involved mothers rather then fathers was based on the existing literature that showed a higher level of participation of the mothers and more precise answers in mother's reports samples (e.g. Scorza et al., 2018).

The study met ethical guidelines for human subject protections, including adherence to the legal requirements of the country (Declaration of Helsinki).

7.2.3 Measures

This study employed three questionnaires in order to investigate social and behavioural difficulties. There are many different ways of assessing aspects of social functioning and behavioural problems; the instruments were chosen because of their wide clinical and research use and their ease of completion. Moreover, important features of these measures were their ability to provide a global view of behaviour and the low comprehension levels needed by participants to complete them.

Children Communication Checklist second edition (CCC-2)

(Bishop, 2003; Italian version by Di Sano et al., 2013). The CCC-2 is a standardized checklist of pragmatic and social communication behaviors. CCC-2 includes a total of 70 items divided in 10 subscales investigating different aspects of communication: (A) speech, (B) syntax, (C) semantics, (D)

coherence, (E) inappropriate initiation, (F) stereotyped language, (G) the use of context, (H) non-verbal communication, (I) social relationships, (J) and interests. Each subscale is made of 7 items aimed to investigate the strength and weakness of children. The respondents are asked to make a frequency judgement about how often behaviours occur on a 4 point scale.

Moreover, it is possible to calculate four main composite scores: the General Communication Composite score (GCC), the Social Interaction Deviance Composite score (SIDC), the Structural language composite (SLC) and the Pragmatic language composite score (PLC). In line with the aim of this study, we selected only the pragmatic scales (E, F, G, H) and the PLC score.

The Internal consistency reliability coefficients for the CCC-2 range from .77 to .85 for all subscales across age groups (Bishop, 2003).

The Questionnaire on School Well-being (QBS)

(Tobia & Marzocchi, 2015). The QBS is a recently validated instrument designed to measure dimensions of well-being at school in children from 3rd to 8th grade from three perspectives: the children themselves, their parents, and their teachers. The child's version of the QBS includes 27 items and five subscales. The parent's and the teacher's version of the QBS comprises 36 items and five subscales: personal experience in relation to the child's difficulties, evaluation of learning processes, child's emotional difficulties at school, child's awareness of his/her school performances, and relationship with teachers in the parent's version and relationship with parents in the teacher's version. Responses to questionnaires are obtained on a three-point Likert scale ranging from not true (0) to very true (2).

The Internal consistency of QBS was calculated by authors by means of Cronbach's alpha in each scale. The following values refer to parent/teacher version: the Total scale has α = .80/.83; in Evaluation of learning processes scale the α is = .83/.92; in the Child's/Pupil's emotional difficulties at

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school scale the α = .72/.80; in the Child's/Pupil's awareness of his/her difficulties scale the α is = .69/.74; and Relationship with teachers/parents scale has α = .80/.88.

Child Behavior Checklist (CBCL)

(Achenbach, 1991; Achenbach & Rescorla, 2001; Italian adaptation by Frigerio et al., 2004). The CBCL is a standardized measure of emotional, social and behavioural problems in children and adolescents. Parents are asked to answer 113 items describing whether the child/adolescent is currently exhibiting, or had exhibited within the past 6 months, specific emotional and behavioural problems. The CBCL includes eight "syndrome subscales": Anxious/Depressed, Withdrawal/Depression, Somatic Complaint, Social Problem, Thought Problem, Attention Problem, Rule-Breaking Behaviour, and Aggressive Behaviour. The CBCL also provides three summary scores: Total scale Score, Internalizing score and Externalizing score.

The Internal consistency of internalizing and externalizing scales is ≥ .80; whereas for the specific syndromes the Internal consistency is ≥ .65. The Test-Retest reliability of CBCL parent's version is good; the values are between .60 and .77.

7.2.4 Statistical Analyses

All statistical analyses were carried out using SPSS 21.0 for Windows with an alpha level of 0.01. Prior to conducting analyses, the data were checked for violation of assumptions of normality and homogeneity of variance using Kolmogorov–Smirnov.

The set of analyses comprised correlations and partial correlations (controlling for verbal ability) between pragmatics (CCC-2) and (1) QBS mother's version scores, (2) QBS teacher's version and CBCL scores.

7.3 Results

7.3.1 Relationships between school well-being and pragmatic abilities

Correlations between CCC-2 scores and QBS scores are presented in Table 1. Regarding QBS mother's version, we found relationships between the PLC score and the QBS total score. Analyzing each CCC-2 scale, QBS total score was related to CCC-2 "stereotyped language" scale and CCC-2 "use of context" scale. These results were confirmed with partial correlations, controlling for verbal ability (see Table 1 for details).

 Regarding the association between CCC-2 and QBS teacher's version, the PLC score was in relationship with the QBS total score. Analyzing more in depth the correlations, we found that each CCC-2 pragmatic scale was associated with the QBS total score reported by teachers (for detailed results see Table 1). The results did not change controlling for verbal ability (see partial correlations in Table 1) except for the relationship between Non-verbal communication scale (H) and teachers' QBS total score.

Correlations and partial correlations between CCC-2 pragmatic scales and QBS total score		
	QBS total score	
CCC-2 pragmatics scale	Mother's score	Teacher's score
Inappropriate initiation (E)	.218 (264)	.435* (411*)
Stereotyped language (F)	.389* (371*)	.444* (368*)
Use of context (G)	.343* (342*)	.408* (383*)
Non-verbal communication (H)	.252 (212)	.402* (275)
Pragmatic Language Composite Score (PLC)	.381* (360*)	.483* (428*)

Table 1: Correlations between CCC-2 and QBS. Partial correlations controlling for verbal ability are given in parentheses. *p values < .01 (all significance tests are two-tailed).

Relationships between psychopatological symptoms and pragmatic abilities

Correlations between CCC-2 scales and CBCL scores are presented in Table 2. The analyses showed that the PLC score was associated with both CBCL Internalizing and Externalizing scores.

With regard to each CCC-2 subscale, correlations were found between Internalizing score and three pragmatic scales ("stereotyped language", "use of context" and "non-verbal communication") and between Externalizing score and two pragmatic scales (""use of context" and "non-verbal communication"). Significant correlations were also found between pragmatic measures (PLC and each CCC-2 subscale) and both CBCL scales regarding Attentional and Social problems respectively.

Partial correlations were performed to control the role of verbal ability. The results confirmed the data found with the correlations except for the following relationships: the partial correlations showed new links between Inappropriate initiation scale (E) and both Internalizing and Externalizing scores; the relationship between Attentional problems and stereotyped language was no longer significant (see Table 2).

	CCC-2 scales				
Correlations and partial correlation between CCC-2 pragmatic scales and CBCL scales					
CBCL scales	Scale E	Scale F	Scale G	Scale H	PLC
Internalizing score	- .311 (- .379*)	- .360* (- .362*)	- . 353* (- .349*)	- .390* (- .353*)	-.436* (- .432*)
Externalizing score	- .323 (- .385*)	- .314 (- .325)	- .349* (- .394*)	- .364* (- .335*)	- .417* (- .433*)
Social Problems	- .417* (- .445*)	- .510* (- .486*)	- .388* (- .352*)	- .452* (- .398*)	- .514* (- .500*)
Attentional Problems	- .355* (- .388*)	- .358* (- .323)	- .321 (- .295)	- .323 (- .277)	- .412* (- .529*)

Table 2: Correlations between CCC-2 and CBCL. Partial correlations controlling for verbal ability are given in parentheses.

* p < .01 (all significance tests are two-tailed).

Note. E: inappropriate initiation; F: stereotyped language; G: use of context; H: non-verbal communication;

PLC: Pragmatic language composite score.

7.4 Discussion

To the best of our knowledge, this is the first work investigating in depth the relationship between pragmatic abilities and school well-being in TD children. The study was grounded on three pillars: the multidimensional school well-being model proposed by Tobia (Tobia et al., 2019), the well documented relationship between students' well-being and both academic and social functioning (e.g. Djambazova-Popordanoska, 2016) and the role of language pragmatic in social interaction with peers, family and teachers (e.g. Bierman, 2004).

The current findings showed close relationships between language pragmatic abilities and school-well being. According to mothers' and teachers' reports, our findings suggested that children's ability to suitably use language in communicative exchanges was linked to school well-being. School is one of

the main contexts in which children are asked to use language and communicative abilities to be accepted by peers and to have success in academic requests. Therefore, having good pragmatic skills could influence children's school well-being and their feelings with peers or adults (Westby & Culter, 1994). The abilities to produce topics, maintain them and product new expressions are fundamental skills to interact with others (Bierman, 2004), thus pragmatic difficulties could have a negative impact on social relationships and academic performance, usually based on language abilities and interaction with teachers and peers. Specifically, low use of stereotyped language and of context were the two variables most strongly associated with school well-being, as reported by mothers. We can speculate that children that use stereotyped language and with difficulties in using the context for language comprehension and production, are less involved in academic activities and they could have problems in the relationships with both teachers and peers (Bierman, 2004; Mok et al., 2014). Considering the natural and universal desire of humans to build and maintain positive relationships, the failure to satisfy this need can lead to negative outcomes for children's well-being (Maner et al. 2007).

According to teachers' point of view, inappropriate initiation and non-verbal communication were related to general school well-being as well. It seems likely that teachers are more able to identify pragmatic competences and related problems in children compared to mothers probably as they spend a lot of time with children in school context and thus, they have more opportunities to observe children in everyday communication and social relationships.

The second goal of this work was to investigate the relationship between pragmatic abilities and behavioural problems. Previous studies reported a strong link between pragmatic difficulties and social and behavioural problems in children with neurodevelopmental disorders (Ketelaars et al., 2010; Leonard et al., 2011). Moreover, recent findings showed that a large percentage of children with emotional/behavioural difficulties, experienced significant language problems, including pragmatics difficulties (Benner et al., 2002; Mackie & Law; 2009). Only few studies focused on TD children and

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the data are still mixed. Overall these studies found relationships between low pragmatic competences and behavioural problems (Ketelaars et al., 2010). Interestingly, Korhonen and colleagues (Korhonen et al., 2014) found a link between social competence in children and both chronic internalizing and externalizing problems and they underlined the importance of evaluating internalizing problems in children with academic or social problems. Our data provide new evidence to past literature by revealing that low pragmatic skills are related to externalizing and internalizing symptoms in TD children as well. Difficulties in communicative exchanges with peers or adults could determine lower self- esteem, anger (Hartas, 2012) and therefore be associated with an increase of social internalizing and externalizing behaviours in TD children as well. In particular, our data showed that two pragmatic abilities are related to psychological problems: the use of context and non-verbal communication. The study supported the link between pragmatic and social domains as well. In fact, we found that children with lower pragmatic abilities were those with more social problems compared with their peers. Pragmatic abilities, stereotyped language and inappropriate initiation in particular, were in relationship also with attention problems. These data represent a novelty, showing that inattention had a significant negative relationship with pragmatics within TD children. Similar and unique results were reported by Leonard (Leonard et al., 2011) that found a negative relation between hyperactivity, inattention and language pragmatic, and described the role of pragmatic in mediating social skills and hyperactivity or inattention problems.

Overall, our findings supported the importance of considering non-verbal and verbal pragmatic abilities as possible contributory factor to child's psychological health (Helland et al., 2014).

Relevance to the Practice of School Psychology

Overall, this study contributes to shed light on the relationships between pragmatic abilities and school and psychological well-being in TD children. Our findings suggest that pragmatic difficulties should be considered as possible risk factors for emotional and behavioural problems during developmental

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stages. For children, the class is one of the key social contexts they find themselves embedded in as they spend a lot of time at school, as much as 25 hours or more per week. Moreover, as children enter in elementary school, conversation becomes more important for

both social relationships and academic tasks (Leonard et al., 2011). It seems likely, therefore, that pragmatic and communicative abilities could influence well-being and behaviours.

Therefore, an early identification of pragmatic difficulties, even in children without evident psychological distress and/or psychopathological symptoms, may prevent psychological problems that could occur later in development.

According to our data, teachers play a crucial role in this early identification. They are the first professionals that could detect both pragmatic skills and psychological problems in different contexts and communicative exchanges. Therefore, it seems fundamental for clinicians to work in concert with teachers, and parents as well, in the assessment and interventions in children with communicative, psychological and behavioural problems.

Finally, our findings underline the importance of defining strategies and interventions supporting children in their pragmatic abilities and social skills in the classroom setting, in order to improve school well-being and overall psychological health.

8 STUDY 2: LANGUAGE AND PRAGMATICS ACROSS NEURODEVELOPMENTAL DISORDERS. AN INVESTIGATION USING THE ITALIAN VERSION OF CCC-2

8.1 The aims of the study

Language is a very complex domain comprising several closely-related components involved in specific aspects of language (American Speech-Language-Hearing Association [ASHA], 1993). Language structure includes syntax, morphology, phonology and semantics. These four components regulate grammatical rules, combinations of sound units and the meaning of words. Language structural is not enough to understand social communication that requires the explanation of meanings emerging when language is used to communicate (Martin & McDonald, 2003). The pragmatics performs this last role, as it contributes to use language properly in interactions with other people and to interpret language correctly in social contexts or in communicative exchanges (Milligan et al. 2007). The measurement of pragmatic skill in children known to have communication impairments has become recognized as a difficult task. In Italy there are many well-standardized assessments for structural language abilities; instead the instruments for the identification of pragmatic difficulties are limited. Recently, the use of the CCC-2 has increased but to our knowledge there are no systematic studies about the reliability of the scale in discriminating the different linguistic and communicative disorders in the Italian population. In particular from the clinical work arises the need to better understand and differentiate the similar linguistic profiles that characterized different neurodevelopmental disorders.

The present study therefore was designed to examine the reliability of the CCC-2 questionnaire as a valid measurement tool for the discrimination of communication skill difficulties in children with different neurodevelopmental disorder, Developmental Language Disorder (DLD), Autism Spectrum Disorder (ASD) and Developmental Dyslexia (DD).

Our first hypothesis was that children with ASD would score lower in all the scales of CCC-2 and in particular in the items evaluating pragmatics, social relations and interests, compared with children with DD, children with DD associated with DLD (DD+DLD) and typically developing peers (TD).

Secondly, we expected mild difficulties in pragmatics in both DD and DD+DLD groups.

Finally, we hypothesized differences in social functioning between DD children and DD children with also DLD. Even if in both groups we expected relative adequate abilities in social skills, such as relations and interests, DD+DLD children would have lower skills according to their more severe language difficulties.

8.2 Method

8.2.1 Participants

Our sample included 89 children ranging from 8 to 10 years (mean age 9,45), 34 girls and 55 boys. Sixty-three children had a clinical condition and twenty-six had a typical development. Specifically, 19 children had a diagnosis of ASD (14 male and 5 females; mean age 10); 23 children met a diagnosis of both Dyslexia and Developmental Language Disorder (DD +DLD) (10 male and 13 females; mean age 8,84) and 21 children had diagnosis of Developmental Dyslexia without language impairments (DD) (16 male and 5 females; mean age 9,48). The control group, included 26 typically developing (TD) children (15 male and 11 females; mean age 9,47).

All the children were native Italian speakers.

The clinical groups (ASD, DD, DLD+DD) were recruited from private and public clinics from three different geographic areas of Italy (the North, the Centre and the South).

The diagnosis of DD and DLD was provided by a child psychologist, according to the ICD-10 criteria (World Health Organization, 1992) and through the administration of standardized battery for the

evaluation of academic skills and language abilities. According to the criteria reported in the guidelines typically adopted by Italian clinical services (Consensus Conference 2011) the Perceptual Reasoning Index (PRI) of the WISC-IV scale (Orsini et al. 2012) was equal or higher then 85. None of the children had visual and hearing impairments or other diagnoses or neurological disorders.

Children with ASD were diagnosed by a multi-professional team including child psychiatrists and child psychologists using ICD-10 criteria (World Health Organization, 1993) and Autism Diagnostic Observation Schedule (ADOS-2) (Lord et al., 2012). For this study we selected High functioning ASD children with a Perceptual Reasoning Index (PRI), obtained through WISC-IV (Orsini et al. 2012), equal or above then 85 (mean 109, ds 14).

The TD children were recruited from local primary schools from various areas in the North, the Centre and the South of Italy. The typical development was verified by the school psychologist with a complete neuropsychological assessment for IQ level (PRI equal or above than 85), language abilities and academic skills.

8.2.2 Procedure

Children with neurodevelopmental disorders (ASD, DD, DD+DLD) were recruited after the clinical evaluation. The psychologist, that evaluated the child, asked the parents to participate in this study children. If a written permission was given, the CCC-2 was administered. CCC-2 questionnaires were then scored by two members of the research team.

TD children were invited to participate through an advertisement in schools. A written information and consent sheets were given by the teachers to the children who gave them to their parents. After the return of the written permission, the CCC-2 questionnaire was distributed to the parents during the monthly parent-teachers meeting. The children were tested for their cognitive, learning and language abilities in a quiet room at school by a psychologist who took part in the research.

8.2.3 Measures

Language skills and linguistic pragmatic abilities were assessed using the Children Communication Checklist second edition (CCC-2) (Bishop 2003, Italian version by Di Sano et al. 2013). CCC-2 is one of the most widely used standardized checklist of pragmatic and social communication behaviours. It is used to measure various aspects of communicative impairments, covering language structure skills as well as pragmatic skills. The CCC-2 discriminates children with clinically significant communication problems from TD children as well as differentiating between children with Developmental Language Disorder and children with pragmatic language impairment. The respondents are asked to make a frequency judgement about how often behaviours occur, i.e. less than once a week, at least once a week, once or twice a day, several times a day.

CCC-2 includes a total of 70 items divided in 10 subscales according to different aspects of communication. Each subscale is made of 7 items aimed to investigate the strength and weakness of different areas regarding children's language, communication and social aspects.

The subscales are (A) speech, (B) syntax, (C) semantics, (D) coherence, (E) inappropriate initiation, (F) stereotyped language, (G) the use of context, (H) non-verbal communication, (I) social relationships, (J) and interests. For sample items, see Table 3.

 The first four subscales (A-D) measure competence of structural language aspects. Subscales E, F, G and H evaluate pragmatic skills in children involved in conversation such as repetitive initiations and failure to commence topics with mutual interests. Moreover, subscales E, F, G and H describe stereotyped language with atypical and unusual expressions and the use of non-verbal communication like facial expressions, bodily movements and gestures. The last two subscales (I and J) measure competencies in social relations and interests.

Each item (A–J) describes the occurrence of a specific behaviour on a 4-point scale (0 – less than once a week or never; 1 – at least once a week; 2 – once or twice a week; 3 – more than twice a week or

always). Five of the seven items in each subscale (A-J) measure weaknesses in the communication areas they referred to, whereas the other two items measure strengths. When taking the CCC-2 questionnaire, parents are first asked to answer 50 randomized items formulated in negative terms ('the child does not') and then 20 randomized items formulated in positive terms ('the child does').

The randomization of the items is needed to minimize response bias. Moreover, a consistency check is established to ensure that the responses to positive and negative items are consistent. This monitoring improves the validity of the checklist.

The direct scores are converted by the clinician into scalar scores with a mean of 10 and a standard deviation of 3. The lower the score on the scales, the more impaired the communicative abilities are. More precisely, a scalar score of 5 (10° percentile) doesn't indicate severe difficulties if it is present only in one scale, on the contrary a score below the 5° percentile in two or more scales describes possible communicative impairments.

It is possible to calculate two main composite scores. The first is the general communication composite score (GCC). It is obtained adding up the scalar scores of the first eight subscales. GCC is a global measure of communication and it distinguishes children with communication problems from children with atypical development. A score below 55 on the GCC indicates an impairment. The second composite score, the SIDC is used to describe the nature of a communication impairment and it should be considered only when the GCC is lower than 55. SIDC is obtained subtracting the sum of the scalar scores of the scales concerning structural language (speech, syntax, semantics, coherence) from the sum of the scalar scores of the following scales: inappropriate initiation, non-verbal communication, social relationship and interests. SIDC could discriminate between children with DLD and children with pragmatic difficulties that are disproportionate to their structural language abilities. Indeed, SIDC includes two scale (social Relationships and interests) that are not solely concerned with communication. A child with a DLD, characterized mainly by structural language difficulties, would

receive a positive value (0 or above); on the contrary the score of a child with pragmatic or social difficulties would be negative. An important caveat is that among a large cohort of children with communication disorders, scores on the SIDC were continuously distributed, with no clear boundaries between specific language impairments and ASD (Norbury 2004). Finally, in order to better describe pragmatic and language competences in children, it could be useful to calculate two more composite scores: Structural language composite (SLC, scales of speech, syntax, semantics and coherence) and Pragmatic language composite (PLC, scales of inappropriate initiation, stereotyped language, use of context and non-verbal communication).

The Internal consistency reliability coefficients for the CCC-2 range from .77 to .85 for all subscales across age groups (Bishop, 2003).

Scale	Sample item
A. Speech	Semplifica le parole tralasciando qualche suono, ad esempio dice "amadio" al posto di "armadio" oppure "coccodillo" al posto di "coccodrillo" [Simplifies words by leaving out some sounds, e.g. "crocodile" pronounced as "crockodile", or "stranger" as "staynger"]
B. Syntax	(+) Produce frasi lunghe e complicate quali: "Quando siamo andati al parco ho fatto un giro sull'altalena", oppure "Ho visto quest'uomo mentre stava in piedi all'angolo" (+) [Produces long and complicated sentences such as: "When we went to the park I went on the swing"; "I saw this man standing on the corner"]
C. Semantics	È impreciso nella scelta delle parole rendendo poco chiaro quello di cui sta parlando. Ad esempio, dice "la cosa" invece di dire "la caffettiera" [Is vague in choice of words, making it unclear what s/he is talking about, e.g. saying "that thing" rather than "pan"]
D. Coherence	Parla in modo chiaro di ciò che ha intenzione di fare nel futuro (ad esempio, cosa farà domani o i progetti per le vacanze) [Talks clearly about what s/he plans to do in the future (e.g. what s/he will do tomorrow, or plans for going on vacation)]
E. Inappropriate initiation	Parla ripetutamente di cose alle quali nessuno è interessato [Talks repetitively about things that no-one is interested in]
F. Stereotyped language	Dice cose che non sembra comprendere del tutto (può sembrare che ripeta cose sentite dire dagli adulti). Ad esempio, un bambino di 5 anni può dire di un insegnante "Gode di un'ottima reputazione. [Says things he or she does not seem to fully understand or seems to be repeating something he or she heard an adult say (e.g. a 5-year-old describing a teacher by saying, "she's got a very good reputation")]

G. Use of context.	(+) Fa confusione quando una parola è usata con un significato differente da quello usuale: ad esempio, può non riuscire a comprendere se una persona poco amichevole viene descritta come "fredda" (e pensa che stia rabbrividendo) (+) [Gets confused when a word is used with a different meaning from usual: e.g. might fail to understand if an unfriendly person was described as 'cold' (and would assume they were shivering!)]
H. Nonverbal communication	Sta troppo vicino alle altre persone quando parla con loro [Stands too close to other people when talking to them]
I. Social relations	Parla dei suoi amici e mostra interesse per quello che dicono e fanno [Talks about his/her friends; shows interest in what they do and say]
J. Interests	Mostra interesse per cose e attività che la maggior parte delle persone troverebbero insolite, quali semafori, lavatrici, lampioni [Shows interest in things or activities that most people would find unusual, such as traffic lights, washing machines, lamp-posts]

Table 3: CCC-2 scales with sample items.

8.2.4 Statistical Analyses

All statistical analyses were carried out using SPSS 21.0 for Windows with an alpha level of 0.05.

Preliminary analyses were conducted to examine the distribution of the variables using the Kolmogorov-Smirnov test.

Comparisons between variables with a normal distribution were conducted with the univariate ANOVA test. Post-hoc analysis was performed to make multiple comparisons among the four groups using the LSD test.

For some subscales, as their distribution was not normal, we used the Mann-Whitney test.

8.3 Results

The scores obtained in the ten subscales and in the CCC-2 composite scores are summarized in Table 4. The comparisons between the four groups in each subscale are described in Table 5.

The results showed that the DD score was lower than TD score in the following subscales: syntax ($F_{(3,85)}$ = 6.89; p = 0,005; partial $\eta 2$ = .196), coherence ($F_{(3,85)}$ = 7.02; p = .004; partial $\eta 2$ = .199), use of the context ($F_{(3,85)}$ = 14.99; p = .001; partial $\eta 2$ = 346) and interests ($F_{(3,85)}$ = 17.38; p = .004; partial $\eta 2$ = .380). The comparison between DD+DLD and ASD showed significant differences. The first difference concerns the subscale of syntax in which DD+DLD scored lower than ASD ($F_{(3,85)}$ = 6.89; p = .002; partial $\eta 2$ = .196). The opposite trend was find in the subscales of inappropriate initiation ($F_{(3,85)}$ = 10.99; p = .000; partial $\eta 2$ = .280), of social relations ($F_{(3,85)}$ = 7.14; p = .001; partial $\eta 2$ = .201), of interests ($F_{(3,85)}$ = 17.38; p = .000; partial $\eta 2$ = .380) and of use of the context ($F_{(3,85)}$ = 14,99; p = .000; partial $\eta 2$ = .346. In these subscales DD+DLD performed higher than ASD. Moreover, compared to TD group, the DD+DLD group scored lower in the subscale of syntax ($F_{(3,85)}$ = 6,89; p = .000; partial $\eta 2$ = .196) and of coherence ($F_{(3,85)}$ = 7,02; p = .003; partial $\eta 2$ = .199). However, the DD+DLD group scored higher than the DD group in the interests subscale ($F_{(3,85)}$ = 17,38; p = .000; partial $\eta 2$ = .380).

Subscales Score	DD Mean (SD)	DD+DLD Mean (SD)	ASD Mean (SD)	TD Mean (SD)
A. Speech	7,10 (3,33)	5,61 (3,46)	9,26 (3,63)	9,92 (2,41)
B. Syntax	8,1 (4,06)	7,17 (3,24)	10,32 (2,94)	10,85 (2,54)
C. Semantic	7,71 (3,07)	7,35 (3,9)	8 (2,45)	11,35 (3,53)
D. Coherence	7,62 (3,34)	7,57 (3,09)	6,21 (3,19)	10,42 (3,29)
E. Inappropriate initiation	9,43 (3,89)	10,96 (4,03)	5,47 (1,43)	10,58 (3,42)
F. Stereotyped language	9,05 (2,40)	10,3 (3,21)	7,32 (3,18)	10,54 (2,9)
G. Use of context	8,33 (3,23)	9,48 (3,68)	4,58 (3,08)	11,12 (3,17)
H. Nonverbal communication	8,48 (3,31)	11,43 (3,31)	4,84 (2,32)	11,77 (2,44)
I. Social relationship	8,14 (3,77)	9,17 (3,79)	5,53 (3,29)	10,12 (3,19)
J. Interests	8,38 (3,02)	12,35 (4,42)	5,32 (2,03)	11,42 (3,77)
Composite Scores				
SLC	30,52 (9,71)	27,6 (11,25)	33,79 (7,66)	42,54 (10,12)
GCC	65,81 (18,2)	67 (24)	56 (13,2)	86,54 (16,24)
PLC	35,29 (10,27)	42,17 (12,83)	22,21 (7,9)	44 (9,06)
SIDC	3,9 (10,27)	15,83 (13,60)	-10 (11,85)	1,54 (11,93)

Table 4: Mean Scores and Standard Deviations (SD) of the CCC-2 scales in each groups.

Comparing the DD group to the ASD group, dyslexic children scored higher than ASD children in the subscales of the interests ($F_{(3,85)} = 17.38$; $p = .007$; partial $\eta 2 = .380$), of inappropriate initiation ($F_{(3,85)} = 10,99$; $p = .000$; partial $\eta 2 = .280$), of use of the context ($F_{(3,85)} = 14,99$; $p = .001$; partial $\eta 2 = .346$) and of social relationship ($F_{(3,85)} = 7,14$; $p = .017$; partial $\eta 2 = .201$). Regarding the syntax subscale, DD scored lower than ASD ($F_{(3,85)} = 6.89$; $p = .032$; partial $\eta 2 = .196$).

The comparison of the ASD group and the TD group showed that the ASD group scored lower on the following scales: coherence (F (3,85) = 7.02; p = .000; partial η2 = .199), inappropriate initiation (F (3,85) = 10.99; p = .000; partial η2 = .280), use of the context (F (3,85) = 14.99; p = .000; partial η2 = 346), social relations (F (3,85) = 7.14; p = .000; partial η2 = .201) and interests (F (3,85) = 17.38; p = .000; partial η2 = .380).

Repeated measures ANOVA was also used to compare the composite scores of the four groups (see Table 5). The DD group scored lower than the TD group on the SLC scale (F (3,85) = 10.47; p = .000; partial η2 = .270), GCC (F (3,85) = 11.15; p = .000; partial η2 = .282) and PLC (F (3,85) = 19.44; p = .005; partial η2 = .407). Furthermore, on the SIDC scale, the DD group scored higher than the ASD group (F (3,85) = 16.31; p = .000; partial η2 = .365) but lower than the DD+DLD group (F (3,85) = 16.31; p = .001; partial η2 = .365). On the PLC scale, DD children scored higher than the ASD group (F (3,85) = 19.44; p = .000; partial η2 = .407) and lower than the DD+DLD group (F (3,85) = 19.44; p = .028; partial η2 = .407).

The ASD group scored lower than TD children in all four composite scales: SLC (F (3,85) = 10.47; p = .004; partial η2 = .270), GCC (F (3,85) = 11.15; p = .000; partial η2 = .282), PLC (F (3,85) = 19.44; p = .000; partial η2 = .407) and SIDC (F (3,85) = 16.31; p = .002; partial η2 = .365). The comparison between DD+DLD group and ASD group showed lower scores in the DD+DLD group on the SLC scale (F (3,85) = 10.47; p = .049; partial η2 = .270). The DD+DLD group scored higher than ASD children on the PLC scales (F (3,85) = 19.44; p = .000; partial η2 = .407) and SIDC (F (3,85) = 16.31; p = .000; partial η2 = .365). Compared to TD group, DD+DLD group scored lower on the SLC scale (F (3,85) = 10.47; p = .000; partial η2 = .270) and on the GCC scale (F (3,85) = 11,15; p = .000; partial η2 = 2,82). On SIDC scale, DD+DLD group scored higher than TD group (F (3,85) = 16,31; p = .000; partial η2 = .365).

	Post-hoc analysis					
Subscales Score	DD vs TD	ASD vs TD	DD+DLD vs TD	DD vs DD+DLD	DD+DLD vs ASD	DD vs ASD
B. Syntax	DD < TD*	ASD < TD	DD+DLD < TD*	DD > DD+DLD	DD+DLD < ASD*	DD < ASD*
D. Coherence	DD < TD*	ASD < TD*	DD+DLD<TD*	DD > DD+DLD	DD+DLD > ASD	DD > ASD
E. Inappropriate initiation	DD < TD	ASD < TD*	DD+DLD >TD	DD < DD+DLD	DD+DLD > ASD*	DD > ASD*
G. Use of context	DD < TD*	ASD < TD*	DD+DLD <TD	DD < DD+DLD	DD+DLD > ASD*	DD > ASD*
I. Social relationship	DD < TD	ASD < TD*	DD+DLD <TD	DD>DD+DLD	DD+DLD > ASD*	DD > ASD*
J. Interests	DD < TD*	ASD < TD*	DD+DLD >TD	DD < DD+DLD*	DD+DLD > ASD*	DD > ASD*
Composite Score						
SLC	DD < TD*	ASD < TD*	DD+DLD<TD*	DD > DD+DLD	DD+DLD < ASD*	DD < ASD
GCC	DD < TD*	ASD < TD*	DD+DLD<TD*	DD < DD+DLD	DD+DLD > ASD	DD > ASD
PLC	DD < TD*	ASD < TD*	DD+DLD <TD	DD < DD+DLD *	DD+DLD > ASD*	DD > ASD*
SIDC	DD > TD	ASD < TD*	DD+DLD>TD*	DD < DD+DLD*	DD+DLD > ASD*	DD > ASD*

Table 5: ANOVA and Group Comparisons of the Children's Communication Checklist Scores.
*Note: * significant results.*
DD: Dyslexic; ASD: Autism Spectrum Disorder; DD+DLD: Dyslexic + Developmental Language Disorder; TD: Typical Development.
SLC = Structural language composite(A+B+C+D); PLC = pragmatic language composite (E+F+G+H); GCC = general communication composite (A+B+C+D+ E+F+G+H); SIDC =social interaction deviance composite (A+B+C+D- E- F-G-H).

For some subscales it was not possible to carry out the univariate ANOVA because the distribution was not normal. A non-parametric analysis was done through the Mann-Whitney U test and subsequently it was possible to make comparisons in pairs between the various groups (see Table 6).

The analysis indicates significantly lower scores for the DD group compared to the TD group in the speech scale (U = 137.5; p = .003; r = -0.31), semantics (U = 120; p = .000; r = -0.34) and non-verbal communication (U = 125; p = .000; r = -0.34). Compared to the DD+DLD group, the DD group scored

lower only in the subscale of non-verbal communication (U = 122; p = .001; r = -0.3). The ASD group showed lower scores compared to the TD group in the subscales of the semantics (U = 110; p = .001; r = -0.32), of stereotyped language (U = 113; p = .000; r = - 0.33), and of non-verbal communication (U = 16.5; p = .000; r = -0.56). Compared to the DD+DLD group, the ASD group scored lower in the subscale of the stereotyped language (U = 106.5 ; p = .002; r = -0.3) and in the subscales of non-verbal communication (U = 32; p = .000; r = -0.5) but higher in the subscale of speech (U = 112.5; p = .000; r = -0.28). Comparing the ASD group to DD children, the ASD group scored lower in the subscales of stereotyped language (U = 116; p = .006; r = -0.24) and in non-verbal communication (U = 77; p = .000; r = -0,35). Finally, the DD+DLD group scored lower than the TD group in the subscale of speech (U = 100.5; p = .000; r = -0.42), and semantics (U = 132; p = .000; r = -0.35).

Subscales Score	Comparisons in pairs between groups on CCC-2 scores					
	DD vs TD	*DD vs ASD*	*DD vs DD+DLD*	*DD+DLD vs ASD*	*DD+DLD vs TD*	*ASD vs TD*
A. Speech	DD<TD*	DD<ASD	DD>DD+DLD	DD+DLD<ASD*	DD+DLD<TD*	ASD<TD
C. Semantic	DD<TD*	DD<ASD	DD>DD+DLD	DD+DLD<ASD	DD+DLD<TD*	ASD<TD*
F. Stereotyped language	DD<TD	DD>ASD*	DD<DD+DLD	DD+DLD>ASD*	DD+DLD<TD	ASD<TD*
H. Nonverbal communication	DD<TD*	DD>ASD*	DD<DD+DLD*	DD+DLD>ASD*	DD+DLD<TD	ASD<TD*

Table 6: Comparisons of the Children's Communication Checklist Score with Mann Whitney test.
*Notes: * significant results.*
DD: Dyslexic; ASD:Autism Spectrum Disorder; DD+DLD: Dyslexic + Developmental Language Disorder; TD: Typical Development.
SLC = Structural language composite (A+B+C+D); PLC = pragmatic language composite (E+F+G+H); GCC = general communication composite (A+B+C+D+ E+F+G+H); SIDC =social interaction deviance composite (A+B+C+D- E- F-G-H).

8.4 Discussion

The goal of this study was to provide the reliability of the CCC-2 questionnaire as a tool to measure language and pragmatic difficulties and to discriminate children with different neurodevelopmental disorders in the Italian population.

In general, our results confirm the effectiveness of the CCC-2 questionnaire in detecting the typical linguistic and communicative impairments of children with neurodevelopmental disorders. According to this study, the CCC-2 questionnaire distinguishes between children with ASD from children with a diagnosis of DLD. Moreover, it seems that the CCC-2 is a valid tool that could be used to describe language and pragmatic difficulties in children without a diagnosis of language disorder, as in the case of DD, but with lower skills if compared to their typically developing peers. Finally, the data confirms the utility of the CCC-2 to disentangle the contribution of language processing to pragmatic competence.

In order to explore the validity of CCC-2 in detecting pragmatic and language abilities in children with different neurodevelopmental disorders, we compared the results obtained in each clinical group with those detected in the control group. First, from the analysis of the composite scores, all the clinical groups scored lower on the General Communication Composite Score and on the Structural Language Composite Score when compared to the control group. According to our results, the Pragmatic Language Composite Score could discriminate children with ASD and children with DD from their typically developing peers. Indeed, both DD and ASD groups underperformed when compared with the control group. Interestingly, the result of the DD+DLD group in the Pragmatic Composite Score was comparable to those obtained by the control group.

Observing the specific scale for the linguistic and pragmatic competences, we observed that the scales which differentiate the TD group and all the clinical groups included semantic and coherence skills. Moreover, the results obtained by the DD and the DD+DLD groups in the Syntax scale and in the

Speech scale showed mild impairments if compared to the TD group. These findings were in line with the literature (Snowling et al., 2016) and they confirmed the value of the CCC-2 to identify linguistic difficulties in children with DD. On the contrary, according to the parental report, children with ASD did not show any impairment pertaining the speech or syntax domain. Their abilities in structural language seemed to be comparable with those of typical developing peers. As expected, the ASD group had lower scores in the subscales concerning social relationships, use of stereotyped language and the ability to initiate conversation in an appropriate manner. Moreover, comparing the TD group with ASD children, the latter showed difficulties in the scales evaluating non-verbal communication, the use of context and interests. Interestingly, these scales also differentiated the DD children from the control group. Even if the score of these scales was not indicative of a severe deficit, children with dyslexia had more problems in these skills than their peers. In particular, the DD group seemed to have some difficulties in the domain of social competences, pragmatics abilities (such as the comprehension of idioms, irony and sense of humour) and the management of conversation in a group of peers. Difficulties in the use of context could be explained as a secondary effect of the documented impairments in other linguistic domains. In fact, our data is in line with previous works which reported the role of structural language aspects in pragmatics compared to the limited influence of social skills (Gernsbacher & Pripas-Kapit, 2012; Norbury, 2004). Difficulties in pragmatics were described in a recent study conducted by Lam and Ho (2014). From the CCC-2 questionnaire, completed by mothers of dyslexic children aged 8-11, the authors found significant difficulties in pragmatics compare to peers with typical development. Moreover, Cardillo and colleagues (2018) reported impairments in children with dyslexia in the comprehension of metaphors. Finally, the presence of difficulties in both the use and the comprehension of inferential language and metaphors has been confirmed in a recent study of adults with dyslexia (Cappelli et al., 2018). Unexpectedly, none of the pragmatic scales differentiate children with dyslexia and language disorders from the typically developing peers. Similarly to this

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latest result, DD children showed lower pragmatic skills than DD+DLD children when comparing the two groups on the Pragmatic Language Composite score. The difference in the use of language in the social context might be influenced by the clinical history that distinguishes children with dyslexia and children with a history of Language Disorder. The mean age of the diagnostic evaluation represents the main significant difference between DD and DD+DLD (4 years for DLD and 8 years for DD). Moreover, even if dyslexic children often show mild impairments in language, these difficulties become more evident only in the first school years (Cantiani et al., 2013; Snowling et al., 2016) and their treatment begins later than those provided for DLD children. Usually, the diagnosis of DLD is made in the preschool period and after the evaluation children could begin training with a speech therapist in order to improve the linguistic and communicative abilities. As described in the recent literature, early intervention represents a protective factor, not only for the linguistic and academic skills, but also for the well-being of both the child and his family (Livingston et al., 2018). Moreover, data collected from longitudinal studies suggests that early intervention on language skills also reduces behavioural problems in children with language development delays (Curtis, 2019). Therefore, leaving early language delays untreated represents a risk factor that can have negative effects on children's academic skills (Catt, 2002) as well on emotional development (Benaisch, 1993). In the case of dyslexic children, both diagnosis and intervention are provided from the end of the second class of the primary school. Late reading interventions tend to improve academic skills but their effect on social outcomes and on behaviours is small and still not clear (Wanzek, 2006; Roberts, 2015). Moreover, as described in the study in adults conducted by Partanen and Siegel (2014) satisfying outcomes in academic, social, emotional and economic domains are related to early identification of developmental dyslexia and an accurate intervention. In fact, adaptation, academic success and occupational opportunity are more frequent if dyslexia is diagnosed early in childhood (Stampoltzis & Polychronopoulou, 2009). Therefore, late diagnosis and support have a negative impact on self-

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perception and confidence and on acceptance of friends and family (Gennaro et al., 2017; Gibson & Kendall, 2010). In line with these results, the difficulties in non-verbal communication and in having interests found in our DD group, could derive from late training and unrecognised problems in language skills leading to inadequate behaviours. These issues are consistent with the current knowledge of psychological and emotional functioning in children with dyslexia characterized by both externalizing behaviours (Huc-Chabrolle et al., 2010; Knivsberg & Andreassen, 2008) and internalizing disorders (Ackerman et al., 2007; Mugnaini et al., 2009; Scorza et al., 2018a, 2018b). However, more studies are needed to support the role of early training on emotional and social consequences in dyslexic children.

In line with our first hypothesis, the Pragmatic Composite Score discriminate the DD group from the DD+DLD group as well as it distinguish children with major impairments in pragmatic skill from children with impairments in the structural language. In particular, the data showed more severe deficits in pragmatic skills in ASD children compared to DD and DD+DLD groups. These findings were similar to those described in other studies (Lord & Paul, 1997; Rapin & Dunn, 2003; Gibson et al., 2013; Loukusa et al., 2018; Baixauli-Fortea et al., 2019) and confirmed the presence of deficits in communication and language skills as core problems in children with ASD. Moreover, the comparison of the clinical groups found a significant difference between the pragmatic skills (Pragmatic Composite Score) and the structural language (Structural Language Score). As hypothesized, pragmatics was more compromised in the ASD group, in contrast the linguistic skills were more significantly impaired in the DD+DLD group.

Similar to these results, all the subscales regarding pragmatics (inappropriate initiation, stereotyped language, use of context, non-verbal communication) were more compromised in ASD children than in other groups. This data was consistent with other studies (Gibson et al., 2013; Loukusa et al., 2018; Baixauli-Fortea et al., 2019). Regarding the structural language subscales, children with ASD achieved

higher competence in the semantic domain than in the narrative coherence domain (semantic scale>coherence scale), whereas in DD and DD+DLD groups, both language components were similar (semantic scale=coherence scale). These profiles might clarify the mechanisms that drive narrative difficulties in each group. In the DD and DD+DLD children the difficulties could derive from linguistics impairments concerning syntax, phonology and lexicon. Thus, the difficulties in manipulating sounds, retrieving words and building syntactic frames resulted poor narratives. In ASD children the narrative deficit can not be linked to structural language skills. On the contrary, it seems associated to pragmatics and to social-communicative abilities. Indeed, ASD children showed higher level of stereotype language (e.g. use of unexpected words or messages, pedantic speech style), inappropriate initiation (e.g. one-sided verbosity, frequent initiation, lengthy responses) and use of context (e.g. literal interpretation, difficulties in processing idioms, irony and sense of humour). All these mechanisms heavily influence discourse production, leading to verbal narratives with limited coherence and macro-structure. These results confirm that weakness in oral narratives, both in children with ASD and in children with language disorder, have different origins (Norbury et al., 2014; Norbury & Bishop, 2003). ASD children without language impairment produce atypical narratives due to their socio-pragmatic deficit. Instead, children with language problems have narrative difficulties linked to syntax, phonology and semantic processing.

Finally, comparing the three clinical groups in the scales evaluating the competence (social relation scale and the interests scale) ASD children obtained the lower score. The data is consistent with deficits in social communication and with restricted, repetitive patterns of behaviour that characterized children with ASD. Unexpectedly, the scales of interests and non-verbal communication could discriminate also DD from DD+DLD, probably as consequences of early intervention that characterized the DD+DLD children and not the DD.

In summary, according to our results, CCC-2 questionnaire seems to be a valid tool that could be easily used in the clinical setting to describe pragmatic and language skills in children with different neurodevelopmental disorders. Moreover, even if pragmatics seem to be a core features of children with both communicative deficits (ASD) and language weaknesses, written and oral (DD and DLD+DLD), the results of this study showed that the questionnaire seems to appropriately discriminate different neurodevelopmental disorders in the Italian population.

9 STUDY 3: SPECIFIC LEARNING DISORDERS IN YOUNG ADULTS: INVESTIGATING PRAGMATIC ABILITIES AND THEIR RELATIONSHIP WITH THEORY OF MIND, EXECUTIVE FUNCTIONS AND QUALITY OF LIFE

9.1 The aims of the study

The ability to process pragmatic aspects of language (e.g. non-literal language, irony and metaphors) is a crucial social skill that contributes to individual well-being.

Of all the cognitive domains that could have a role on pragmatic functioning, Theory of Mind (ToM) and Executive Functions (EF) have received the most attention (Matthews et al., 2018).

The relationship between ToM and pragmatics has been studied mainly in neurological ans psychiatric disorders (Austism Spectrum Disorder and Schizophrenia). Among clinical conditions, Specific Learning Disorders (SLD) have received little attention and only few studies have discussed the link between SLD and pragmatic competence (Cardillo et al., 2017; Cappelli et al., 2018; Griffiths, 2007; Lam & Ho, 2014). Previous results on children with Austism Spectrum Disorder and adults with Schizophrenia supported the role of ToM in pragmatic comprehension (e.g., Happe, 1993; Brüne & Bodenstein, 2005). In contrast, the evidence on typically developing children, suggested that the link between metaphor interpretation and ToM is stronger in earlier ages, but it becomes looser in later stages (Lecce et al., 2018). Interestingly, the limited literature on metaphor processing in adults is compatible with this view, as it did not describe strong relationship with ToM, while in contrast emphasizing the role of other components such as working memory and executive control (e.g., Chiappe & Chiappe, 2007). Moreover, recent studies concluded that pragmatics and ToM are different constructs and that, while they do partially overlap, none of the two can be simply considered a sub-

component of the other (Bosco et al., 2018). According to this view, in this study, we considered ToM as an independent variable.

EF, inhibition and working memory in particular, are the second important cognitive abilities for pragmatics. Although the executive function model has been suggested to be valid (Martin & McDonald, 2003), to date pragmatic deficits cannot be completely explained by executive dysfunction (Champagne-Lavau & Stip, 2010). For instance, the role of EF in metaphor comprehension is evident in children and in adolescents; opposite, in young adults, the studied variables made a lower contribution to language pragmatics (Carriedo et al., 2016).

Finally, to the best of our knowledge only few studies have investigated the link between pragmatics and Quality of Life (QoL). Data from neurological samples suggested that the competence in conversational discourse correlates with social integration and QoL (Bambini et al., 2016).

Unexpectedly, the link between the two constructs, pragmatics and well-being, in adults with SLD has not been fully investigated. Given the potential clinical relevance of the relationship between QoL and pragmatics, this aspect needs to be further investigated.

Addressing gaps in the existing literature, the present work focused on young adults with SLD and had three main goals. The first aim was to examine pragmatic comprehension in young adults with SLD. In line with the few available studies, we hypothesized difficulties in pragmatic abilities in adults with SLD compared to healthy adults, in particular in the comprehension of figurative language. Secondly, we studied relationships between pragmatics and other cognitive abilities namely ToM and EF, in both SLD and in the control group. We expected close relationships between pragmatics abilities, EF and ToM. Third goal was to analyse relationships between pragmatics abilities and QoL. According to the literature, we hypothesized a significant influence of pragmatic abilities on QoL.

9.2 Method

9.2.1 Participants

Fifty-six young adults took part in the study: 26 young adults who had been diagnosed with Specific Learning Disorders (SLD group) by experienced clinicians (*mean age* = 20; *SD* = 1.9) and 30 healthy adults (*mean age* = 23; *SD* = 2.5) as the control group (C group). The years of education for SLD group was 14.35 (*SD* =1.1) and for the control group were 15.13 (*SD* = 2.0); the years of education were not significantly different between the two groups when compared with Mann Whitney test (*U* = 347.5; *p* = .473; *r* = .096) (see Table 7 for sample's details).

	SLD group (n = 26)	C group (n = 30)
Male	7	9
Female	19	21
Workers (with college degree)	2	10
Workers (with bachelor's or master's degree)	1 è	4
University students	23	16
Mean age (SD)	20 (1.9)	23 (2.5)

Table 7: Socio-demographic characteristics of the SLD and the C groups.

SLD adults were recruited from the Specific Learning and Disabilities Service of the University Modena and Reggio Emilia and from private clinical centres in Italy. All participants received a diagnosis based on the ICD-10 (1993) coding system and met the criteria indicated in the National Italian Consensus Conference on SLD published by the Italian Ministry of Health (Istituto Superiore di Sanità, 2010). The diagnoses of SLD were distributed as follows: 42.3 % (n = 11) with dyslexia, 15.4% (n = 4) with dyslexia and dysorthography, and 42.3 % (n = 11) with mixed disorder (dyscalculia + dyslexia + dysorthography).

The controls were selected from the general population. To exclude any possible difficulty due to specific medical conditions, we defined as exclusion criteria the presence of major neurological or psychiatric history. Finally, none of the participants had visual or hearing impairments, and all the subjects were Italian native speakers.

9.2.2 Procedure

The study was conducted in accordance with the Declaration of Helsinki. The participants were informed in detail about the aims of the study, the voluntary nature of their participation, their right to withdraw from the study at any time and provided their informed written consent for participation in the study, data analysis, and data publication.

The tests were administered individually by a psychologist, in a quiet room during a 2-h session in which pragmatic abilities were assessed using APACS test (Arcara et al., 2016), ToM and Executive functions were measured using the following tests: Imposing Memory Task (IMT, Kinderman et al., 1998; Italian version by Valle et al., 2015) and Story based Empathy Task (SET; Dodich et al., 2015) for ToM; Digit Span (DS) subtest of the Italian adaptation of the WAIS-IV (Orsini & Pezzuti, 2013) and Stroop Test (Caffarra et al., 2002) for EF. QoL was assessed with a standardized and validated questionnaire, PedsQL™ 4.0 self report (Varni et al., 2009), completed at home by the subjects and sent back to the clinicians after one week.

9.2.3 Measures

The battery below was chosen to cover a wide range of psychological domains, including cognitive abilities and psychological health. There are many different ways of assessing aspects of cognitive functioning; we selected well validated neuropsychological instruments used in clinical and experimental settings to evaluate young adults. Moreover, for the evaluation of pragmatic abilities and

ToM we decided to use batteries recently developed and standardized for the Italian population, already used with neurological and psychiatric patients (e.g. Bambini et al., 2016) and with healthy young adults as well (e.g. Valle et al., 2015). We selected these tests as they focus on specific social cognition and cognitive facets, analysing in depth the different domains.

Finally, to asses the QoL we chose a self-report measure (PedsQL™), as it is based on a multidimensional model of QoL and it explores each aspect of this domain in a limited range of time.

Pragmatic abilities

Pragmatic of language was evaluated with APACS (Arcara et al., 2016). We measured only the comprehension of pragmatics and therefore we chose the four APACS subtests evaluating this domain. The "Narratives" task measures the ability to answer questions about narrative texts. It consists of 6 stories, inspired by real news articles, with increasing length and complexity. The stories are read aloud and at normal rate by the clinician to the subject. For each story, subjects are asked to answer an open question about the global topic of the story (rated 1 when correctly answered or 0), 2 to 4 yes-no questions about specific elements of the story (rated 1 when correctly answered or 0) and 2 questions requiring a verbal explanation of 2 non-literal expressions included in the story (rated 2, 1, or 0 according to the level of the accuracy of the explanation). Maximal global score is 56. The "Figurative Language 1" task assesses the ability to infer non literal meanings. Fifteen sentences are presented to the subjects, which have to choose between three possible interpretations. Options include one correct interpretation, and two incorrect interpretations (one literal and one unrelated with respect to the target word). Each item scores 1 or 0 and the maximal score is 15. The "Humour" task measures the ability to understand verbal humour. It consists of five brief stories with three possible endings each. The subject is asked to select the correct alternative (rate 1 when the answer is correct or 0). The last task is the "Figurative Language 2" that assesses the ability to understand familiar idioms, novel metaphors, and common proverbs. The subtest includes 15 items (5 highly familiar idioms, 5 novel metaphors and 5

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common proverbs). The instruction is to explain the meaning of each expression. Three scores are possible: 2 when the subject describes the actual meaning of the figurative expression, 1 if the subject provides incomplete explanation, 0 when the subject fails to explain the meaning (e.g using paraphrases of the figurative expression or providing a literal explanation) (maximal score: 30).

Finally a composite score, the "Pragmatic Comprehension" score (PCS), was derived from the four subtests. It was obtained transforming the original tasks' scores in proportions, and averaging these proportions.

The Internal consistency of APACS was calculated by the authors by means of Cronbach's alpha on all items in each APACS task. Results indicate that all APACS tasks have acceptable internal consistency, with alpha values ranging from .60 to 0.70. Specifically, the following values were obtained: .63 for Interview; .65 for Description; .66 for Narratives; .60 for Figurative Language 1; .63 for Humour; 0.70 for Figurative Language 2. The Test-Retest reliability of APACS was assessed in a subset of 19 participants (mean age = 42.00, SD = 14.85; mean education 16.89, SD = 4.12) tested at two separate times with a 2-week interval, by the same examiner. Results indicate that Test-Retest reliability, calculated by means of Pearson correlations, is good to excellent for all APACS tasks except for Narratives, which showed a remarkably low value (i.e., .19). According to the authors, the reason of this low value is the almost ceiling performance of the participants who underwent the Test-Retest combined with the practice effect.

Theory of Mind

Mental state attribution skills were assessed with two task. First, we selected a non verbal task, the Story based Empathy Task (SET) (Dodich et al., 2015) measuring the attribution of intentions and emotional states represented by comic strip. The test includes two main experimental conditions (identifying intentions, SET-IA and emotional states, SET-EA), and a control condition entailing the

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inference of causality reaction based on the knowledge of the physical properties of objects and human bodies (SET-CI). Each condition includes 6 stories. The subjects is asked to select the one out of three presented endings. The total score for each condition is calculated summing the number of correct answers given by the subjects for each cartoon (1 point for correct answer, 0 for incorrect choice). The global score (SET-G) for the task is 18.

Secondly, we used the Italian version of the Imposing Memory Test (IMT) (Valle et al., 2015) in order to measure verbal ToM. IMT is composed of a series of four mentalistic stories and one control story. In each mentalistic story the perspective and the intentions of the characters could be understand only with an effective recursive thinking. The subject is asked to chose the correct sentence between two possible alternatives, one true and one false: one correct and one incorrect. The questions collectively assess different levels of recursive thinking (from the first level to the fifth level of complexity). The the total score, obtained by the sum of the score of all levels, has been proportioned and the possible score range is from 0 to 1.

Executive functions

Working Memory (WM) was assessed with the Digit Span (DS) subtest of the Italian version of the WAIS-IV battery (Orsini & Pezzuti, 2013). The subtest included three tasks: the digit span forward,

  the backward and the sequencing. The Internal consistency reliability coefficients for the WAIS subtests is .90.

The ability to inhibit cognitive interference was measure with the Stroop Test (Caffarra et al., 2002). The test includes 3 conditions: reading, naming, and color-word interference. The reading and naming conditions are used to measure the speed of information processing. The color-word interference condition is a measure of EF, in particular of the inhibitory control ability. Two scores are obtained. The

first refers to the time interference effect (based on execution time, Stroop Test-Time), the second to the error interference effect (based on number of errors, Stroop Test-Errors).

Quality of life

QoL was evaluated with the PedsQL™ 4.0 self-report (Varni et al., 2009). The subject is asked to answer 23 items referring to problems during the past month. The items are grouped into 4 multidimensional scales: physical functioning (8 items) (QoL_P), emotional functioning (5 items) (QoL_E), social functioning (5 items) (QoL_S), and school/work activities (5 items) (QoL_W). These four scales could be grouped into 3 composite scores: a General Score (23 items) (QoL_G), a Physical Health Summary Score (8 items) and a Psychosocial Health Summary Score (15 items). Among these composite scores, in the present study, we considered only the QoL_G.

Statistical analyses

All statistical analyses were carried out using SPSS 23.0 for Windows with an alpha level of 0.05. Preliminary analyses were conducted to examine the distribution of the variables using the Kolmogorov-Smirnov test. With regard to the first goal, as some variables were not normally distributed, Mann Whitney tests were conducted to assess potential differences in APACS subtests scores between the adults with SLD and control group. The Effect sizes (r) for Mann–Whitney U tests were calculated using the formula $r = \frac{z}{\sqrt{N}}$ where N is the total number of participants in the whole sample; the standard values of r for small, medium and large effect sizes are 0.1, 0.3, and 0.5 respectively (Field 2009, p. 550). To prove the second hypothesis, a Generalized Linear Model was applied to evaluate the interaction effect group by EF and group by ToM abilities on the pragmatic abilities. The Generalized Linear Model allows studying the main effect of the group on pragmatic

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abilities and the interaction effect group by EF and ToM on pragmatic abilities. In the Generalized

Linear Model, the APACS total score was used as the dependent variable, the Group (SLD vs C) was

used as a subject factor, and the EF (Digit Span, Stroop Test-Time and Stroop Test-Errors) and ToM

(Story based Empathy Task and Imposing Memory Test) subscales were used as continues factors

(covariates). The Generalized Linear Model assumes that the dependent variable is linearly related to

the factors and covariates via a specified link function. The effect sizes (Cramer's V) for Wald Chi-

Square tests were calculated using the formula V = $\sqrt{\frac{x^2}{n \cdot df}}$ where df are the degrees of freedom and n is

the number of subjects. The standard values of Cramer's V for small, medium and large effect sizes are

0.1, 0.3, and 0.5 respectively (Cohen, 1988). Moreover, the model allows for the dependent variable to

have a non-normal distribution.

With regard to the third goal, a Multivariate Analysis of Covariance (MANCOVA) was performed to

explore the effect of pragmatic abilities on the QoL in SDL and C group. The QoL subscales (QoL_G,

QoL_P; QoL_E; QoL_S; QoL_W) were considered as dependent variables, the group (SLD and C) as

between-subject factor and the Pragmatic Comprehension (PCS) as the covariate. The analysis allowed

evaluating the effect of pragmatic abilities on the QoL and the effect of SLD on QoL (independently

from the pragmatics abilities).

9.3 Results

9.3.1 Pragmatic abilities in young adults with SLD compared with healthy young adults

Descriptive data are presented in Table 8. Using the Mann Whitney test, we found significant

differences in the PCS and 3 out of 4 pragmatic tasks: Narratives, Figurative Language 1 and

Figurative language 2. Compared to the control group, adults with SLD performed significantly lower

in all of these tasks (see Table 8). No significant difference was found between the SLD and C groups in Humour task (see Table 8). In order to test the hypothesis of a pragmatic deficit in adults with SLD, we conducted a descriptive analysis of the number of subjects who fell under the cut-off score on APACS test. Fifteen out of 26 (58%) adults with SLD demonstrated a performance below the cut-off in the PCS and 22 (85%) of them had a score below the cut-off in the Figurative Language 2 task. By contrast, only 2 (6%) adults of the control group performed below the cut-off in the PCS and in the task evaluating the comprehension of metaphors (Figurative Language 2).

APACS tasks and composite score	SLD group Mean (SD) (n = 26)	C group Mean (SD) (n = 30)	Mann Whitney			
			U	p	r	CI
Narratives (max score 56)	51.15 (4)	53.83 (1.94)	235	**.010**	-.34	.000 – 4.000
Figurative Language 1 (max score 15)	14.46 (.7)	14.93 (.25)	235	**.001**	-.43	.000 – 1.000
Humour (max score 7)	6.26 (.87)	6.46 (.77)	377.5	.335	-.12	.000 - 1.000
Figurative Language 2 (max score 30)	19.61 (3.3)	25.97 (1.97)	38	**<.001**	-1.74	4.000 - 9.000

Table 8: Means, Standard deviations and results of the comparison between the performance of individuals with SLD and controls in the APACS comprehension tasks and pragmatic comprehension composite score. Significant results are in bold.

9.3.2 Effect of ToM and EF on pragmatic abilities

The Generalized Linear Model returned significant level (Likelihood Ratio Chi-Square=44.27; p<.001; Cramer's V=.27) attesting the fact that the factors considered (group, EF and ToM) significantly affected the Pragmatic Comprehension (PCS) when taken together. The effect of the group *per se* was not predictive of Pragmatic Comprehension (see Table 9). Only when considering the presence of SLD in interaction with Story-based Empathy Task (SET), a higher level of PCS was found in SLD group compared to control group (SLD (b)=.604; C(b)=.595). This result assumed that only in the SLD group, the effect of SET significantly improve the pragmatic abilities.

	PCS		
	Wald's Chi^2	p	Cramer's V
SLD	.000	.998	.000
SLD by DS	1.446	.485	.116
SLD by Stroop_E	1.560	.458	.120
SLD by Stroop_t	3.573	.168	.182
SLD by SET	**6.276**	**.043**	**.241**
SLD by IMT	2.256	.324	.145

Table 9: Effect of SLD and interaction effect between SLD and FE and SLD and ToM on Pragmatic Comprehension. Note: PCS: Pragmatic Comprehension; DS: Digit Span; Stroop_E: Stroop Test-Errors; Stroop_t: Stroop Test-Time; SET: Story based Empathy Task; IMT: Imposing Memory Test. *p < 0.05. Significant results are in bold.

9.3.3 Relationships between pragmatics and quality of life

The MANCOVA showed a significant difference between SLD and C adults on QoL as a general effect ($F_{(5, 46)}$=3.982; p=.004, Partial η^2=.302). In particular, the SLD group showed a lower QoL S level and a significantly lower level of QoL W compared to C group (see table 10) independently from the subject's pragmatic abilities. The PCS significantly predict the QoL if the different subscales were taken together ($F_{(5, 46)}$=2.634; p=.035, Partial η^2=.223). No significant effects were found for the single QoL subscales (see table 10).

	SLD group	C group	F	p	Partial η2
	Mean (SE)				
QoL G	74.730 (2.093)	80.280 (1.784)	3.394	.071	.064
QoL P	81.633 (2.482)	82.519 (2.115)	.0620	.805	.001
QoL E	60.094 (3.363)	61.261 (2.861)	.0580	.810	.001
QoL S	80.693 (2.773)	91.469 (2.363)	**7.290**	**.009**	**.127**
QoL W	72.357 (2.593)	84.526 (2.210)	**10.631**	**.002**	**.175**

Tabella 10: Estimated marginal means (and standard errors_SE) of QoL subscales in Specific Learning Disable (SLD) and control (C) group.Note: Covariates appearing in the model are evaluated at the following value: PCS= .904. QoL G: Quality of Life_General Score; QoL P: Quality of Life_ physical functioning; QoL E: Quality of Life_ emotional functioning; QoL S: Quality of Life_ social functioning; QoL W: Quality of Life_ school/work activities Significant results are in bold.

9.4 Discussion

This study aimed to shed light on pragmatic abilities in young adults with SLD. In particular, we focused on the comprehension of pragmatics (irony, narratives and figurative language) as a possible domain of deficit and target of clinical evaluation and intervention.

With regard to the first purpose, our results support the hypothesis of a pragmatic impairment in young adults with SLD; in fact, pragmatic comprehension was widely compromised in the group of adults with SLD. This evidence is consistent with our first hypothesis and with other studies (Cappelli et al., 2018; Griffith 2007) that showed difficulties in understanding the pragmatic aspects of language in university students with DD. Analysing our data, we observed that the main difficulty concerned the comprehension and the verbalization of the meaning of figurative language (metaphors and proverbs). These findings are similar to those found by Cappelli and colleagues (2018). The authors described a poorer performance in university students with DD compared to healthy university students in all pragmatic domains, and they found more severe impairments in the tasks evaluating the understanding of figurative language (Figurative Language 1 and Figurative Language 2 of APACS test). Deficits in

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the pragmatic of language were found in children with DD as well (Cardillo et al., 2018). These children with DD showed more difficulties in the understanding of metaphors and idioms compared to their C peers. Pragmatic difficulties were also described by parents of children with DD using the CCC2 (Ferrara et al., 2020; Lam & Ho, 2014). Consistent with this literature, our data seem to confirm that the difficulties in pragmatics are life long in SLD continuing to characterize these people also in adulthood.

The second goal of our study was to analyse the relationship between pragmatic abilities and other cognitive domains, namely ToM and EF. The rationale behind this second aim referred to the traditional hypothesis of problems in the pragmatics of language as related to impairment in other cognitive and socio-cognitive domains, especially EF and ToM deficits (Martin & McDonald, 2003), and to literature that shows that these relationships between different domains could vary across clinical populations (Bambini et al., 2016).

Concerning the social cognition domain, we found that in SLD group pragmatic comprehension abilities were related to the performance in the SET test, measuring attribution of intentions and emotional states. The only study that to our knowledge investigated this relationship in adults with DD was those by Cappelli et al. (2018) in which the authors did not find any correlation between ToM (SET task) and pragmatics evaluated with APACS test. Thus, our results provide new evidence supporting the association between pragmatics and ToM in adults with SLD.

Previous works have hypothesized that the link between metaphor interpretation and ToM progressively loses strength from childhood to adulthood in the healthy population (Lecce et al., 2018), whereas it remains strong in the neurodevelopmental disorders and in other clinical conditions such as schizophrenia (e.g. Bosia et al., 2015; Champagne-Lavau & Stip, 2010). Our data are congruent with these researches. Interestingly, in our study, pragmatic abilities in adults with SLD are in relationship with visual ToM and not with verbal ToM. A likely scenario is that in this clinical population,

pragmatic comprehension abilities do not ground on semantic knowledge, often reached by reading, that is used by healthy young adults to interpret others intention (Carriedo et al., 2016). Moreover, according to this evidence, it seems that pragmatic deficits cannot be completely explained by ToM abilities; instead, pragmatic difficulties appear to exist in adult with SLD independently of ToM (Bosco et al., 2018).

Another main result of this study regards the relationship between pragmatic comprehension and EF. Until now, there have been mixed results, and the literature on different populations remains contradictory. Some studies showed an association between pragmatic abilities and EF (Channon & Watts, 2003), whereas others did not (Martin & McDonald, 2005). In the typical population, verbal reasoning, updating in WM and inhibition have been related with language (e.g. Pettenati et al., 2015) and metaphor interpretation (Lecce et al., 2018; Matthews et al., 2018); however, the strength of the relationship between EF and pragmatics seemed to decrease from childhood to adulthood (Carriedo et al., 2016). Our data support the hypothesis of a plausible co-occurrence of EF impairments and pragmatic difficulties without correlation between them (Champagne-Lavau & Stip, 2010). In fact, we did not observe any relation between pragmatics and EF neither in adults with SLD nor in the control group. This finding is consistent with the result reported by Cappelli et al. (2018) in university students with DD; the authors did not find a link between pragmatics and high-level EF. More generally, our result is in accordance with Karmiloff-Smith's model of the progressive modularization and specialization of cognitive skills (Karmiloff-Smith, 1995).

Regarding the last aim of the study, adults with SLD showed an impaired QoL compared to healthy subjects. More specifically, adults with SLD reported significantly lower scores in the quality of the relationship with peers and in their work or studying setting than in controls. The differences between SLD and C groups in the QoL subscales are found net of pragmatic abilities, ie they do not depend on the pragmatic skills of the subjects belonging to the two groups. These results are consistent with the

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literature that reports in patients with DD difficulties in finding friends or maintaining relationships (Gennaro et al., 2019), which could be due both to negative attitudes towards individuals and to cognitive impairments (Lisle & Wade, 2014; Livingston et al., 2018). Furthermore, the PedsQL™ scale concerning problems in work or studying mainly refers to planning activities and to organizing materials, and these aspects represent broad challenges for SLD adults due to their deficit in EF, WM in particular. These cognitive impairments, combined with increased feelings of nervousness, frustration and uncertainty during testing and working, have been considered a key contributor to decrease success (Heiman & Precel, 2003). Moreover, not all the students or employees of the SLD group had the possibility to use strategies such as assistive technologies, learning technologies and support services in their university/work setting; this lack may have hindered their well-being in the study/work environment (MacCullagh et al. 2017). We also explored the relationship between pragmatic abilities and QoL. The results showed a link between pragmatics and general QoL independently from the presence of SLD. To the best of our knowledge, there are no data on literature concerning the possible effect of pragmatics on daily functioning in adults with SLD, and our study is the first in this direction. Previous studies on neurological and psychiatric patients reported relationships between pragmatic abilities and QoL (Galski et al., 1998). Interestingly, data from patients with Schizophrenia (Bambini et al., 2016) suggested that performance in pragmatics, measured as APACS Total score, predicted quality of life. Our findings are in line with this evidence and support the interaction between pragmatic deficits and QoL. The observation of this relationship is of extreme interest for its potential clinical relevance as the interventions on pragmatic abilities could in turn, improve the patients' QoL. Unexpectedly, we did not find a strong relationship between pragmatics and any of the QoL aspects if considered separately. Thus, more research is needed to better understand the pragmatic factors that influence the QoL of adults with SLD.

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10 GENERAL DISCUSSION AND CONCLUSION

10.1 General discussion

Pragmatics is a complex domain and it includes different abilities, among which the two most crucial are the ability to use language or other expressive means to convey a message in a communicative context and the ability to manage conversation (e.g. Bara, 2010; Tirassa & Bosco, 2008). Behind the various theories on pragmatics, in literature there is an agreement about the role of inferential process in pragmatic comprehension as the listener has to fill the gap between what the speaker literally has said and what he/she actually meant (Griece, 1989; Searle, 1975). The ability to infer the communicative intention is fundamental to solve pragmatic sentences and it characterizes human communication (Bosco et al., 2018).

The development of pragmatics is an important milestone in child's communication development and it begins in early infancy, when the bases for the pragmatic skills are formed. The preschool period has been described as an important stage in which pragmatic abilities improve and children begin to explore language. In particular, children progressively start to manage speech acts (Bosco & Bucciarelli, 2008), deceits (Bussey, 1999), irony (Filippova & Astington, 2008) and metaphor (Van Herwegen, et al., 2013).

The development of pragmatics continues through adolescence and its progress seems to be linked with the achievement of other cognitive abilities, Theory of mind and Executive functions in particular (Martin & McDonald, 2003). The general hypothesis is that pragmatic abilities and social cognition, especially Theory of mind, are linked and they cooperate to support successful social communication. In fact, while pragmatic abilities govern the integration of language and context, social cognition addresses social interaction and social cue interpretation (Bosco et al., 2018). Executive functions represent a crucial element involved in the activity of social communication, as they support the

planning, execution and regulation of goal-directed behaviour. Martin (Martin & McDonald, 2003) contributed to shed light on the cognitive domains that give emphasis to pragmatic abilities. The authors described three models that seem to explain pragmatic abilities. The first, the Weak Central Coherence account postulated that the inability to use context to derive meaning is the main cause of pragmatic difficulties. In particular, this theory was applied to Autism Spectrum Disorder (e.g. Frith 1989) and adults with neurological disorder such as right hemisphere damage (e.g. Bihrle et al., 1986). In fact, in these clinical conditions, the patients failed to use contextual information and they do not understand the non-literal meanings of communication. The second theory, the "Social Inference Theory", postulated the role of Theory of mind in pragmatic abilities. In fact, social inferences are always required when we attempt to explain or predict the intentions, thoughts and behaviours of our interlocutors. The link between Theory of mind and pragmatic is still debated. For example, Happe (1993) found that Autism Spectrum Disorder children with deficit in Theory of mind, could not understand metaphors that require the interpretation of the speaker's beliefs; by contrast, Norbury (2005) found that Theory of mind was not sufficient for correct metaphor comprehension, even if the understanding of the speaker's intention may help the listener to interpret the metaphor in natural contexts. The link between Theory of mind and pragmatic has also been studied in adults with right hemisphere damage (e.g. Winner et al., 1998) and schizophrenia (e.g. Janseen et al., 2003). The results supported the role of Theory of mind, the second-order belief in particular, in pragmatic comprehension. The last theory, the "Executive Dysfunction Account" focused on the relationship between Executive functions and pragmatic abilities. Intact Executive functions seem to be crucial to be engaged in motivated, adaptive and effective communication (Champagne-Lavau & Stip, 2010; Martin & McDonald, 2003). Among Executive functions, inhibitory control has been described as the process most involved in pragmatic functioning. In fact, the activation of this cognitive mechanism allows to suppress superfluous information and to consider the communicative partner's perspective. In

general, an executive dysfunction may cause pragmatic difficulties such as rigid and concrete elaboration of linguistic information and impairments in the comprehension of figurative language.

Considering the complexity of pragmatics and the heterogeneous findings on pragmatic deficits, the three causal hypotheses (WCC, deficit of Theory of mind and deficit of Executive functions) seem to be not mutually exclusive, but an interaction it is plausible between the three different domains, Theory of mind and Executive functions in particular (Poletti, 2011).

Interestingly, pragmatic abilities have been linked to well-being and quality of life as well (Matthews et al., 2018). In particular, it seems crucial to consider school well-being, as children spend at least 25 hours a week at school and with peers. Recently, Tobia (Tobia et al., 2019) proposed a multi-informant approach that took into consideration both the point of view of the child and adults who are indirectly or directly involved in school life (i.e. parents and teachers). In line with this model, we considered the school well-being as a multi-dimensional concept that includes cognitive, emotional and social domains.

Pragmatic abilities and their role on well-being and behaviours have been studied mainly in children with neurodevelopmental disorders. In contrast, the possible negative consequences of pragmatic difficulties in typically developing children have still not been fully investigated.

To shed light on this debated issue, the first study of the present work focused on the link between pragmatic abilities and both the school well-being and behavioural problems in typically developing children. We collected parents' opinion with three questionnaires (QBS, CBCL and CCC-2) evaluating the school well-being, the psychological/behavioural problems and the pragmatic abilities respectively. Teachers were asked to complete the QBS questionnaire.

The data supported the hypothesis of a relationship between pragmatic abilities and school well-being. Pragmatic abilities were also linked to externalizing and internalizing symptoms and with specific behavioral problems such as social and attentional problems.

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Overall, this study supports the relationships between pragmatic abilities and school and psychological well-being in typically developing children. Our findings suggest that pragmatic difficulties should be considered as possible risk factors for emotional and behavioural problems during developmental stages. For children, the class is one of the key social context they find themselves embedded in as they spend a lot of time at school, as much as 25 hours or more per week. Moreover, as children enter elementary school, conversation becomes more important for both social relationships and academic tasks (Leonard et al., 2011). It seems likely that pragmatic and communicative abilities could influence well-being and behaviours.

Therefore, an early identification of pragmatic difficulties, even in children without evident psychological distress and/or psychopathological symptoms, may prevent psychological problems that could occur later in the development.

According to our data, teachers play a crucial role in this early identification. They are the first professionals that could detect both pragmatic skills and psychological problems in different context and in communicative exchanges. Therefore, it seems fundamental for clinicians to work in concert with teachers, and parents as well, in the assessment and interventions in children with communicative, psychological and behavioural problems.

Finally, our findings highlight the importance of defining strategies and interventions supporting children in their pragmatic abilities and social skills in the classroom setting, in order to improve school well-being and overall psychological health.

Although our results bring new evidences, the study is not free from limitations. First, the sample size is limited and replication of the present findings with larger samples is needed. Secondly, data from this study is limited to a single age point. There is a need for longitudinal studies aimed at verifying the persistence of relationships between pragmatic abilities, school well-being and psychological health at a later age. Lastly, our study used adults' reports only, whereas future studies should examine pragmatic

abilities comparing tasks directly administered to the child with parent reports, in order to get a complete picture of the child's pragmatic development (Adams, 2002).

The assessment of pragmatic abilities in typically developing children and in children with neurodevelopmental disorders is a scientific topic still debated in literature. In fact, some authors claim the importance   of using a direct assessment in order to verify the presence of a specific pragmatic skill, others support the use of standardized questionnaire completed by adults (e.g. Adams, 2002). In Italy, the instruments for the identification of pragmatic difficulties are limited. Recently, the CCC-2 questionnaire (Bishop, 2003) has became one of the instruments of choice to evaluate pragmatic abilities. However, to our knowledge, in the Italian literature there are no systematic studies about the CCC-2 and its reliability in detecting pragmatic difficulties. In particular in our opinion, it seemed important to investigate if CCC-2 scale could discriminate linguistic and communicative skills in children with different neurodevelopmental disorders in order to define an efficient intervention. We asked the mothers of Italian children with typical development and with different neurodevelopmental conditions (Autism Spectrum Disorder with good intellectual functioning, Developmental Dyslexia associated with Developmental language disorder, and Developmental Dyslexia without linguistic impairments) to complete the CCC-2 questionnaire and we compared the results.

Our findings support the validity of CCC-2 as a screening measure able to distinguish children with communication impairments from non-impaired peers. According to our study, the CCC-2 could provide a complete profile of weaknesses and strengths of the child, helping clinicians to plan the rehabilitation training and early interventions.

Moreover, in line with the very limited studies on children with Developmental Learning Disorder (Cardillo et al., 2018, Lam & Ho, 2014), we find pragmatic difficulties in this clinical population as well. Unexpectedly, the scales of interests and non-verbal communication could discriminate also

children with Developmental Dyslexia from children with Developmental Dyslexia associated with Developmental language disorder, which showed higher social and behavioural skills.

A first limitation of this study concerns the small sample of participants. Even if the sample size is comparable with other studies and it is sufficient to identify important differences between groups, additional investigation with a larger sample is necessary to confirm and extend our findings. Secondly, even though the CCC-2 provides satisfactory estimates of internal consistency and reliability (Bishop & Baird, 2001), the sole use of a parent report is a limitation. A problem inherent in a checklist is that informants may vary both in their ability to understand the items and in their subjective interpretations and biases (Bishop & McDonald, 2009). Parents could have difficulties in understanding and in detecting some pragmatic behaviours that are sometimes overt, some of which must be inferred, and others represent a sum of different levels of processing. Lastly, it would be interesting to conduct a longitudinal study in order to verify the persistence of pragmatic difficulties over time and their link with other domains such as quality of life and cognitive abilities.

In line with this last consideration, a third study was designed. We investigated the language pragmatic abilities in a sample of young adults with Specific Learning Disorder and in a control group from the general population. The role of other cognitive abilities (Theory of mind and Executive functions) on pragmatic skills was studied as well. Finally, considering the previous data found in children, we looked for a possible link between pragmatics and quality of life in these adult populations. According to our hypothesis we find impairments in the pragmatic competence in young adults with Specific Learning Disorder. The main deficit concerns the comprehension of figurative language that remains a challenge in adulthood in these patients. Moreover, the study contributes to clarify the relationship between pragmatics and other cognitive domains namely Theory of mind and Executive functions. The findings support recent evidence (Matthews et al., 2018) of close relationships between pragmatics and Theory of mind and expand the research concerning relationships between pragmatic comprehension

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and Executive functions, inhibitory control in particular, in adults with Specific Learning Disorder. Finally, this study provides new data supporting impairments in the quality of life of adults with Specific Learning Disorder and their link with pragmatics. Taken together, these results highlight the importance of including in the clinical assessment of patients with Specific Learning Disorder the evaluation of pragmatic abilities and of considering the pragmatic skills in the intervention plans. In fact, these difficulties appear still underestimated and rarely evaluated in clinical settings.

The study contains some limitations that need to be mentioned. We explored only pragmatic comprehension. Future studies should explore pragmatics production as well, investigating its relationship to cognitive skills and psychological aspects in adults with Specific Learning Disorder. Another limitation regards our sample size that was relatively small, with a prevalence of university students in both groups (in the Specific Learning Disorder group in particular) and of female rather than male adults. Future research with a larger and more heterogeneous sample would be interesting.

10.2 Conclusions

Overall this work sheds light on pragmatic abilities both in typically developing children and in different neurodevelopmental disorders.

First, the data collected support the hypothesis of a relationship between pragmatic abilities, school well-being and both externalizing and internalizing problems during the early stage of development in typically developing children.

Moreover, our findings seem to confirm that difficulties in pragmatic abilities, language pragmatic in particular, characterize children with different neurodevelopmental disorders (Autism Spectrum Disorder, Developmental Dyslexia and Developmental language disorder). The pragmatic profiles in these children are often very similar and an integrate approach that combines direct and indirect tests is

needed to correctly identify the pragmatic skills. According to our results, the CCC-2 questionnaire represents a valid tool that discriminates between the different neurodevelopmental conditions and allows early diagnosis and intervention.

Interestingly, language pragmatic difficulties are likely to persist in young adults with Specific Learning Disorder as well. In this clinical population, pragmatics is related with other cognitive abilities, Theory of mind in particular. As expected, pragmatic difficulties have a role on quality of life. To conclude, the study supports the importance of considering pragmatics as a domain of interest in clinical evaluation, in order to early detect difficulties, define an intervention and prevent psychological, social and behavioural problems that could occur later in the development and in adulthood.

11 References

Achenbach, T. M. (1991). Manual for the Child Behavior Checklist/4-18 and 1991 Profile. Burlington, VT: University of Vermont, Department of Psychiatry.

Achenbach, T. M., & Rescorla, L. A. (2001). Manual for the ASEBA school-age forms & profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth & Families.

Ackerman, B. P., Izard, C. E., Kobak, R., Brown, E. D., & Smith, C. (2007). Relation between reading problems and internalizing behavior in school for preadolescent children from economically disadvantaged families. Child Development, 78(2), 581-596.

Adams, C. (2002). Practitioner review: The assessment of language pragmatics. Journal of Child Psychology and Psychiatry, and Allied Disciplines, 43(8), 973–987.

Adams, C., & Lloyd, J. (2005). Elicited and spontaneous communicative functions and stability of conversational measures with children who have pragmatic language impairments. International journal of language & communication disorders, 40(3), 333-347.

Adlof, S. M., & Hogan, T. P. (2018). Understanding dyslexia in the context of developmental language disorders. Language, Speech, and Hearing Services in Schools, 49(4), 762-773.

Airenti, G. and Angeleri, R. (2011). "Situation-sensitive use of insincerity: Pathways to communication in young children," British Journal of Developmental Psychology 29(4), 765–782.

Akbar, M., Loomis, R., & Paul, R. (2013). The interplay of language on Executive functions in children with Autism Spectrum Disorder. Research in Autism Spectrum Disorders, 7(3), 494–501.

Al-Yagon, M. (2012). Adolescents with learning disabilities: Socioemotional and behavioral functioning and attachment relationships with fathers, mothers, and teachers. Journal of youth and adolescence, 41(10), 1294-1311.

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Arlington, VA: American Psychiatric Association.

American Speech-Language-Hearing Association. (1993). Definitions of communication disorders and variations. Retrieved from http://www.asha.org/docs/htlm/RP1993-00208.htlm

Amerijckx, G., & Humblet, P. C. (2014). Child well-being: What does it mean?. Children & Society, 28(5), 404-415.

Andrés-Roqueta, C., Adrian, J. E., Clemente, R. A., & Katsos, N. (2013). Which are the best predictors of theory of mind delay in children with specific language impairment?. International Journal of Language & Communication Disorders, 48(6), 726-737.

Angeleri, R., Bosco, F. M., Zettin, M., Sacco, K., Colle, L., & Bara, B. G. (2008). Communicative impairment in traumatic brain injury: A complete pragmatic assessment. Brain and language, 107(3), 229-245.

Angeleri, R., & Airenti, G. (2014). The development of joke and irony understanding: A study with 3- to 6-year-old children. Canadian Journal of Experimental Psychology, 68, 133–146.

Arcara, G., & Bambini, V. (2016). A test for the assessment of pragmatic abilities and cognitive substrates (APACS): Normative data and psychometric properties. Frontiers in psychology, 7, 70.

Arosio, F., Pagliarini, E., Perugini, M., Barbieri, L., & Guasti, M. T. (2016). Morphosyntax and logical abilities in Italian poor readers: The problem of SLI under-identification. First Language, 36(3), 295-315.

Arosio, F., Panzeri, F., Molteni, B., Magazù, S., & Guasti, M. T. (2017). The comprehension of Italian relative clauses in poor readers and in children with Specific Language Impairment. Glossa: a journal of general linguistics, 2(1).

Asher, S. R. (1979). Referential communication. In G. J. Whitehurst & B. J. Zimmerman (Eds.), Functions of language and cognition (pp. 175–197). New York, NY: Academic Press.

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Asp, E., Manzel, K., Koestner, B., Cole, C. A., Denburg, N. L., Tranel, D. (2012). A neuropsychological test of belief and doubt: Damage to ventromedial prefrontal cortex increases credulity for misleading advertising. Frontiers in Neuroscience, 6(100).

Asp, E., & Tranel, D. (2013). False tagging theory. Principles of frontal lobe function, 383.

Austin, J. L. (1975). How to do things with words (Vol. 88). Oxford university press.

Baixauli-Fortea, I., Miranda Casas, A., Berenguer-Forner, C., Colomer-Diago, C., & Roselló-Miranda, B. (2019). Pragmatic competence of children with autism spectrum disorder. Impact of theory of mind, verbal working memory, ADHD symptoms, and structural language. Applied Neuropsychology: Child, 8(2), 101-112.

Bambini, V., Gentili, C., Ricciardi, E., Bertinetto, P. M., & Pietrini, P. (2011). Decomposing metaphor processing at the cognitive and neural level through functional magnetic resonance imaging. Brain research bulletin, 86(3-4), 203-216.

Bambini, V., Arcara, G., Bechi, M., Buonocore, M., Cavallaro, R., & Bosia, M. (2016). The communicative impairment as a core feature of schizophrenia: frequency of pragmatic deficit, cognitive substrates, and relation with quality of life. Comprehensive psychiatry, 71, 106-120.

Bara, B. G., Bosco, F. M., & Bucciarelli, M. (1999). Developmental pragmatics in normal and abnormal children. Brain and language, 68(3), 507-528.

Bara, B. G. (2010). Cognitive Pragmatics: The Mental Processes of Communication. Cambridge: MIT Press.

Barkley, R. A. (2001). The executive functions and self-regulation: an evolutionary neuropsychological perspective. Neuropsychological Review, 11(1), 1–29.

Bates, E. Language and context: The acquisition of pragmatics. New York: Academic Press, 1976.

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. Psychological bulletin, 117(3), 497.

Belacchi, C., Scalisi, T. G., Cannoni, E., & Cornoldi, C. (2008). Matrici progressive di raven forma colore (CPM-47): Manuale d'uso e standardizzazione italiana [Raven colored progressive matrices (CPM-47): Manual and Italian standardization]. Florence, Italy: Organizzazioni Speciali.

Benasich, A. A., Curtiss, S., & Tallal, P. (1993). Language, learning, and behavioral disturbances in childhood: A longitudinal perspective. Journal of the American Academy of Child & Adolescent Psychiatry, 32, 585–594.

Benner, G. J., Nelson, J. R., & Epstein, M. H. (2002). Language skills of children with EBD: A literature review. Journal of Emotional and Behavioral Disorders, 10(1), 43-56.

Bentin, S., Deutsch, A., & Liberman, I. Y. (1990). Syntactic competence and reading ability in children. Journal of Experimental Child Psychology, 49(1), 147-172.

Bierman, K. L. (2004). Peer rejection: Developmental processes and intervention strategies. Guilford Press.

Bihrle, A. M., Brownell, H. H., & Powelson, J. A. (1986). Comprehension of humorous and nonhumorous materials by left and right brain-damaged patients. Brain and Cognition, 5(4), 399-411.

Bishop, D. V., Chan, J., Adams, C., Hartley, J., & Weir, F. (2000). Conversational responsiveness in specific language impairment: Evidence of disproportionate pragmatic difficulties in a subset of children. Development and psychopathology, 12(2), 177-199.

Bishop, D. V., & Baird, G. (2001). Parent and teacher report of pragmatic aspects of communication: use of the Children's Communication Checklist in a clinical setting. Developmental Medicine and Child Neurology, 43(12), 809-818.

Bishop, D. V. (2003). The children's communication checklist: CCC-2. Harcourt Assessmen.

Bishop, D. V., & Snowling, M. J. (2004). Developmental dyslexia and specific language impairment: Same or different?. Psychological bulletin, 130(6), 858.

Bishop, D. V., & McDonald, D. (2009). Identifying language impairment in children: Combining language test scores with parental report. International Journal of Language & Communication Disorders, 44(5), 600-615.

Bishop, D. V. M., McDonald, D., Bird, S., & Hayiou-Thomas, M. (2009). Children who read words accurately despite language impairment: Who are they and how do they do it?. Child Development, 80, 593–605.

Bohrn, I. C., Altmann, U., & Jacobs, A. M. (2012). Looking at the brains behind figurative language— A quantitative meta-analysis of neuroimaging studies on metaphor, idiom, and irony processing. Neuropsychologia, 50(11), 2669-2683.

Bosco, F. M., & Bucciarelli, M. (2008). Simple and complex deceits and ironies. Journal of Pragmatics, 40(4), 583-607.

Bosco, F. M., Angeleri, R., Colle, L., Sacco, K., & Bara, B. G. (2013). Communicative abilities in children: An assessment through different phenomena and expressive means. Journal of child language, 40(4), 741-778.

Bosco, F. M., Angeleri, R., Sacco, K., & Bara, B. G. (2015). Explaining pragmatic performance in traumatic brain injury: A process perspective on communicative errors. International Journal of Language and Communication Disorders, 50, 63–83.

Bosco, F. M., & Gabbatore, I. (2017). Sincere, deceitful, and ironic communicative acts and the role of the theory of mind in childhood. Frontiers in psychology, 8, 21.

Bosco, F. M., Parola, A., Valentini, M. C., & Morese, R. (2017). Neural correlates underlying the comprehension of deceitful and ironic communicative intentions. Cortex, 94, 73-86.

Bosco, F. M., Tirassa, M., & Gabbatore, I. (2018). Why pragmatics and Theory of Mind do not (Completely) overlap. Frontiers in psychology, 9, 1453.

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Bosia, M. (2015). Pragmatic abilities across symptoms dimensions in schizophrenia Marta Bosia, Giorgio Arcara, Andrea Moro, Roberto Cavallaro, Valentina Bambini Studi italiani di linguistica teorica e applicata XLIV, 3 (2015), pp. 473-485. Studi italiani di linguistica teorica e applicata, 44(3), 473-485.

Bosia, M., Arcara, G., Buonocore, M., Bechi, M., Moro, A., Cavallaro, R., ... & Di Sciullo, A. M. (2016). Communication in schizophrenia, between pragmatics, cognition, and social cognition. Biolinguistic Investigat. Lang. Fac, 213-234.

Bowdle, B. F., & Gentner, D. (2005). The career of metaphor. Psychological review, 112(1), 193.

Braver, T. S., Barch, D. M., Gray, J. R., Molfese, D. L., & Snyder, A. (2001). Anterior cingulate cortex and response conflict: effects of frequency, inhibition and errors. Cerebral cortex, 11(9), 825-836.

Breeman, L. D., Theo Wubbels, P. A. C. Van Lier, F. C. Verhulst, Jan van der Ende, Athanasios Maras, J. A. B. Hopman, and N. T. Tick. "Teacher characteristics, social classroom relationships, and children's social, emotional, and behavioral classroom adjustment in special education." Journal of school psychology 53, no. 1 (2015): 87-103.

Brinton, B., Fujiki, M., & Powell, J. M. (1997). The ability of children with language impairment to manipulate topic in a structured task. Language, Speech, and Hearing Services in Schools, 28(1), 3-11.

Brownell, H., & Martino, G. (1998). Deficits in inference and social cognition: The effects of right hemisphere brain damage on discourse. In M. Beeman, & C. Chiarello (Eds.), Right hemisphere language comprehension: Perspectives from cognitive neuroscience (pp. 309–328). Mahwah, NJ: Lawrence Erlbaum Associates.

Brüne, M., & Bodenstein, L. (2005). Proverb comprehension reconsidered—'theory of mind'and the pragmatic use of language in schizophrenia. Schizophrenia research, 75(2-3), 233-239.

Bussey, K. (1999). Children's categorization and evaluation of different types of lies and truths. Child Development, 70(6), 1338-1347.

Byrne, B. (1981). Deficient syntactic control in poor readers: Is a weak phonetic memory code responsible?. Applied psycholinguistics, 2(3), 201-212.

Camfield, L., Streuli, N., & Woodhead, M. (2010). Children's well-being in developing countries: A conceptual and methodological review. The European Journal of Development Research, 22(3), 398-416.

Cantiani, C., Lorusso, M. L., Perego, P., Molteni, M., & Guasti, M. T. (2013). Event-related potentials reveal anomalous morphosyntactic processing in developmental dyslexia. Applied psycholinguistics, 34(6), 1135-1162.

Capelli, C. A., Nakagawa, N., & Madden, C. M. (1990). How children understand sarcasm: The role of context and intonation. Child Development, 61(6), 1824-1841.

Cappelli, G., Noccetti, S., Arcara, G., & Bambini, V. (2018). Pragmatic competence and its relationship with the linguistic and cognitive profile of young adults with dyslexia. Dyslexia, 24(3), 294-306.

Capps, L., Kehres, J., & Sigman, M. (1998). Conversational abilities among children with autism and children with developmental delays. Autism, 2, 325–344

Cardillo, R., Garcia, R. B., Mammarella, I. C., & Cornoldi, C. (2018). Pragmatics of language and theory of mind in children with dyslexia with associated language difficulties or nonverbal learning disabilities. Applied Neuropsychology: Child, 7(3), 245-256.

Cardinaletti, A., & Volpato, F. (2015). On the comprehension and production of passive sentences and relative clauses by Italian university students with dyslexia. Structures, Strategies and Beyond: Studies in honour of Adriana Belletti, 223, 279.

Carriedo, N., Corral, A., Montoro, P. R., Herrero, L., Ballestrino, P., & Sebastián, I. (2016). The development of metaphor comprehension and its relationship with relational verbal reasoning and executive function. PloS one, 11(3).

Carston, R. (2010). Lexical pragmatics, ad hoc concepts and metaphor: from a relevance theory perspective. Italian Journal of Linguistics, 22(1), 153-180.

Carter, J. A., Lees, J. A., Murira, G. M., Gona, J., Neville, B. G., & Newton, C. R. (2005). Issues in the development of cross-cultural assessments of speech and language for children. International Journal of Language & Communication Disorders, 40(4), 385-401.

Catts, H. W., Adlof, S. M., Hogan, T. P., & Weismer, S. E. (2005). Are specific language impairment and dyslexia distinct disorders?. Journal of Speech, Language, and Hearing Research.

Catts, H. W., Fey, M. E., Tomblin, J. B., & Zhang, X. (2002). A longitudinal investigation of reading outcomes in children with language impairments. Journal of Speech, Language, and Hearing Research, 45, 1142–1157.

Champagne-Lavau, M., & Stip, E. (2010). Pragmatic and executive dysfunction in schizophrenia. Journal of Neurolinguistics, 23(3), 285-296.

Channon, S., & Watts, M. (2003). Pragmatic language interpretation after closed head injury: Relationship to executive functioning. Cognitive Neuropsychiatry, 8(4), 243-260.

Chen, E., Widick, P., & Chatterjee, A. (2008). Functional–anatomical organization of predicate metaphor processing. Brain and language, 107(3), 194-202.

Chiappe, D. L., & Chiappe, P. (2007). The role of working memory in metaphor production and comprehension. Journal of Memory and Language, 56(2), 172-188.

Chinn, S. J., & Crossman, M. (1995). Stress factors in the dyslexic adolescent. Dyslexia and Stress. London: Whurr.

Clark, E. V. (2014). Pragmatics in acquisition. Journal of Child Language, 41(S1), 105.

Cocquyt, M., Mommaerts, M. Y., Dewart, H., & Zink, I. (2015). Measuring pragmatic skills: early detection of infants at risk for communication problems. International journal of language & communication disorders, 50(5), 646-658.

Colich, N. L., Wang, A. T., Rudie, J. D., Hernandez, L. M., Bookheimer, S. Y., & Dapretto, M. (2012). Atypical neural processing of ironic and sincere remarks in children and adolescents with autism spectrum disorders. Metaphor and symbol, 27(1), 70-92.

Columbus, G., Sheikh, N. A., Côté-Lecaldare, M., Häuser, K., Baum, S. R., & Titone, D. (2015). Individual differences in executive control relate to metaphor processing: an eye movement study of sentence reading. Frontiers in Human Neuroscience, 8, 1057.

Conti-Ramsden, G., & Botting, N. (2004). Social difficulties and victimization in children with SLI at 11 years of age. Journal of Speech, Language, and Hearing Research.

Cornoldi, C., & Carretti, B. (2016). Prove MT avanzate-3-clinica: la valutazione delle abilità di lettura e comprensione per la scuola primaria e secondaria di 1° grado: manuale. Giunti Edu.

Curtis, P. R., Kaiser, A. P., Estabrook, R., & Roberts, M. Y. (2019). The longitudinal effects of early language intervention on children's problem behaviors. Child development, 90(2), 576-592.

Dahle, A. E., Knivsberg, A. M., & Andreassen, A. B. (2011). Coexisting problem behaviour in severe dyslexia. Journal of Research in Special Educational Needs, 11(3), 162-170.

Dale, P. S., 1997, Parent report assessment of language and communication. In K. N. Cole, P. S.

Davies, C., Andrés-Roqueta, C., & Norbury, C. F. (2016). Referring expressions and structural language abilities in children with specific language impairment: A pragmatic tolerance account. Journal of Experimental Child Psychology, 144, 98-113.

De Rosnay, M., Fink, E., Begeer, S., Slaughter, V., & Peterson, C. (2014). Talking theory of mind talk: Young school-aged children's everyday conversation and understanding of mind and emotion. Journal of child language, 41(5), 1179-1193.

Del Sette, P., Bambini, V., Bischetti, L., & Lecce, S. (2020). Longitudinal associations between theory of mind and metaphor understanding during middle childhood. Cognitive Development, 56, 100958.

Delage, H., & Durrleman, S. (2018). Developmental dyslexia and specific language impairment: distinct syntactic profiles?. Clinical linguistics & phonetics, 32(8), 758-785.

Demorest, A., Meyer, C., Phelps, E., Gardner, H., & Winner, E. (1984). Words speak louder than actions: Understanding deliberately false remarks. Child Development, 1527-1534.

Dennis, M., Lazenby, A. L., & Lockyer, L. (2001). Inferential language in high-function children with autism. Journal of autism and developmental disorders, 31(1), 47-54.

Diamond, A. (2013). Executive functions. Annual review of psychology, 64, 135-168.

Diener, E., Lucas, R. E., & Oishi, S. (2002). Subjective well-being: The science of happiness and life satisfaction. Handbook of positive psychology, 2, 63-73.

Djambazova-Popordanoska, S. (2016). Implications of emotion regulation on young children's emotional wellbeing and educational achievement. Educational Review, 68(4), 497-515.

Dodich, A., Cerami, C., Canessa, N., Crespi, C., Iannaccone, S., Marcone, A., Realmuto, S., Lettieri, S., Perani, D., & Cappa, S. F. (2015). A novel task assessing intention and emotion attribution: Italian standardization and normative data of the Story-based Empathy Task. Neurological Sciences, 36(10), 1907-1912.

Domaneschi, F., & Bambini, V. (2020). Pragmatic Competence.

Donno, R., Parker, J., Gilmour, J., & Skuse, D. H. (2010). Social communication deficits in disruptive primary-school children. British Journal of Psychiatry, 196, 282–289.

Dupierrix, E., de Boisferon, A. H., Méary, D., Lee, K., Quinn, P. C., Di Giorgio, E., ... & Pascalis, O. (2014). Preference for human eyes in human infants. Journal of Experimental Child Psychology, 123, 138-146.

Durrleman, S., & Franck, J. (2015). Exploring links between language and cognition in autism spectrum disorders: Complement sentences, false belief, and executive functioning. Journal of communication disorders, 54, 15-31.

Eales, M. J. (1993). Pragmatic impairments in adults with childhood diagnoses of autism or developmental receptive language disorder. Journal of Autism and Developmental Disorders, 23, 593–617.

Eaves, L. C., & Ho, H. H. (2008). Young adult outcome of autism spectrum disorders. Journal of autism and developmental disorders, 38(4), 739-747.

Eigsti, I. M., Bennetto, L., & Dadlani, M. (2007). Beyond pragmatics: Morphosyntactic development in autism. Journal of Autism and Developmental Disorders, 37, 1007–1023.

Eigsti, I. M., de Marchena, A. B., Schuh, J. M., & Kelley, E. (2011). Language acquisition in autism spectrum disorders: A developmental review. Research in Autism Spectrum Disorders, 5(2), 681-691.

Eisenmajer, N., Ross, N., & Pratt, C. (2005). Specificity and characteristics of learning disabilities. Journal of Child Psychology and Psychiatry, 46(10), 1108-1115.

Emerich, D. M., Creaghead, N. A., Grether, S. M., Murray, D., & Grasha, C. (2003). The comprehension of humorous materials by adolescents with high-functioning autism and Asperger's syndrome. Journal of autism and developmental disorders, 33(3), 253-257.

FDA. (2006). Guidance for industry: Patient-reported outcome measures: Use in medical product development to support labeling claims. Rockville, MD: Center for Drug Evaluation and Research, Food and Drug Administration.

Fernández, C. (2013). Mindful storytellers: Emerging pragmatics and theory of mind development. First Language, 33(1), 20-46.

Feurer, D. P., & Andrews, J. J. (2009). School-related stress and depression in adolescents with and without learning disabilities: An exploratory study. Alberta Journal of Educational Research, 55(1).

Fey, M. E. (1988). Generalization issues facing language interventionists: An introduction. Language, Speech, and Hearing Services in Schools, 19(3), 272-281.

Field, A. (2009). Discovering statistics using SPSS (3rd ed.). London: Sage.

Filippova, E., & Astington, J. W. (2008). Further development in social reasoning revealed in discourse irony understanding. Child development, 79(1), 126-138.

Fletcher, P. C., Anderson, J. M., Shanks, D. R., Honey, R., Carpenter, T. A., Donovan, T., Papadakis, N., & Bullmore, E. T. (2001). Responses of human frontal cortex to surprising events are predicted by formal associative learning theory. Nature neuroscience, 4(10), 1043-1048.

Fortea, I. B., Forner, C. B., Colomer, C., Casas, A. M., & Miranda, B. R. (2018). Communicative skills in Spanish children with Autism Spectrum Disorder and children with Attention Deficit Hyperactivity Disorder. Analysis through parents' perceptions and narrative production. Research in Autism Spectrum Disorders, 50, 22-31.

Fraser, J., Goswami, U., & Conti-Ramsden, G. (2010). Dyslexia and specific language impairment: The role of phonology and auditory processing. Scientific Studies of Reading, 14(1), 8-29.

Frith, U. (1989). Autism and asperger syndrome. London: MRC Cognitive Development Unit.

Frith, U., & Happe, F. (1994). Autism: Beyond theory of mind. Cognition, 50, 115–132.

Frith, C. D., & Frith, U. (2006). The neural basis of mentalizing. Neuron, 50(4), 531-534.

Frome, P. M., & Eccles, J. S. (1998). Parents' influence on children's achievement-related perceptions. Journal of personality and social psychology, 74(2), 435.

Fugelsang, J. A., & Dunbar, K. N. (2004). Brain-based mechanisms underlying complex causal thinking. Neuropsychologia, 43(8), 1204-1213.

Gallagher, T. (1999). Interrelationships among children with language, behaviour, and emotional problems. Topics in Language Disorders, 19(2), 1–15.

Gallagher, H. L., Happe, F., Brunswick, N., Fletcher, P. C., Frith, U., & Frith, C. D. (2000). Reading the mind in cartoons and stories: An fMRI study of theory of the mind in verbal and nonverbal tasks. Neuropsychologia, 38(1), 11–21.

Galski, T., Tompkins, C., & Johnston, M. V. (1998). Competence in discourse as a measure of social integration and quality of life in persons with traumatic brain injury. Brain injury, 12(9), 769-782.

Gennaro, A., Scorza, M., Benassi, E., Stella, G., & Salvatore, S. (2017). Perception of Specific Learning Disorders in parents and teachers. A socio-cultural perspective. Life Span and Disability, 20 (2), 227-250.

Gennaro, A., Scorza, M., Benassi, E., Zonno, M. G. P., Stella, G., & Salvatore, S. (2019). The role of perceived learning environment in scholars: A comparison between university students with dyslexia and normal readers. *International Journal of Disability and Human Development, 18*(1), 107-115.

Gentner, D., Bowdle, B., Wolff, P., & Boronat, C. (2001). Metaphor is like analogy. The analogical mind: Perspectives from cognitive science, 199-253.

Gernsbacher, M. A., Keysar, B., Robertson, R. R., & Werner, N. K. (2001). The role of suppression and enhancement in understanding metaphors. Journal of Memory and Language, 45(3), 433-450.

Gernsbacher, M. A., & Pripas-Kapit, S. R. (2012). Who's missing the point? A commentary on claims that autistic persons have a specific deficit in figurative language comprehension. Metaphor and Symbol, 27(1), 93-105.

Ghisi, M., Bottesi, G., Re, A. M., Cerea, S., & Mammarella, I. C. (2016). Socioemotional features and resilience in Italian university students with and without dyslexia. Frontiers in psychology, 7, 478.

Gibbs Jr, R. W., Gibbs, R. W., & Gibbs, J. (1994). The poetics of mind: Figurative thought, language, and understanding. Cambridge University Press.

Gibbs, R. W. (2000). Irony in talk among friends. Metaphor and symbol, 15(1-2), 5-27.

Gibbs Jr, R. W. (2002). A new look at literal meaning in understanding what is said and implicated. Journal of pragmatics, 34(4), 457-486.

Gibbs Jr, R. W., & Tendahl, M. (2006). Cognitive effort and effects in metaphor comprehension: Relevance theory and psycholinguistics. Mind & Language, 21(3), 379-403.

Gibson, S., & Kendall, L. (2010). Stories from school: Dyslexia and learners' voices on factors impacting on achievement. Support for learning, 25(4), 187-193.

Gibson, J., Adams, C., Lockton, E., & Green, J. (2013). Social communication disorder outside autism? A diagnostic classification approach to delineating pragmatic language impairment, high functioning autism and specific language impairment. Journal of Child Psychology and Psychiatry, 54(11), 1186-1197.

Gilmour, J., Hill, B., Place, M., & Skuse, D. H. (2004). Social communication deficits in conduct disorder: A clinical and community survey. Journal of Child Psychology and Psychiatry, 45(5), 967–978.

Giora, R. (2003). On our mind: Salience, context, and figurative language. Oxford University Press.

Glenwright, M., & Pexman, P. M. (2010). Development of children's ability to distinguish sarcasm and verbal irony. Journal of Child Language, 37(2), 429-451.

Glucksberg, S. (2003). The psycholinguistics of metaphor. Trends in cognitive sciences, 7(2), 92-96.

Grice, H. P. (1975). Logic and conversation. In P. Cole, & J. Morgan (Eds.), Syntax and semantics (pp. 41-58). New York: Academic Press

Grice, H. P. (1989). Studies in the Ways of Words. Cambridge, MA: Harvard University Press.

Griffiths, C. C. (2007). Pragmatic abilities in adults with and without dyslexia: A pilot study. Dyslexia, 13(4), 276-296.

Hala, S., Pexman, P. M., & Glenwright, M. (2007). Priming the meaning of homographs in typically developing children and children with autism. Journal of Autism and Developmental disorders, 37(2), 329.

Hala, S., Pexman, P., Climie, E., Rostad, K., & Glenwright, M. (2010). A bidirectional view of executive function and social interaction. Self-and social-regulation: Social interaction and the development of social understanding and executive functions, 293-311.

Halliday, M. A. K., & Hasan, R. (2014). Cohesion in english. Routledge.

Hancock, J. T., Dunham, P. J., & Purdy, K. (2000). Children's comprehension of critical and complimentary forms of verbal irony. Journal of Cognition and Development, 1(2), 227-248.

Happé, F. G. (1993). Communicative competence and theory of mind in autism: A test of relevance theory. Cognition, 48(2), 101-119.

Harris, M., & Pexman, P. M. (2003). Children's perceptions of the social functions of verbal irony. Discourse Processes, 36(3), 147-165.

Harrison, A. G., Rosenblum, Y., & Currie, S. (2010). Examining unusual digit span performance in a population of postsecondary students assessed for academic difficulties. Assessment, 17(3), 283-293.

Hartas, D. (2012). Children's social behaviour, language and literacy in early years. Oxford Review of Education, 38(3), 357–376.

Heiman, T., & Precel, K. (2003). Students with learning disabilities in higher education: Academic strategies profile. Journal of learning disabilities, 36(3), 248-258.

Helland, W. A., Lundervold, A. J., Heimann, M., & Posserud, M. B. (2014). Stable associations between behavioral problems and language impairments across childhood–The importance of pragmatic language problems. Research in developmental disabilities, 35(5), 943-951.

Hemphill, L., & Siperstein, G. N. (1990). Conversational competence and peer response to mildly retarded children. Journal of Educational Psychology, 82(1), 128.

Hill, J. W., & Coufal, K. L. (2005). Emotional/behavioral disorders: A retrospective examination of social skills, linguistics, and student outcomes. Communication Disorders Quarterly, 27(1), 33–46.

Hogg, M. A., & Vaughan, G. M. (2014). Social Psychology 7th Eds. Harlow: Pearson Education Limited.

Horn, L. (1972). On the semantic properties of logical operators in English: UCLA dissertation. Distributed by IULC.

Horowitz, A. C., Schneider, R. M., & Frank, M. C. (2018). The trouble with quantifiers: exploring children's deficits in scalar implicature. Child development, 89(6), e572-e593.

Huc-Chabrolle, M., Barthez, M. A., Tripi, G., Barthelemy, C., & Bonnet-Brilhault, F. (2010). Psychocognitive and psychiatric disorders associated with developmental dyslexia: A clinical and scientific issue. L'Encephale, 36(2), 172-179.

Istituto Superiore di Sanità (2010). Consensus Conference: Disturbi Specifici dell'Apprendimento

Iverson, J. M., & Goldin-Meadow, S. (2005). Gesture paves the way for language development. Psychological science, 16(5), 367-371.

Jerome, A. C., Fujiki, M., Brinton, B., & James, S. L. (2002). Self-esteem in children with specific language impairment. Journal of Speech, Language, and Hearing Research.

Jolliffe, T., & Baron-Cohen, S. (1999). A test of central coherence theory: linguistic processing in high-functioning adults with autism or Asperger syndrome: is local coherence impaired?. Cognition, 71(2), 149-185.

Jones, D. E., Greenberg, M., & Crowley, M. (2015). Early social-emotional functioning and public health: The relationship between kindergarten social competence and future wellness. American journal of public health, 105(11), 2283-2290.

Johnson, J., & Pascual-Leone, J. (1989). Developmental levels of processing in metaphor interpretation. Journal of Experimental Child Psychology, 48(1), 1-31.

Kahneman, D., Diener, E., & Schwarz, N. (Eds.). (1999). Well-being: Foundations of hedonic psychology. Russell Sage Foundation.

Kaland, N., Møller-Nielsen, A., Callesen, K., Mortensen, E. L., Gottlieb, D., & Smith, L. (2002). A newadvanced'test of theory of mind: evidence from children and adolescents with Asperger syndrome. Journal of Child Psychology and Psychiatry, 43(4), 517-528.

Kalandadze, T., Bambini, V., & Næss, K. A. B. (2019). A systematic review and meta-analysis of studies on metaphor comprehension in individuals with autism spectrum disorder: Do task properties matter?. Applied Psycholinguistics, 40(6), 1421-1454.

Katsos, N., Roqueta, C. A., Estevan, R. A. C., & Cummins, C. (2011). Are children with Specific Language Impairment competent with the pragmatics and logic of quantification?. Cognition, 119(1), 43-57.

Kerns, J. G., Cohen, J. D., MacDonald, A. W., Cho, R. Y., Stenger, V. A., & Carter, C. S. (2004). Anterior cingulate conflict monitoring and adjustments in control. Science, 303(5660), 1023-1026.

Ketelaars, M. P., Cuperus, J., Jansonius, K., & Verhoeven, L. (2010). Pragmatic language impairment and associated behavioural problems. International Journal of Language & Communication Disorders, 45(2), 204-214.

Kim, S., & Lombardino, L. J. (2013). What do diagnostic test data tell us about differences in the profiles of children diagnosed with reading disability or language impairments?. Journal of communication disorders, 46(5-6), 465-474.

Kim, S. H., Junker, D., & Lord, C. (2014). Observation of spontaneous expressive language

Kinderman, P., Dunbar, R., & Bentall, R. P. (1998). Theory-of-mind deficits and causal attributions. British Journal of Psychology, 89(2), 191-204.

Kintsch, W. (2001). Predication. Cognitive science, 25(2), 173-202.

Klassen, R. M., Tze, V. M., & Hannok, W. (2013). Internalizing problems of adults with learning disabilities: A meta-analysis. Journal of learning disabilities, 46(4), 317-327.

Konu, A., & Rimpelä, M. (2002). Well-being in schools: a conceptual model. Health promotion international, 17(1), 79-87.

Konur, O. (2002). Assessment of disabled students in higher education: current public policy issues. Assessment & Evaluation in Higher Education, 27(2), 131-152.

Korhonen, M., Luoma, I., Salmelin, R. K., Helminen, M., Kaltiala-Heino, R., & Tamminen, T. (2014). The trajectories of child's internalizing and externalizing problems, social competence and adolescent self-reported problems in a Finnish normal population sample. School Psychology International, 35(6), 561-579.

Kuusikko, S., Haapsamo, H., Jansson-Verkasalo, E., Hurtig, T., Mattila, M. L., Ebeling, H., ... & Moilanen, I. (2009). Emotion recognition in children and adolescents with autism spectrum disorders. Journal of autism and developmental disorders, 39(6), 938-945.

Lam, K. H., & Ho, C. S. H. (2014). Pragmatic skills in Chinese dyslexic children: Evidence from a parental checklist. Asia Pacific Journal of Developmental Differences, 1(1), 4-19.

Landa, R. (2007). Early communication development and intervention for children with autism. Mental retardation and developmental disabilities research reviews, 13(1), 16-25.

Langdon, R., Coltheart, M., Ward, P. B., & Catts, S. V. (2002). Disturbed communication in schizophrenia: the role of poor pragmatics and poor mind-reading. Psychological medicine, 32(7), 1273.

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Lauro, L. J. R., Tettamanti, M., Cappa, S. F., & Papagno, C. (2008). Idiom comprehension: a prefrontal task?. Cerebral Cortex, 18(1), 162-170.

Lecce, S., Ronchi, L., Del Sette, P., Bischetti, L., & Bambini, V. (2019). Interpreting physical and mental metaphors: Is Theory of Mind associated with pragmatics in middle childhood?. Journal of child language, 46(2), 393-407.

Lee, S. B., Song, S. H., Ham, J. H., Song, D. H., & Cheon, K. A. (2015). Idiom comprehension deficits in high-functioning autism spectrum disorder using a Korean autism social language task. Yonsei medical journal, 56(6), 1613-1618

Leikin, M., & Bouskila, O. A. (2004). Expression of syntactic complexity in sentence comprehension: A comparison between dyslexic and regular readers. Reading and Writing, 17(7-8), 801-822.

Leonard, M. A., Milich, R., & Lorch, E. P. (2011). The role of pragmatic language use in mediating the relation between hyperactivity and inattention and social skills problems. Journal of Speech, Language, and Hearing Research.

Leonard, L. B., & Dispaldro, M. (2013). The effects of production demands on grammatical weaknesses in specific language impairment: The case of clitic pronouns in Italian. Journal of Speech, Language, and Hearing Research.

Liles, B. Z., Duffy, R. J., Merritt, D. D., & Purcell, S. L. (1995). Measurement of narrative discourse ability in children with language disorders. Journal of Speech, Language, and Hearing Research, 38(2), 415-425.

Lindquist, K. A. (2009). Language is powerful. Emotion Review, 1, 16 –18.

Lisle, K., & Wade, T. J. (2013). Does the presence of a Learning Disability elicit a stigmatization?. British Journal of Education, Society & Behavioural Science, 4(2), 211.

Livingston, E. M., Siegel, L. S., & Ribary, U. (2018). Developmental dyslexia: emotional impact and consequences. Australian Journal of Learning Difficulties, 23(2), 107-135.

Lockton, E., Adams, C., & Collins, A. (2016). Do children with social communication disorder have explicit knowledge of pragmatic rules they break? A comparison of conversational pragmatic ability and metapragmatic awareness. International journal of language & communication disorders, 51(5), 508-517.

López, B., & Leekam, S. R. (2003). Do children with autism fail to process information in context?. Journal of child psychology and psychiatry, 44(2), 285-300.

Lord, C., & Paul, R. (1997). Language and communication in autism. In D. J. Cohen & F. R. Volkmar (Eds.), Handbook of autism and pervasive developmental disorders (2nd ed., pp. 195–225). New York: Wiley.

Lord, C., Rutter, M., DiLavore, P., Risi, S., Gotham, K., and Bishop, S. L. (2012). Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) Manual (Part I): Modules 1-4. Torrance, CA: Western Psychological Services.

Lorusso, M. L. (2009). APL Medea–Abilità pragmatiche nel linguaggio [APL Medea – Pragmatics abilities in language]. Firenze, Italy: Giunti OS.

Loukusa, S., Leinonen, E., Jussila, K., Mattila, M. L., Ryder, N., Ebeling, H., & Moilanen, I. (2007). Answering contextually demanding questions: Pragmatic errors produced by children with Asperger syndrome or high-functioning autism. Journal of Communication Disorders, 40(5), 357-381.

Loukusa, S., & Leinonen, E. (2008). Development of comprehension of ironic utterances in 3-to 9-year-old Finnish-speaking children. Psychology of Language and Communication, 12(1), 55-69..

Loukusa, S., Mäkinen, L., Kuusikko-Gauffin, S., Ebeling, H., & Leinonen, E. (2018). Assessing social-pragmatic inferencing skills in children with autism spectrum disorder. Journal of communication disorders, 73, 91-105.

Lyon, G. R., Shaywitz, S. E., & Shaywitz, B. A. (2003). A definition of dyslexia. Annals of dyslexia, 53(1), 1-14.

Ma, F., Evans, A. D., Liu, Y., Luo, X., & Xu, F. (2015). To lie or not to lie? The influence of parenting and theory-of-mind understanding on three-year-old children's honesty. Journal of Moral Education, 44(2), 198-212.

MacCullagh, L., Bosanquet, A., & Badcock, N. A. (2017). University students with dyslexia: A qualitative exploratory study of learning practices, challenges and strategies. Dyslexia, 23(1), 3-23.

MacKay, G., & Shaw, A. (2004). A comparative study of figurative language in children with autistic spectrum disorders. Child Language Teaching and Therapy, 20(1), 13-32.

Mackie, L., & Law, J. (2010). Pragmatic language and the child with emotional/behavioural difficulties (EBD): a pilot study exploring the interaction between behaviour and communication disability. International journal of language & communication disorders, 45(4), 397-410.

Manhardt, J., & Rescorla, L. (2002). Oral narrative skills of late talkers at ages 8 and 9. Applied psycholinguistics, 23(1), 1-21.

Maner, J. K., DeWall, C. N., Baumeister, R. F., & Schaller, M. (2007). Does social exclusion motivate interpersonal reconnection? Resolving the" porcupine problem". Journal of personality and social psychology, 92(1), 42–55.

Martin, I., & McDonald, S. (2003). Weak coherence, no theory of mind, or executive dysfunction? Solving the puzzle of pragmatic language disorders. Brain and language, 85(3), 451-466.

Martin, I., & McDonald, S. (2004). An exploration of causes of non-literal language problems in individuals with Asperger syndrome. Journal of autism and developmental disorders, 34(3), 311-328.

Martinez, Y. J., Tannock, R., Manassis, K., Garland, E. J., Clark, S., & McInnes, A. (2015). The teachers' role in the assessment of selective mutism and anxiety disorders. Canadian Journal of School Psychology, 30(2), 83-101.

Matthews, D., Biney, H., & Abbot-Smith, K. (2018). Individual differences in children's pragmatic ability: a review of associations with formal language, social cognition, and executive functions. Language Learning and Development, 14(3), 186-223.

McLaughlin, S. (1998). Introduction to language development. San Diego, CA: Singular.

McNamara, J., Vervaeke, S. L., & Willoughby, T. (2008). Learning disabilities and risk-taking behavior in adolescents: A comparison of those with and without comorbid attention-deficit/hyperactivity disorder. Journal of learning disabilities, 41(6), 561-574.

Melby-Lervåg, M., Lyster, S. A. H., & Hulme, C. (2012). Phonological skills and their role in learning to read: a meta-analytic review. Psychological bulletin, 138(2), 322.

Mentis, M., & Prutting, C. A. (1991). Analysis of topic as illustrated in a head-injured and a normal adult. Journal of Speech, Language, and Hearing Research, 34(3), 583-595.

Michelon, P., Snyder, A. Z., Buckner, R. L., McAvoy, M., & Zacks, J. M. (2003). Neural correlates of incongruous visual information: An event-related fMRI study. Neuroimage, 19(4), 1612-1626.

Milligan, K., Astington, J. W., & Dack, L. A. (2007). Language and theory of mind: Meta-analysis of the relation between language ability and false-belief understanding. Child development, 78(2), 622-646.

Miniscalco, C., Nygren, G., Hagberg, B., Kadesjö, B., & Gillberg, C. (2006). Neuropsychiatric and neurodevelopmental outcome of children at age 6 and 7 years who screened positive for language problems at 30 months. Developmental medicine and child neurology, 48(5), 361-366.

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. Cognitive psychology, 41(1), 49-100.

Mok, P. L., Pickles, A., Durkin, K., & Conti-Ramsden, G. (2014). Longitudinal trajectories of peer relations in children with specific language impairment. Journal of Child Psychology and Psychiatry, 55(5), 516-527.

Mugnaini, D., Lassi, S., La Malfa, G., & Albertini, G. (2009). Internalizing correlates of dyslexia. World Journal of Pediatrics, 5(4), 255-264.

Nelson, J. M., & Harwood, H. (2011). Learning disabilities and anxiety: A meta-analysis. Journal of learning disabilities, 44(1), 3-17.

Nilsen, E. S., Glenwright, M., & Huyder, V. (2011). Children and adults understand that verbal irony interpretation depends on listener knowledge. Journal of Cognition and Development, 12(3), 374-409.

Ninio, A., & Snow, C. E. (1996). Pragmatic development. Boulder, CO: Westview Press.

Nobre, A. C., Coull, J. T., Frith, C. D., & Mesulam, M. M. (1999). Orbitofrontal cortex is activated during breaches of expectation in tasks of visual attention. Nature neuroscience, 2(1), 11-12.

Norbury, C. F., & Bishop, D. V. (2003). Narrative skills of children with communication impairments. International Journal of Language & Communication Disorders, 38(3), 287-313.

Norbury, C. F. (2004). Factors supporting idiom comprehension in children with communication disorders. Journal of Speech, Language, and Hearing Research.

Norbury, C. F. (2005). The relationship between theory of mind and metaphor: Evidence from children with language impairment and autistic spectrum disorder. British journal of developmental psychology, 23(3), 383-399.

Norbury, C. F. (2014). Practitioner review: Social (pragmatic) communication disorder conceptualization, evidence and clinical implications. Journal of Child Psychology and Psychiatry, 55(3), 204-216.

Norbury, C. F., Gemmell, T., & Paul, R. (2014). Pragmatics abilities in narrative production: A cross-disorder comparison. Journal of child language, 41(3), 485-510.

Norbury, C. F., & Paul, R. (2015). Disorders of speech, language, and communication. Rutter's Child and Adolescent Psychiatry, 683-701.

O'Neill, D. K. (2012). Components of pragmatic ability and children's pragmatic language development. Cognitive pragmatics, 4, 261-287.

Orsini, A., Pezzuti, L., Picone, L. (2012). Wechsler Intelligence Scale for Children IV Edizione Italiana. Florence, Italy: Organizzazioni Speciali.

Orsini, A., & Pezzuti, L. (2013). Italian validation of the Wechsler adult intelligence scale. (WAIS IV). Firenze, Italy: Giunti OS.

Özçalişkan, Ş. (2005). Metaphor meets typology: Ways of moving metaphorically in English and Turkish. Cognitive Linguistics, 16(1), 207-246.

Parris, B. A., Kuhn, G., Mizon, G. A., Benattayallah, A., & Hodgson, T. L. (2009). Imaging the impossible: An fMRI study of impossible causal relationships in magic tricks. Neuroimage, 45(3), 1033-1039.

Partanen, M., & Siegel, L. S. (2014). Long-term outcome of the early identification and intervention of reading disabilities. Reading and Writing, 27(4), 665-684.

Perkins, M. R. (2010). Pragmatic impairment. The Handbook of language and speech disorders, 227-246.

Peterson, C. C., & Siegal, M. (2000). Insights into theory of mind from deafness and autism. Mind & Language, 15(1), 123-145.

Pettenati, P., Benassi, E., Deevy, P., Leonard, L. B., & Caselli, M. C. (2015). Extra-linguistic influences on sentence comprehension in Italian-speaking children with and without specific language impairment. International journal of language & communication disorders, 50(3), 312-321.

Poletti, M. (2011). A neuropsychological approach to the etiology of pragmatic language impairment. Clinical Neuropsychiatry, 8(5).

Pollard, E. L., & Lee, P. D. (2003). Child well-being: A systematic review of the literature. Social indicators research, 61(1), 59-78.

Pouscoulous, N. (2011). Metaphor: For adults only?. Belgian Journal of Linguistics, 25(1), 51-79.

Ramus, F., Rosen, S., Dakin, S. C., Day, B. L., Castellote, J. M., White, S., & Frith, U. (2003). Theories of developmental dyslexia: insights from a multiple case study of dyslexic adults. Brain, 126(4), 841-865.

Ramus, F., Marshall, C. R., Rosen, S., & van der Lely, H. K. (2013). Phonological deficits in specific language impairment and developmental dyslexia: towards a multidimensional model. Brain, 136(2), 630-645.

Rapin, I., & Dunn, M. (2003). Update on the language disorders of individuals on the autistic spectrum. Brain and development, 25(3), 166-172.

Rapp, A. M., Mutschler, D. E., & Erb, M. (2012). Where in the brain is nonliteral language? A coordinate-based meta-analysis of functional magnetic resonance imaging studies. Neuroimage, 63(1), 600-610.

Re, A. M., Ghisi, M., Guazzo, E., Boz, F., & Mammarella, I. C. (2014). Difficoltà psicologiche negli studenti universitari con dislessia. Psicologia clinica dello sviluppo, 18(2), 279-290.

Riddick, B., Farmer, M., & Sterling, C. (1997). Students and dyslexia: Growing up with a specific learning difficulty. London: Whurr. Reading and writing: an interdisciplinary journal, 9, 55-63.

Riva, D., Nichelli, F., & Devoti, M. (2000). Developmental aspects of verbal fluency and confrontation naming in children. Brain and language, 71(2), 267-284.

Roberts, G. J., Solis, M., Ciullo, S., McKenna, J. W., Vaughn, S. (2015). Reading interventions with behavioral and social skill outcomes: A synthesis of research. Behavior modification, 39(1), 8-42.

Rodas, N. V., Eisenhower, A., & Blacher, J. (2017). Structural and pragmatic language in children with ASD: Longitudinal impact on anxiety and externalizing behaviors. Journal of autism and developmental disorders, 47(11), 3479-3488.

Rossetti, I., Brambilla, P., & Papagno, C. (2018). Metaphor comprehension in schizophrenic patients. Frontiers in psychology, 9, 670.

Rotsika, V., Coccossis, M., Vlassopoulos, M., Papaeleftheriou, E., Sakellariou, K., Anagnostopoulos, D. C., ... Skevington, S. (2011). Does the subjective quality of life of children with specific learning disabilities (SpLD) agree with their parents' proxy reports? Quality of Life Research, 20(8), 1271–1278.

Rundblad, G., & Annaz, D. (2010). The atypical development of metaphor and metonymy comprehension in children with autism. Autism, 14(1), 29-46.

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. Journal of personality and social psychology, 57(6), 1069.

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. Journal of personality and social psychology, 69(4), 719.

Saban-Bezalel, R., & Mashal, N. (2015). The effects of intervention on the comprehension of irony and on hemispheric processing of irony in adults with ASD. Neuropsychologia, 77, 233-241.

Scarborough, H. S. (1990). Very early language deficits in dyslexic children. Child development, 61(6), 1728-1743.

Scorza, M., Benassi, E., Gennaro, A., Bruganelli, C., & Stella, G. (2018a). Psychopathological symptoms in Italian children and adolescents with Specific Learning Disorder: What do mothers and fathers report about?. BPA-Applied Psychology Bulletin (Bollettino di Psicologia Applicata), 66(281).

Scorza, M., Zonno, M., & Benassi, E. (2018b). Dyslexia and psychopathological symptoms in Italian university students: A higher risk for anxiety disorders in male population?. Journal of Psychopathology, 24:193-203.

Scrimin, S., Osler, G., Pozzoli, T., & Moscardino, U. (2018). Early adversities, family support, and child well-being: The moderating role of environmental sensitivity. Child: care, health and development, 44(6), 885-891.

Searle, J. R. (1975). Indirect speech acts. In P. Cole & J. L. Morgan (Eds.), Syntax and semantics, Vol. 3: Speech acts (pp. 59–82). New York, NY: Seminar Press.

Shallice, T. (1988). From neuropsychology to mental structure. Cambridge University Press.

Shibata, M., Toyomura, A., Itoh, H., & Abe, J. I. (2010). Neural substrates of irony comprehension: A functional MRI study. Brain research, 1308, 114-123.

Sirigatti, S., Stefanile, C., Giannetti, E., Iani, L., Penzo, I., & Mazzeschi, A. (2009). Assessment of factor structure of Ryff's Psychological Well-Being Scales in Italian adolescents. Bollettino di Psicologia Applicata, 259(56), 30-50.

Smith-Spark, J. H., Henry, L. A., Messer, D. J., Edvardsdottir, E., & Zięcik, A. P. (2016). Executive functions in adults with developmental dyslexia. Research in developmental disabilities, 53, 323-341.

Snowling, M., & Hulme, C. (1994). The development of phonological skills. Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences, 346(1315), 21-27

Snowling, M. J., Gallagher, A., & Frith, U. (2003). Family risk of dyslexia is continuous: Individual differences in the precursors of reading skill. Child development, 74(2), 358-373.

Snowling, M. J., Bishop, D. V. M., Stothard, S. E., Chipchase, B., & Kaplan, C. (2006). Psychosocial outcomes at 15 years of children with a preschool history of speech-language impairment. Journal of Child Psychology and Psychiatry, 47(8), 759-765.

Snowling, M. J., Duff, F. J., Nash, H. M., & Hulme, C. (2016). Language profiles and literacy outcomes of children with resolving, emerging, or persisting language impairments. Journal of Child Psychology and Psychiatry, 57(12), 1360-1369.

Spotorno, N., Koun, E., Prado, J., Van Der Henst, J. B., & Noveck, I. A. (2012). Neural evidence that utterance-processing entails mentalizing: the case of irony. NeuroImage, 63(1), 25-39.

St Clair, M. C., Pickles, A., Durkin, K., & Conti-Ramsden, G. (2011). A longitudinal study of behavioral, emotional and social difficulties in individuals with a history of specific language impairment (SLI). Journal of communication disorders, 44(2), 186-199.

Stampoltzis, A., & Polychronopoulou, S. (2009). Greek university students with dyslexia: an interview study. European Journal of Special Needs Education, 24(3), 307-321.

Striano, T., & Stahl, D. (2005). Sensitivity to triadic attention in early infancy. Developmental Science, 8(4), 333-343.

Suraniti, S., Ferri, R., & Neri, V. (2009). Test for Reception of Grammar version 2 (TROG-2). Firenze: OS.

Stella, G., Pizzioli, C., & Tressoldi, P. E. (2000). PPVT-R: Adattamento italiano e standardizzazione [PPVT-R: Italian adaptation and standardization].

Swanson, H. L., & Hsieh, C. J. (2009). Reading disabilities in adults: A selective meta-analysis of the literature. Review of Educational Research, 79(4), 1362–1390.

Tager-Flusberg, H., Calkins, S., Nolin, T., Baumberger, T., Anderson, M., & Chadwick-Dias, A. (1990). A longitudinal study of language acquisition in autistic and Down syndrome children. Journal of Autism and Developmental Disorders, 20, 1–21.

Tager-Flusberg, H. (1999). A psychological approach to understanding the social and language impairments in autism. International review of psychiatry, 11(4), 325-334.

Talwar, V., Gordon, H. M., & Lee, K. (2007). Lying in the elementary school years: verbal deception and its relation to second-order belief understanding. Developmental psychology, 43(3), 804.

Tirassa, M., & Bosco, F. M. (2008). On the nature and role of intersubjectivity in communication. In Enacting intersubjectivity: A cognitive and social perspective to the study of interactions (pp. 81-95). Amsterdam: IOS Press.

Tobia, V., & Marzocchi, G. M. (2015). QBS 8-13. Questionari per la valutazione del benessere scolastico e identificazione dei fattori di rischio [QBS 8-13. Questionnaires for the evaluation of school wellbeing and the identification of risk factors]. Trento: Erickson.

Tobia, V., Greco, A., Steca, P., & Marzocchi, G. M. (2019). Children's wellbeing at school: a multi-dimensional and multi-informant approach. Journal of Happiness Studies, 20(3), 841-861.

Tomasello, M., & Farrar, M. J. (1986). Joint attention and early language. Child development, 1454-1463.

Tompkins, V., Guo, Y., & Justice, L. M. (2013). Inference generation, story comprehension, and language skills in the preschool years. Reading and Writing, 26, 403–429.

Toplak, M., & Katz, A. N. (2000). On the uses of sarcastic irony. Journal of pragmatics, 32(10), 1467-1488.

Turkstra, L. S., Clark, A., Burgess, S., Hengst, J. A., Wertheimer, J. C., & Paul, D. (2017). Pragmatic communication abilities in children and adults: Implications for rehabilitation professionals. Disability and rehabilitation, 39(18), 1872-1885.

Uchiyama, H., Seki, A., Kageyama, H., Saito, D. N., Koeda, T., Ohno, K., & Sadato, N. (2006). Neural substrates of sarcasm: a functional magnetic-resonance imaging study. Brain research, 1124(1), 100-110.

Utsumi, A., & Sakamoto, M. (2011). Indirect categorization as a process of predicative metaphor comprehension. Metaphor and Symbol, 26(4), 299-313.

Vaez, M., & Laflamme, L. (2002). First-year university students' health status and socio-demographic determinants of their self-rated health. Work, 19(1), 71-80.

Valle, A., Massaro, D., Castelli, I., & Marchetti, A. (2015). Theory of mind development in adolescence and early adulthood: the growing complexity of recursive thinking ability. Europe's journal of psychology, 11(1), 112.

van Agt, H. M., Essink-Bot, M. L., van der Stege, H. A., de Ridder-Sluiter, J. G., & de Koning, H. J. (2005). Quality of life of children with language delays. Quality of life research, 14(5), 1345-1355.

van Agt, H., Verhoeven, L., van den Brink, G., & de Koning, H. (2011). The impact on socio-emotional development and quality of life of language impairment in 8-year-old children. Developmental Medicine & Child Neurology, 53(1), 81-88.

Van Herwegen, J., Dimitriou, D., & Rundblad, G. (2013). Development of novel metaphor and metonymy comprehension in typically developing children and Williams syndrome. Research in Developmental Disabilities, 34(4), 1300-1311.

Varga, E., Schnell, Z., Tényi, T., Németh, N., Simon, M., Hajnal, A., ... & Herold, R. (2014). Compensatory effect of general cognitive skills on non-literal language processing in schizophrenia: a preliminary study. Journal of Neurolinguistics, 29, 1-16.

Varni, J. W., & Limbers, C. A. (2009). The PedsQL™ 4.0 generic core scales young adult version: feasibility, reliability and validity in a university student population. Journal of health psychology, 14(4), 611-622.

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Vender, M. (2011). Disentangling dyslexia. Phonological and processing impairment in developmental dyslexia.

Veneziano, E. (Guest Editor). (2010). Special issue on conversation in language development and use. First Language, 30, 241–534.

Wang, A. T., Lee, S. S., Sigman, M., & Dapretto, M. (2006). Neural basis of irony comprehension in children with autism: the role of prosody and context. Brain, 129(4), 932-943.

Wanzek, J., Vaughn, S., Kim, A. H., Cavanaugh, C. L. (2006). The effects of reading interventions on social outcomes for elementary students with reading difficulties: A synthesis. Reading & Writing Quarterly, 22(2), 121-138.

Waterman, A. S. (1993). Two conceptions of happiness: Contrasts of personal expressiveness (eudaimonia) and hedonic enjoyment. Journal of personality and social psychology, 64(4), 678.

Westby, C. E., & Cutler, S. K. (1994). Language and ADHD: Understanding the bases and treatment of self-regulatory deficits. Topics in language disorders.

Whitehouse, A. J., Watt, H. J., Line, E. A., & Bishop, D. V. (2009). Adult psychosocial outcomes of children with specific language impairment, pragmatic language impairment and autism. International Journal of Language & Communication Disorders, 44(4), 511-528.

Whyte, E., & Nelson, K. (2015). Trajectories of pragmatic and non literal language development in children with autism spectrum disorders. Journal of Communication Disorders, 54, 2–14.

Wigfield, A., Byrnes, J. P., & Eccles, J. S. (2006). Development During Early and Middle Adolescence.

Wilson, A. M., Deri Armstrong, C., Furrie, A., & Walcot, E. (2009). The mental health of Canadians with self-reported learning disabilities. Journal of Learning Disabilities, 42(1), 24-40.

Wilson, D., & Sperber, D. (2012). Meaning and relevance. Cambridge University Press.

Winner, E., Brownell, H., Happe, F., Blum, A., & Pincus, D. (1998). Distinguishing lies from jokes: Theory of mind deficits and discourse interpretation in right hemisphere brain-damaged patients. Brain and Language, 62(1), 89–106.

World Health Organization. (1993). The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines. Geneva, Switzerland: World Health Organization.

Xiao, X. Y., & Ho, C. S. (2014). Weaknesses in semantic, syntactic and oral language expression contribute to reading difficulties in Chinese dyslexic children. Dyslexia, 20(1), 74–98.

Yont, K. M., Hewitt, L. E., & Miccio, A. W. (2000). A coding system for describing conversational breakdowns in preschool children. American Journal of Speech-Language Pathology, 9(4), 300-309.

Yoon, E. J., & Frank, M. C. (2019). The role of salience in young children's processing of ad hoc implicatures. Journal of Experimental Child Psychology, 186, 99-116.

Zullig, K. J. (2005). Using CDC's health-related quality of life scale on a college campus. American journal of health behavior, 29(6), 569-578.