Universiteit
Leiden
The Netherlands

I AM *YOU* WHEN YOU SPEAK

The role of turn taking in personal deixis acquisition

Helena Ros Redon
Theoretical and Experimental Linguistics
Leiden University – Faculty of Humanities
Prof. Dr. Arie Verhagen
Dr. Hannah de Mulder
6th of July, 2018

First and foremost, I want to express my gratitude to my supervisor Prof. Dr. Arie Verhagen for guiding me in the research process. I treasure every conversation in our meetings and the way you made me reason and organize my thoughts. Thank you for helping me turn my ideas into a thesis.
Secondly, special thanks to Dr. Hannah de Mulder for taking the time to be my second reader.
In third place, I want to thank Prof. Dr. Joana Rosselló Ximenes. You inspire me as a linguist and as a teacher; and you influenced my interests from the very beginning.
Finally, to Lizzie and Nora, who thought along with me, read these pages carefully and knew how to express my statements clearer. Your support kept me going and your friendship is an indescribable gift. Thank you; for this and for so much more.

Als meus pares, gràcies, sempre, per fer possible allò que em proposo. I a la meva àvia, que se'ns en va anar quan tot això just començava.

OUTLINE

1. INTRODUCTION

When acquiring the pronominal system in a mother tongue, children have to discover that, unlike most other words, pronouns do not have a stable reference. In fact, personal pronouns shift referent with every change of speaker in a conversation. Thus, I am *I* to myself; you are *I* to yourself (Loveland, 1984). Shifting reference make pronouns an exception, as far as children are concerned, because they constitute a case where the "name" does not go with the object designated (Clark, 1977).

Personal pronouns are deictic terms, words that "pick out" or "point to" the different participants and people involved in a conversation: the speaker (*I*), the addressee (*you*), or 'other' (third person, *she/he*). Thus, personal pronouns code speech roles. Together with space and time deictics, these linguistic elements anchor each utterance by reference to the speaker in the here and now (Clark, 1977). The common notion of them all is the *speaker*, which plays a major role in the contrast between *I* and *you*.

Several factors play a role for the gradual mastery of personal pronouns and personal deixis, some of them being of a more cognitive nature (namely, the sense of self and other or joint attention), and some other being mainly linguistic, specifically of a pragmatic nature (Ricard, 1999). Pragmatic factors relate to the child's understanding of speech roles and the shifting points of reference with which *I* and *you* pronouns are used (Loveland, 1984; Chiat, 1981; Clark, 1977; Sharpless, 1976; Strayer, 1977; Tanz, 1980). Personal deixis mastery demands knowledge of speech roles and an ability to identify oneself and others in those roles (Charney, 1980). Therefore, children cannot understand words requiring a deictic shift until they have learned, in some rudimentary way, to take the perspective of other people (Loveland, 1993).

The analysis of pronoun production and comprehension is a way to understand how children master the shifting references coded in personal deictics. This is why numerous researchers have studied the phenomenon of pronoun reversal: the use of *I* instead of *you*, and vice versa (Halliday, 1975; Cooley, 1908; Jespersen, 1922; Van der Gest, 1975; Savić, 1974; Sully, 1896; Shipley & Shipley, 1969; Sharpless, 1974; Chiat, 1981, 1982).

Nevertheless, the study of pronouns is a limited proxy to approach this broad research question of how children master personal deixis. This method is especially difficult to apply in studies involving infants, whose linguistic production is still very limited; and in clinical

populations, such as autistic children, whose language delay does not permit pronoun analysis until much later in their linguistic and cognitive development.

But how can we measure children's understanding of deictic shift without analysing pronoun use directly? Are there other tools that can be used to study role reversing competences in children?

To identify tools to use with young infants and language-delayed children, we should consider a pre-linguistic aspect. Namely, a phenomenon that occurs at the base of language development that leads to the infant's success in acquiring language. The context where languages are acquired is based on a *turn taking* structure (Bruner, 1975; Levelt, 1993; Stievers et al., 2009; Levinson, 2016). Therefore, the conversational usage of deixis with its shifting references must obey the interactivity of dialogue, which is built upon the afore-mentioned *turn taking* system. In most speech acts, there is not only a *speaker* involved, but also an *addressee*, and these are the speech roles assigned to each participant in the dialogue. Nevertheless, when in a speech act there are at least two turns, role reversal happens: whoever was the *addressee* becomes the *speaker* in the next turn, in order to fit the turn taking system.

This conversational and interactional setting is a universal property of human language (Levinson, 2016; Levelt, 1993; Bruner, 1975). Thus, it can be used to study role reversing competences in any language and from very young ages. In order to measure these processes, it is imperative to operationalize turn taking and role reversing competences.

First of all, correct performance in turn taking can be objectively analysed in interrogative environments. In other words, if children are asked questions during a conversation and they answer or attempt to answer them, then they must understand that it is their turn to speak in the dialogue, at least when the interrogation modality is uttered. If they reply on time, they engage in the turn-taking system with the interlocutor.

Second of all, a correct performance in role reversing implies the child's ability to switch speech roles. They have to understand that they can alternate between being the speaker, the addressee, or a non-participant in the speech act. Once again, competence in role reversing can be analysed in interrogative environments. When children are the speakers uttering the questions, they adopt the role of *questioner* as opposed to *replier* (when they are asked a question). In both cases the child is the speaker, but the crucial aspect in role reversing is that the child initiates the speech act. The fact that children know they can become a *questioner* – because they ask questions as well as replying to them – can be seen as a proof of their understanding of role reversing.

Questions and their responses constitute a universal context for turn transition (Stievers et al., 2009). Therefore, this research will focus on the linguistic environment where turn taking and role reversing competences can be analysed, namely the interrogative environment.

All types of deixis take place within a framework of self-other awareness and role-shifting. This framework is altered in the interpersonal communication in children with autism spectrum disorder, and subsequently, deixis is affected in autism. Regarding personal deixis, autistic children are reported to make pronoun reversal mistakes more often and have a well-documented deficit in the use of *I* and *you*, and in the use of deixis overall (Tomasello, 2009). These findings infer that children with autism show limited engagement with the stances of other people (Bosch, 1970; Fay, 1979; Charney, 1981; Hobson, 1990, 1993), which can additionally be observed in their poor joint attention and limited perspective taking skills. Several studies (Loveland and Landry, 1986; Frith and de Vignemont, 2005; Hobson and García Pérez, 2010; Mizuno, 2014) provide evidence that points out the atypical abilities of comprehension and production of both verbal and non-verbal aspects of deixis in Autism Spectrum Disorder (ASD).

Therefore, the acquisition of personal deictics in ASD differs from Typically Developing (TD) children. One of the reasons involves their lack of understanding of speech roles and role shifting, which leaves the question of whether turn taking plays a role in understanding shifting reference in personal deixis, and if turn taking can be considered a pre-requisite of role reversing competence.

1.1. Research aims

The aim of the present study is to enlarge the methodological toolkit to study role reversal competence in the acquisition of personal deixis. Therefore, we intend to create a new proxy based on turn taking in interrogatives that can be correlated to the level of competence in role reversal.

To our knowledge, only personal pronoun analysis has been used to evaluate role reversing competence, but turn taking has never been used for such purposes. Therefore, this is the first study to point out the importance of turn taking to achieve the mastery of shifting reference in personal deictics.

1.2. Hypothesis

The main hypothesis of this thesis is that turn taking plays a role in the mastery of shifting reference in personal deictics. In order to test this, we will analyse turn taking competence in

interrogatives in two groups, namely typically developing children (TD group) and children with autism spectrum disorder (ASD group). The expected results, in line with our main hypothesis, are the following:

(i) To find a positive correlation between the turn taking competence, the role reversing competence and the correct personal deixis production in typically developing language acquisition (thus, only in TD group).

(ii) To find difference in performance in turn taking and role reversal between the two groups (TD and ASD). Specifically, we expect lower values for ASD compared to TD.

(iii) To find an increase of the values in the three competences across time in TD, and in turn taking and role reversing in ASD, despite the language delay.

1.3. Thesis overview

We will first discuss the hypothetical implication of turn taking for the acquisition of role reversal competences and provide an overview of previous research on the acquisition of personal deixis.

In the methodology section, we will first explain the process of how data was collected and mention the data limitations for this study. Afterwards, we will present the three variables, namely turn taking, role reversal and correct personal deixis. We will then explain the two analyses carried out to answer our research question: the first one will study if turn taking, role reversing competences and correct personal deixis production are correlated over time; and the second analysis compares turn taking and role reversal in two groups, namely TD and ASD, across time.

The results of the two analyses will be presented and discussed, and finally summarized in the conclusion section.

2. LITERATURE REVIEW

2.1. Theoretical approach

If we study turn taking as the base of speech acts, we should analyse an environment where a speech act is initiated and followed by the next speech turn, to establish a turn-taking system between speakers. As pointed out in the introduction, interrogative environments fit this description, since they naturally imply turns. The first turn, namely the initiation of the speech act, will be a question; the second turn will be the reply. In this case, at least two turns must occur in order to make the interrogative speech act felicitous.

In most speech acts, there is not only a *speaker* involved, but also an *addressee*, and those are the speech roles assigned to each participant in the dialogue. Nevertheless, when engaged in an interrogative speech act there are at least two turns. Subsequently, role reversal happens naturally: whoever was the *addressee* has to become the *speaker* in the next turn in order to fit the turn taking system.

The following step is to code linguistically these speech roles, whilst taking into account that speech roles are reversed due to turn taking. This is done through personal deictics whose reference shifts according to the speaker: *I* will always be the *speaker*, *you* will always be the *addressee*.

Considering that question-asking is as an environment where turn taking is naturally elicited, the roles of *questioner* and *replier* have to be matched in the speech roles in each turn. In the first turn, there is a clear implication between the notions of *speaker* > *questioner* > *I.* Nevertheless, when it comes to the addressee during the first turn, the implication is not as straightforward. The following implication is wrong: *addressee* > *replier* > *you*. It is important to notice that the *replier* has to be a *speaker*, and he/she will only be so in the next turn. The following table depicts the asymmetry of roles in interrogatives:

speaker	addressee
questioner, replier	?
I	you

Therefore, during the first turn of a question, the *addressee* is just a *receiver*, as we will call it, and will be coded with the pronoun *you*. This distinction is relevant, since only being

the *replier* (thus, *speaker*) will allow coding with the pronoun *I* in the following turn. This table depicts the speech roles and personal deictics assigned per turn as it happens in felicitous interrogatives:

Turn	1	1
Role	speaker	addressee
	questioner	receiver (future replier)
Personal deictic	*I*	*you*
Turn	2	2
Role	speaker	addressee
	replier	(past questioner)
Personal deictic	*I*	*you*

This is the schema we have taken into account to operationalize the three concepts.

First, for turn taking competence, we question how many times the child enters the turn taking system. To do so, he/she has to be a *replier* in turn 2; whenever the adult has been the *questioner* in turn 1, which means that the child answers or tries to answer the question uttered by his interlocutor.

Secondly, for role reversing competence, we want to observe the difference between how many times the child is a *questioner* (thus, initiates the turn taking) compared to how many times he/she is a *replier*. If he/she would only act as a *replier*, then he/she would not fully understand the role-reversing phenomenon. Therefore, it is crucial to study how often he becomes a *questioner*.

Finally, for the correct personal deixis performance, we want to analyse whether the child is able to match the speech roles to personal deictics correctly, based on each time he/she is the speaker, either a *questioner* or a *replier*.

2.2. Turn taking at the ontogenesis of speech acts

The study of language acquisition deals with the child's initial entry into grammar. Not only is there an ongoing debate about what is acquired and what is innate, but research also offers various perspectives on the way language is acquired. Is it acquired as a set of rules? It

is highly likely that language acquisition involves the regulation of joint activity and joint attention, because they are present in any human social interaction. Language acquisition must reflect and encode the nature of cognitive processes involved with social interactions whose output it encodes.

Bruner (1975) suggests that what may be innate about language acquisition is a special feature of human action and attention. This permits language to be decoded by the uses to which it is put. In other words, a child is not born with a finished schema of interpretation about such interactions, but he has the innate capacity to construct it with the correct input.

The process of language acquisition is, at least in the beginning, highly dominated by the addresser-addressee relationship and it is very closely related to the context (Bruner, 1975). The context where languages are learned is based on a turn taking structure (Stievers et al., 2009). Bruner (1975) states that this pre-linguistic level is the base of typical language development, since what leads children into language is their success in achieving joint action and joint attention. He claims that:

"The child is grasping initially the requirements of joint action, learning to differentiate these into components, learning to recognize the function of utterances placed into these serially ordered structures, until he finally comes to substitute elements of a non-standard lexicon in place of the standard ones." (Bruner 1975, pg. 17)

Therefore, it is not imitation of the adult – who acts as a provider and interactor, rather than as a corrector or reinforcer – that occurs in language acquisition. The process is essentially an extension of rules; rules that are learned in action to the semiotic sphere based on this turn taking system. Grammatical rules are learned by analogy with rules of action and attention. The child is not only learning to distinguish formal linguistic segments, but is also learning substitution rules, learning to reverse order, and trade linguistic positions (speech roles) with the interlocutor in what can be considered an early example of deixis (Bruner, 1975). This would mean that grammar originates as a set of rules inferred from jointly regulated activity, which is coded in the culture of each linguistic community.

Moreover, language acquisition shows that turn-taking precedes language in ontogeny (Levinson, 2016). Thus, turn taking seems to be a crucial aspect in understanding the nature and origins of language, since it constitutes the first social interactional matrix. Human turn-taking involves multi-tasking with comprehension and production. This system is cognitively demanding, since it engages the use of prediction and early preparation of complex turns in order to achieve turn-transitions with a fast reaction time (Levinson, 2016).

Although the overall system employed in conversation seems to be present across all languages, the organization of turns finds a lot of variation in timing, length of silence, or voice overlap (Levinson, 2016). Therefore, two hypotheses can be considered: (i) the universal system hypothesis, with minor cultural variability or (i) the cultural variability hypothesis, by which turn-taking is language and culture dependent.

Four strong arguments have been pointed out (Stievers et al., 2009; Levinson, 2016) to account for a universal system:

a. Exhibition of strong universality by the presence of the norm "minimal gap, minimal overlap" across languages.

a. Part of our ethology: Structured exchange in early proto-conversation in which new-borns and caregivers participate, long before babies understand much about language.

b. The organization of syntax around the clause, which is the minimal structure expressing a speech act and a proposition. Clauses happen in the small turn units licensed by the turn-taking system.

c. The biological nature of human turn-taking comes from comparative primate evidence such as duetting. During the intervening million years, simple vocal turn-taking may have provided the framework for an evolving linguistic complexity, exactly as it does with infants today.

To test the universal system hypothesis, Stievers et al. (2009) studied the interrogative modality and questions in conversation, as we have done in this project. They analysed the delay and inhibition when producing responses to questions by comparing data from 10 languages of the 5 continents with notorious structural differences and from substantially diffferent cultures. Their results provided robust support for the universal system hypothesis, since languages show similar distributions of response offsets, and they all reflect a tendency to minimize overlap and gaps between turns. Thus, this approach seems to be a good starting point to account for role-reversing competence and pronominal achievements in language acquisition.

Therefore, in this thesis we will follow the view that argues for an interactional foundation for language that is relatively stable and relatively separable from the specific languages and cultural practices that instantiate it.

2.2.2. Joint attention

Conversational skills also find their base on joint attention interactions such as pointing and showing that the focus of the caretaker and the child is on the same object, which are

normally well established by the age of 24 months. Moreover, as many researchers have pointed out, these interactions are important to the development of normal language use, and perhaps also to acquiring terms such as personal pronouns, in which autistic children characteristically have deficits in (Bruner, 1975; Clark, 1978; Lock, 1978; Loveland, 1984).

The failure of joint attention mechanisms seems to be related to the specific language deficits characterizing autism and language delay. Both language acquisition and the development of joint attention skills contribute to a grasp of language pragmatics by a child. When this ability is impaired, the functional aspect of language may be the most disrupted (Loveland & Landry, 1984). The concrete consequences for the impairment of these skills may, to some extent, affect how well syntax and semantics are acquired; and they certainly affect the acquisition of strategies and techniques for using language effectively in a social context (pragmatics).

Therefore, in this thesis, we have taken into account pragmatic competences as well as grammatical competences as far as personal deictics are concerned. The strategies and techniques for using language effectively can be non-verbal, such as declarative pointing, head-nodding, and even pre-linguistic vocalizations. For the analysis of our data, these manifestations have to be taken into account because declarative pointing and gesture can already carry a lot of information, and more specifically, deictic information. We are now only concerned about the personal deixis information. We refer to the way the child points to himself or to his interlocutor during the dialogue, even though gesture may not come with the utterance of any word.

It is also relevant to analyse the coherence between gesture and language in personal deictic elements. If the child says: “Give me the toy” while he is actually handing the toy to his interlocutor, there is a dissociation between the deictic information that the pronoun carries compared to the deictic information the gesture carries.

The relation between the correct production of *I* and *you* and joint attention capability has already been studied by Loveland and Landry (1986). They carried out an experiment with two groups, namely, developmental language delayed children and autistic children, using a series of toy-centred tasks that blended with natural play. Each task was focused on one joint attention aspect: shifting gaze towards an object, pointing towards it, showing it, touching it, and moving the child’s hand to touch it. In some tasks, the investigators would use only gesture, and in some others they would use also language.

Their results suggested that joint attention interactions could not be predicted from language development measures such as mean length of utterance (MLU), therefore the

development of joint attention skills may be regarded as a separate factor that interrelates closely with language acquisition. To some extent, joint attention skills may be independent of language acquisition: a child with good language indicators, specifically pronouns, would also have good gestural indicators, but not vice versa. Thus, a child can be very good in gestural indicators but not in pronoun use (Loveland and Landry, 1986).

Considering these findings, we included joint attention and gestural indicators only if they carried relevant deictic information, but not as factors that could explain or influence correct performance on personal deictics.

2.3. The mastery of shifting reference

2.3.1. Perspective taking

As stated in the introduction, there are factors of cognitive nature, such as perspective taking, that play a role for the mastery of shifting reference in personal deictics. Thus, to understand speech roles and shifting reference, we first have to explain perspective taking. In general, claims about the role of early cognition in language acquisition have been of two types, as reviewed in Loveland (1984):

a. A certain cognitive achievement represents a conceptual prerequisite to a particular aspect of language.
b. A certain pre-verbal behaviour serves a communicative function that is developmentally continuous with the function of an aspect of later language.

Perspective taking is one of the necessary aspects to understand how shifting reference in personal deictic works.

According to Flavell (1992), the development of perspective-taking abilities happens when the child comes to understand that the point of view of other people may differ from their own. Perspective-taking abilities evolve according to two developmental levels: (1) what another person sees (developmental sequence) and (2) how another person sees. If the second level is not achieved, they are not aware that the same thing may look different depending on the position from which it is viewed. Thus, perspective-taking may be at the very core of language structure and higher-cognition. The child's efforts to disentangle the differences between his own and other people's point of view are at the basis for acquiring *I/you* (Loveland, 1984; MacWhinney, 2005; Mizuno, 2014; Ricard, 1999). Supporters of this claim emphasize the significance of the ability to shift the viewpoint in a dialogue at the spatial domain – thus, concerning the geographical place of the speaker and addressee –, since this fact seems to be pre-requisite for a correct grasp of the shifting reference in personal deixis.

Two studies will be reviewed here which supported the hypothesis that only children who showed understanding of the possibility of differing points of view would be able to produce and comprehend *I/you* pronouns correctly.

Loveland (1984) carried out two studies under this hypothesis, a cross-sectional and a longitudinal. Two set of tasks were used: one set tested comprehension and production of *I/you* and the other set tested the understanding of differences in spatial points of view. Both tasks blended naturally with the child's free play and activity.

Loveland's results indicated that reciprocal usage of *I/you* pronoun begins at the time the children were aware of different points of view, and the acquisition of these pronouns was completed only when spatial differences in points of view were fully understood. Thus, she concluded: "understanding spatial points of view is a cognitive prerequisite to understanding speaker's point of view, which governs the pragmatics of *I/you* pronouns".

Ricard (1999) replicated Loveland's study; and her results suggested that competence at coordinating two visual perspectives precedes the mastery of 1st and 2nd person pronouns. Another finding was that full pronoun acquisition and basic perspective-taking abilities (namely, what another person sees) were significantly correlated from the age of 1;10 to 2;6. This indicates that, at this stage, a child who performs well (or poorly) on perspective-taking tasks will likewise tend to perform well (or poorly) on pronoun tasks.

However, as Loveland (1984) explains, the developmental relationship hypothesized does not imply that knowledge about points of view alone is sufficient to explain all aspects of the acquisition of *I/you* pronouns. Instead, this pattern of acquisition involves the child's attempt to learn the pragmatics of *I/you* pronouns, which means to master the correct application in each domain. This is why, in the current thesis, we analysed other pragmatic competences such as turn taking.

Moreover, the emergence of perspective-taking skills may not systematically precede and facilitate the acquisition of personal pronouns. Thus, perspective-taking and pronoun acquisition may be seen as interactive and reciprocal, rather than causal or unidirectional.

2.3.2. Role reversing competence

Personal deixis encodes speech roles, and personal deixis mastery eventually requires a developed sensitivity to dialogue roles. However, as Charney (1980) points out, it is not clear just how much of the interpersonal situation the child is aware of, in a dialogue; how he comes to understand his own speech roles; or what part this awareness plays in his acquisition of language.

What most authors agree on is that learning through dialogue is a prerequisite for language acquisition, as an interaction with another person rather than a symbolic code for abstract concepts (Bruner, 1975; Kaye, 1979; Ryan, 1974; Charney, 1980). Therefore, Charney (1980) reviewed three different hypotheses about the importance of dialogue while learning a language that would predict different patterns on personal deixis acquisition. They are all centred on the different stages of speech role understanding that a child may come across, which make a prediction about the correctness of their performance in personal deictics.

a. Speech role referring, supported by Sharpless (1974)

If a child begins the acquisition process with a correct view of speech roles, his/her performance of personal deictics is equal to the adult one, once speech is initiated. Children understand that each personal deictic can refer to any person as long as the person occupies the speech role coded by the personal deictic. In other words, children's performance in personal deictics is totally correct because of a correct reciprocal view of speech roles: they are able to see others in roles they take, and themselves as non-participant roles of the speech act. This view has led some authors to characterize correct personal deixis performance as evidence of non-egocentrism (de Villiers & de Villiers, 1974). Therefore, according to Sharpless (1974), children learn to code themselves first in each role they take.

b. Person referring, supported by McNeil (1963)

This hypothesis starts in the other way round than the previous one: the child begins the acquisition process with no sensitivity to speech roles. Their hypothesis is that pronouns are a type of name. Children notice adults use *you* in addressing them, and use *I* for adult speakers, as an alternative to Mummy or Daddy. Then, personal deictics are person-referring; they are linked to specific speakers in the dialogue. This is the context in which the child may produce pronoun reversals, calling himself *you* and others *I*.

c. Person in speech role referring, supported by Clark (1977)

Children begin learning the personal deictics most relevant to them as they participate in the dialogue (which ones are used when they are the speaker, which ones are used when they are the addressee). Thus, *I* could be produced correctly but understood wrongly when used by other speakers. Only later they would generalize to a more abstract representation of personal deictics applicable beyond their own role. This hypothesis would imply dissociation between the production and the comprehension of personal deictics: *I* would be produced first but comprehended second; *you* would be comprehended first but produced second.

To investigate which of these three hypotheses predicts better the performance on personal deictics for TD children, Charney (1980) conducted a study to evaluate the knowledge of 1p, 2p and 3p pronouns as children took the roles of speaker, addressee and non-addressee listener. The experiment evaluated the comprehension and production of possessive pronouns in several tasks involving photographs of the child, the investigator and the mother that would make the child elicit a specific pronoun. Their results showed evidence to support the third hypothesis, namely, person in speech role referring, since across participants the pronoun referring to the child was acquired first, regardless of the speech role of the child. That is, as a speaker, 1p pronoun preceded 2p; as addressee, 2p preceded 1p. Therefore, children started with a correct use of *I* for himself, but not the comprehension of *I* when used by others. At first, he is only aware of his own speech role.

Similarly, Loveland (1984) also found in her study early asymmetries between the pronouns *I/you*. She concluded that each pronoun is likely to be acquired first as it applies to the child himself. Therefore, the gradual transition to reciprocity with other speakers in the use of *I/you* pronouns made clear that to produce one of these terms is not the same as to comprehend it, nor vice versa.

2.4. History of personal deixis acquisition in typically developing children

Even before children speak any language, they are able to direct the attention of others to objects: first with gestures, and later with gestures and/or words combined. Pointing and showing become an early form of deixis, making it a communicative gesture (Tomasello, 2003).

With the emergent reciprocity between the adult and the child – entering the turn taking system –, children learn to use personal deictics (in gesture or words) only when the interlocutor is perceptually available in their context. Moreover, they progressively perform a checking up on their listener to see if they have the full adult's attention. This fact has already a communicative function, since in order to communicate anything, the speaker – or pre-speaker, so to say – has to make sure that the listener is attending (Bates, Camaioni & Volterra, 1975; Werner & Kaplan, 1963; Clark, 1977).

Children continue to point and gesture after they begin to use their first words. 1st person deictics, such as the pronouns *I, me, mine,* are among the first words of many English speaking (and other) children (Tomasello, 2003). Nevertheless, the stages children seem to go through, as they move from gesture to words, in making deictic reference start with space deictics. First, children use pointing to pick out the location of an object for their listener, then

they add their first deictic word (usually, a spatial deictic), and later they combine the deictic with other words to form longer utterances, progressively abandoning gesture (Clark, 1977).

Unlike spatial deictics, which may indicate the same object with a different word depending on the speaker location, with personal deictics the shift is absolute: I am always *I*, and you are always *you*, when I am the speaker. This absoluteness should mean that personal deictics are easier to learn than spatial deictics, and they are, as Tomasello (2003) points out, but when children make errors with personal deictics, these are especially salient and serious discourse-wise.

Another important step is the course of working out the contrast between the deictics. Children play an active role applying different strategies that are the outcomes of his changing hypotheses. The acquisition of such contrasts between pairs of deictics (of any type) can be roughly characterized by three stages, as Clark (1977) states: first no contrast, followed by an incorrect or partial contrast, followed by the full adult contrast.

At this stage, the notion of the child as *speaker* plays an important role to start working on the right hypothesis. Thus, the first pronoun most children tend to use is a 1st person form such as *I, me, my* or *mine* (Foulke & Stinchfield, 1929; Leopold, 1949; Huxley, 1970; Clark, 1977). It is used sporadically in alternation with the child's own name, which means that the deictic is first used in self-reference. During that stage, children are quite unconcerned by its shifting reference and the fact that other people also use *I* to refer to themselves (Clark, 1977). The next pronoun children use is *you*, and with this addition the first contrast between deictic pairs has to be solved: They have to decide on its relation to *I*. Most children, in fact, seem to begin with the right hypothesis and have little difficulty in contrasting *I* and *you*, since pronoun reversals and abnormalities are very rare in TD children.

As pointed out in section 2.3.2.c, the differences on the acquisition of *I* and *you* are reviewed by Charney (1980). With the 1st person, the child is exposed to the inconsistent pairing of pronoun and referent (different speakers using the same pronoun *I*), unlike proper names. However, with the 2nd person, there is consistency between referent (child) and pronoun (he/she is always referred with *you*); although the child does not learn *you* as person-referring, that is, as linked to himself/herself. One explanation, as given in Charney (1980), is that: "The child is aware of – although perhaps confused by – the fact that 2nd person does have other referents in dialogues in which he does not participate".

According to this claim, Oshima-Takane (1988, 1999) hypothesized that 1st and 2nd person pronouns should present less confusion to children who have siblings, since these children are able to experience adult-child discourse from an outsider's perspective (for

example, they can see parents referring to the sibling as *you*, as well as the sibling calling the parent *you*), as a complement to their own direct discourse with adults.

Overall, these hypotheses are continually built on what children already know; and the way they use words strongly depends on other hypotheses about the meanings of those words. But two questions pointed out by Clark (1977) remain to be answered: (1) What pushes some children to adopt one hypothesis and others another? And (2), if they are not initially aware of the reciprocity of speech roles that can be exchanged, what causes them to change to the right hypothesis? As Lyons (1977) notes, the fact that deictic structures even exist in languages "can only be explained on the assumption that they have developed for communication in face-to-face interaction". Therefore, learning language in this context may trigger the "person in speech role hypothesis" to take over if the child starts with the wrong one.

2.5. Personal deixis in Autism Spectrum Disorder

The study of language in autistic children is considered an important key to their diagnosis assessment (Rutter, Bartak, & Newman, 1971). The extent of the language deficit is usually indicated by the incidence of mutism in the spectrum. Thus, according to Bartolucci (1974), in the cases where language does develop, it is common to find:

a. Absence or low frequency of questions and informative statements.
b. Echolalia and pronoun reversals as traditional characteristics of autistic children's language.

As discussed in the introduction, these two claims frame the hypothesis of this thesis. Nevertheless, as Tager-Flusberg et al. (2010) review, ASD is often first recognized because of unusual patterns of speech development, but in fact many early aspects of the language deficit associated with ASD overlap with other disorders. Thus, though skill in language is important, delays in expressive language in the early preschool years are not specific to ASD (Mattison, Cantwell & Baker, 1980).

The way children with ASD experience themselves in relation to other people directly influences deixis in their language use. Deixis concerns the children's awareness of other people's psychological orientations, which can be distinct and interchangeable with their own (Hobson & García Pérez, 2010). Since all types of deixis take place within a framework of self-other awareness and role-shifting, and this framework is affected in interpersonal communication in ASD, consequently, deixis is affected in ASD.

As far as personal deixis is concerned, the most noted confusion is the atypical usage of the pronouns *you* and *I*. These confusions are usually tied up with the children's proneness to

echolalia, which results in an unmodified usage of these terms. This fact seems to show the children's limited engagement with the stances of other people (Fay, 1970; Bosch, 1970; Charney, 1981; Hobson, 1990, 1993).

The evidence that deictic terms present a special difficulty for children with autism is the clinical description of abnormalities in personal pronoun use (such as pronoun reversal and pronoun avoidance). Hobson and García Pérez (2010) reviewed two studies with suggestive evidences that such abnormalities are intimately related to interpersonal engagement. The first one, by Loveland and Landry (1986), suggested that the children's propensity to achieve active alignment with someone else's psychological orientation is closely related to their productive grasp of *I* and *you* (as pointed out in 2.2.2.). The second one, by Hobson et al. (2009), concluded that atypicality in personal pronoun usage was accompanied by evidence that something was also atypical in the children's co-ordinated attention and engagement with a communicative partner. Other recent research provides complementary evidence of limited communicative role-taking as well as interpersonal engagement and identification (García-Pérez et al. 2007, 2008; Hobson, Lee & Hobson, 2007).

The recent functional MRI studies carried out by Mizuno (2014) about self and other representation in autism also provide complementary evidence. As suggested by Frith and de Vignemont (2005), egocentrism in autism may be characterized as dysfunction of representing the external world on the basis of understanding its relation to oneself. As Mizuno claims: "Pronoun reversals in autism may reflect a disturbed processing of understanding of self and other in the reciprocal relationship, rather than a semantic error to adjust pronominal forms". Thus, "[pronoun reversals] characterize an atypical understanding of the social world because deictic shifting is embedded in understanding the self and other relationship, which requires the recognition of the self-stance relative to the other's existence".

The above studies frame the hypothesis in Hobson and García Pérez (2010): not only full understanding but also proficient use of both verbal and non-verbal deictic expressions relies on children's capacity to identify with other people. Indeed, their results lead them to suggest that: "among participants with autism, the atypicalities that we observed in their comprehension and production of deictic language and gesture reflect limitations in the co-ordination of interpersonal experience and reciprocal role-taking that establish a world held in common with others".

These results lead them to the following question: How did these children achieve their relative proficiency in comprehending and using deictic terms, and in pointing? A child might

be able to grasp aspects of the meanings of personal deictic terms without understanding that its meaning is based on the fully reciprocal and reversible self/other role-taking (that is, role reversing).

In summary, they gave evidence to point out the atypicalities of comprehension and production of both verbal and non-verbal aspects of deixis in ASD.

3. METHODOLOGY

3.1. Data collection

The initial idea for the data set of this project was to find two longitudinal corpora: one for the TD group and another one for the ASD group in the same language. Ideally, those corpora would consist on transcriptions of video-taped sessions of spontaneous interactions of a child with only one interlocutor. The sessions should cover the period in which the first personal deictics are produced, thus from 1;3 to 2;5 approximately, spaced about two months apart. Moreover, sessions should be the same length: 30 minutes of usable transcripts.

Since it would be a longitudinal study and this is a MA thesis, we could not gather the data ourselves, and thus we had to find suitable online available corpora in the CHILDES corpus. Finally, we decided to use the Serra & Solé Corpus (1989) for the TD group and the Rollins Corpus (1999) for the ASD group.

3.1.1. Subjects

Four children are included in the TD group, two female and two male, all of them Catalan monolinguals. Eight video-taped sessions are analyzed between the ages of 1;5 and 3;5 spaced about two to four months apart (precisely: 1st-1;7, 2nd-1;9, 3rd-1;11, 4th-2;1, 5th-2;4, 6th-2;8, 7th-2;11, and 8th-3;5, except for one participant starting at 1;5 and stopping at 3;0). Data was collected at their homes in spontaneous interaction lasting 30 to 45 minutes with a familiar adult, usually the mother. All children belong to middle-class families.

The ASD group is formed by four children, all male and English monolinguals. Four video-typed sessions are analysed between the ages of 2;2 and 3;7 spaced about two to four months irregularly across subjects. The interactions were one on one with a clinician in sessions of 20 to 30 minutes of usable transcripts. The children were included in this group if:

a. They had an initial diagnosis of autism by a psychologist or a neurologist
b. They had been preverbal at the time of intake
c. They had attended the preschool program for at least 1 year
d. They had some conventional expressive vocabulary skills upon completion of the program.

All of the children included in the ASD group were relatively young at the start of the study by Rollins (1999) (mean age of 2;7) and were severely delayed in language as measured by the SICD – Sequenced Inventory of Communication Development (mean receptive

language age 1;2, and mean expressive language age 0;10). The delays in language skills were corroborated by the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984), as was the social impairment, as indicated in the following table:

SICD				Vineland			
Child	Age	Recept	Expr	Commun	Living	Social	Motor
Roger	2;6	1;0	1;4	63	72	72	73
Sid	2;2	1;2	1;5	66	77	77	93
Josh	2;5	1;4	0;8	64	62	62	86
Carl	2;8	1;4	1;0-1;4	N/A	72	72	89

3.1.2. Limitations

First, a statistics study in RM ANOVA cannot be performed in any of the analyses to compare variance within and between groups because the sample is not large enough ($N < 30$). Therefore, we know in advance that none of the results comparing subjects and groups will be significant.

Secondly, the number of sessions available in each corpus is not the same. In the ASD corpus, only four sessions are available for every participant; whereas in the TD corpus, we were able to select eight sessions for each participant. The number of interlocutors of each session is also variable. Moreover, the length of the transcriptions is not equal for each group and for each participant, this is why the independent variables are calculated in rates and not in absolute frequency, as we will discuss in the next section.

Finally, the language of the two groups is not the same: TD group are Catalan monolinguals and ASD group are English monolinguals. This causes a lot of differences on personal deictics production, since in Catalan all finite verbs contain a person morpheme, thus, personal deixis information. Nevertheless, the presence of 1st and 2nd person singular deictics is a language universal, as well as shifting reference in deictics and turn taking system. Therefore, language differences should not prevent the comparison between the two groups in these conditions.

3.2. Variables

In order to study whether turn taking plays a role in the mastery of shifting reference in personal deixis, three independent variables and their relation are explored in this longitudinal

study: turn taking, role reversing and correct personal deixis. For each variable analysed, a count in the transcriptions was carried out to obtain the rate number as follows.

3.2.1. Turn taking rate

To calculate this rate, we have counted in each transcription the number of questions that children have received from their interlocutor (Q received) and the number of questions the children have actually answered (replies). What we have considered as a reply is not necessarily a linguistic unit or a felicitous answer. Incorrect answers, meaningless sentences, vocalizations, head-nodding and declarative pointing have also been counted as answers, if the previous sentence uttered by the interlocutor was a question. Therefore, as long as the child had shown through language or behaviour that he/she was taking his/her turn in the dialogue after a question was uttered, that was included in the count.

This rate is the result of the replies divided by the questions received:

$$Turn\ taking\ rate = \frac{\text{replies}}{\text{Q received}} = \{0,1\}$$

The outcome number is comprised between 0 and 1, as shown. The closer to 1, the more questions the child has answered when he was asked, which indicates how often the child has taken his turn in the dialogue after an interrogative (0 would mean never, 1 would mean always). 1 as a result is not expected, because even in adult speech not all questions received are answered.

3.2.2. Role reversing rate

For this rate, we have counted the questions uttered by the child (Q asked) and again the number of questions he has replied to (replies). As the previous rate, this includes as well non-verbal productions (vocalizations, head-nodding and declarative pointing).

The outcome number establishes a relation between the number of times the child has adopted the role of *questioner* while being the speaker, thus initiating the dialogue, divided by the number of times he has taken part in the dialogue but as a *replier* (also while being a speaker) when his/her interlocutor had initiated the dialogue:

$$Role\ reversing\ rate = \frac{\text{Q asked}}{\text{replies}} > 0$$

This number has to be higher than 0. Scoring 1 would mean he asks as many questions as he replies when he is asked. It indicates how often the shift from *questioner* to *replier* happens in a dialogue (close to 0, never since he is usually the *replier*; 1, always; higher than 1, he is usually the *questioner*). Both the number of questions asked and replies can be very variable in each communicative environment. The score on this rate depends strongly on who the child's interlocutor is (known, unknown, multiple interlocutors…), and of course how many questions the interlocutor asks during the dialogue. Thus, this rate is expected to be very variable, but it is supposed to increase with age to show that the child can take the role of *questioner* as much as he can take the role of *replier*.

3.2.3. Correct personal deixis rate

This rate measures the competence of the child on personal deixis. From the transcriptions, the total number of correct personal deictics referring to 1st and 2nd person singular is counted, and divided by the total number of deictics (also only referring to 1st and 2nd person singular), including incorrect deictics:

$$Correct\ personal\ deixis\ rate = \frac{\text{Correct deictics}}{\text{Total deictics}} = \{0,1\}$$

The closer to 1, the more competence the child shows when producing personal deictics. As opposed to the other two rates, 1 is expected around the age of 2;0, which means that all deictics produced in the dialogue are correct. Moreover, this rate might not be gradual in some children, which means that their values can increase from 0 to 1 directly at a certain age point.

Since the correct personal deixis rate is only analysed in the TD group, which are all Catalan speakers, we have established several criteria to count them in the transcriptions. Catalan is a Romance language, which implies that the verbs will always include a person morpheme and that the Subject pronoun might be dropped while the sentence is still grammatical. Therefore, if a Catalan child produces both the overt Subject pronoun and the person agreement morpheme on the verb, it will only count as one single personal deictic. This will not be the case with Object pronouns, which will count as a separate personal deictic apart from the person morpheme on the verb, since verbs and Objects do not have to agree.

3.3. Analysis in TD group

This first analysis will study if turn taking, role reversing and correct personal deixis production show a correlation across time in one group, namely TD children.

The reason why the ASD group is not included in this analysis is because the transcriptions available start at age 2;5 and stop at 3;5, tested only in 4 time slots. Therefore, we do not have data of the previous stages nor the later ones, in which we would have more information to see how turn taking and role reversing competences evolve. Moreover, since children are expected to produce more personal deictics the older they become, and this data is not available, it is not possible to explore how the ASD group finally masters personal deixis.

3.4. Comparison of TD and ASD subjects and groups

Turn taking and role reversing rates will be compared in this longitudinal study between the two groups, TD and ASD, matched on age. Only four video-taped sessions (instead of eight) are analyzed starting at age 2;4 until age 3;5 (precisely: 1^{st}-2;5, 2^{nd}-2;7, 3^{rd}-2;11, 4^{th}-3;5).

For this analysis, one could argue that the groups should have been matched on verbal mental age, since the children in the ASD group present a severe delay in language and a lower verbal mental age compared to those in the TD group. Because of this delay, their production of personal deictics is expected to be much lower, and their performance much worse, as stated in our hypotheses. Nevertheless, the two groups will not be matched on verbal mental age to compare the three rates analyzed, but on their actual age. The first reason is that they are not performing a language task; therefore, none of the participants needs a specific level of linguistic competence to participate in this study. No verbal mental age threshold is established. The analysis of their turn taking and role reversing competences will be done longitudinally, and based on their production in naturalistic speech as the participants gradually acquire linguistic competence at all levels. The second reason is the following: If we would have matched the groups on verbal mental age (TD group being as developed linguistically as ASD group) we would not expect the two groups to differ in their level of personal deixis performance. By matching them on age, we know they will, as SICD measures show.

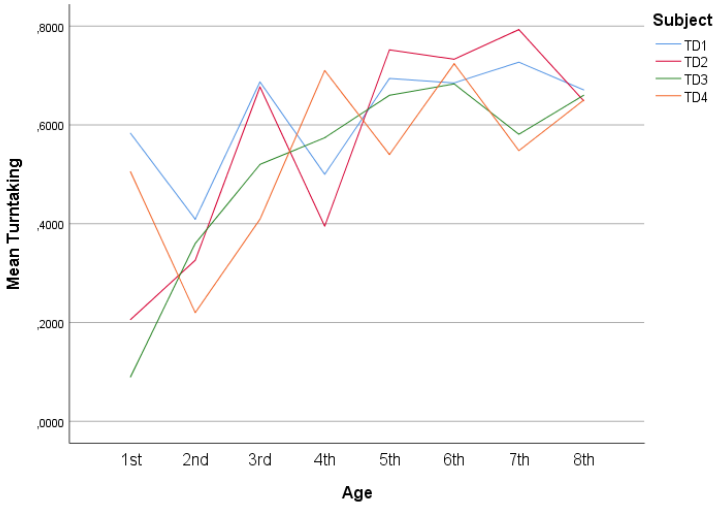
Turn taking and role reversing are at a pre-linguistic level. Thus, if the performance on these two rates also differs between groups (not within), we can say that the difference happens not only at a linguistic level, but also at a pre-linguistic one.

The reason why correct personal deixis is not included in this analysis is because the ASD group presents an important language delay, and the period of time that transcriptions cover is too early for the participants of this group to utter enough questions and produce enough personal deictics to obtain interpretable rates.

4. RESULTS

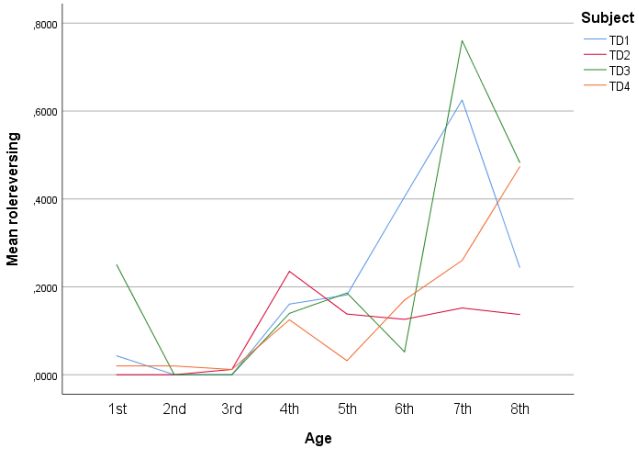
4.1. Analysis in TD group

4.1.1. Turn taking rate



In the above figure, we can observe the turn taking competence of each subject each time they were tested (8 in total). Results show that participants differ greatly in performance during the 1st time slot, and this is also the case during the 2nd and 3rd. Nevertheless, we see that the rate number increases by age (it is closer to 1), and starts stabilizing at around the 7th session. By the time they are tested in the 8th session, all participants perform similarly on that rate.

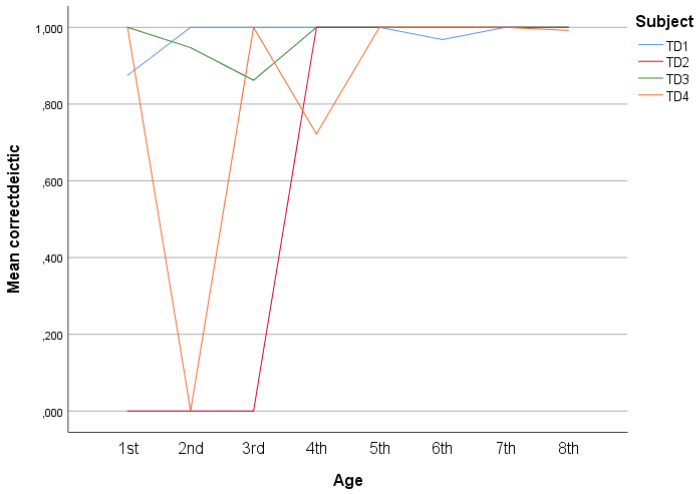
4.1.2. Role reversing rate



In contrast to what we observed in the turn taking rate, the initial performance on role reversing appears similar across participants until the 4th stage. From the 5th to the 8th session, performance varies greatly among subjects. Although the rate increases comparing the first

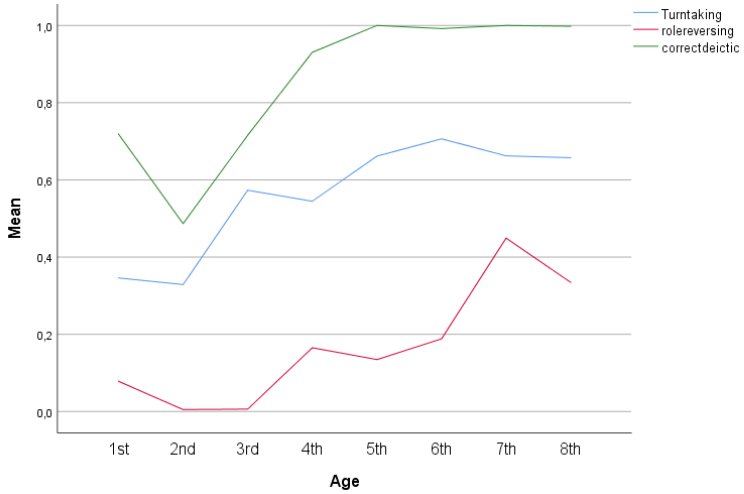
and the last stage, performance does not show a progressive line. In other words, in some cases, higher values are reached in the middle time slots, rather than in the last time slot, which produces some drastic drops of the values.

4.1.3. Correct personal deixis rate



The above figure shows that this variable is not continuous, but rather discrete. Subjects easily go from value 0 to 1, with no intermediate values. It is noteworthy to mention that from the 5th stage onwards, all of the participants reach value 1. Therefore, their performance on personal deictics is equal to adult performance.

4.1.4. Overview of the three variables



The above figure displays the mean rate obtained from each participant for each of the three variables.

The first notable observation is that, overall, all rates increased in value across time. Moreover, the pattern of performance in certain time slots is similar across variables.

Nevertheless, the values of each rate are very different. For example, role-reversing values are overall lower than turn taking, and turn taking values are lower than correct personal deictics.

Error bars are not included in this graph, but since the sample is very small, the mean value of each rate in each time slot may not be representative for the performance of the subjects, especially in the first three stages where there was a lot of variation in performance. Nonetheless, we see in the graph, performance is almost stabilized in all conditions from the 5th session onwards.

4.1.5. Correlation between variables

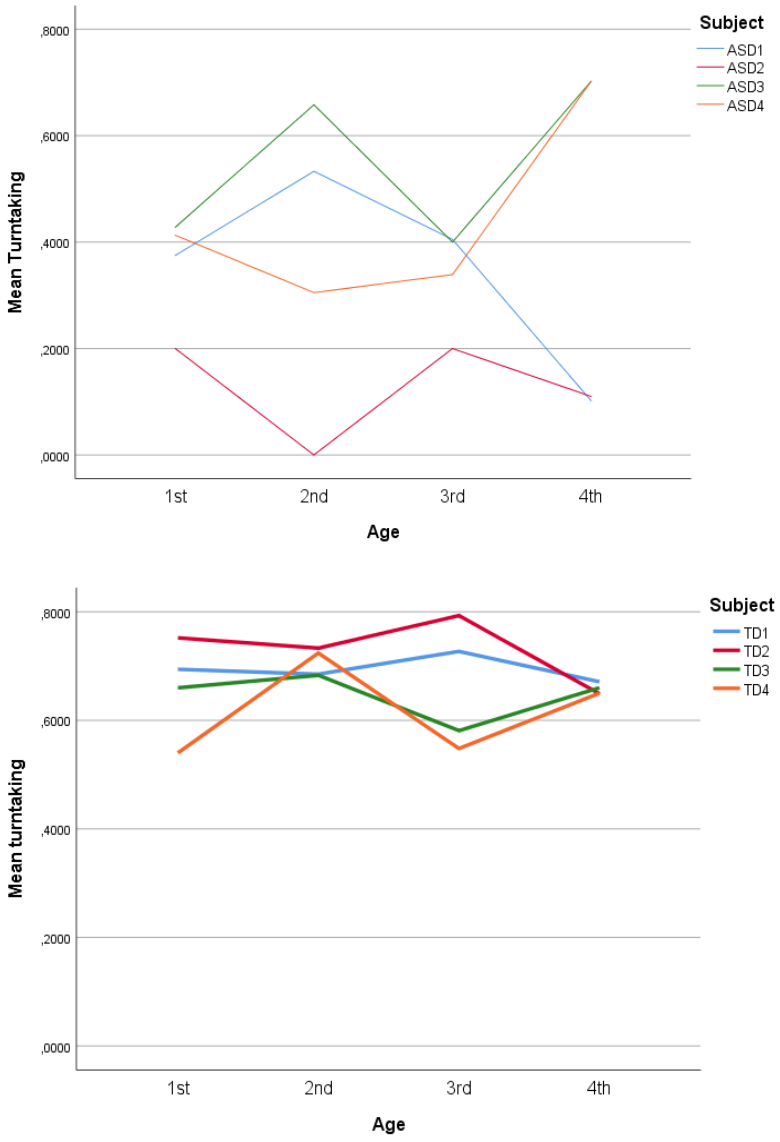
		Turntaking	rolereversing	correctdeictic	Age
Turntaking	Pearson Correlation	1	,290	,427*	,686**
	Sig. (2-tailed)		,107	,015	,000
	N	32	32	32	32
rolereversing	Pearson Correlation	,290	1	,351*	,652**
	Sig. (2-tailed)	,107		,049	,000
	N	32	32	32	32
correctdeictic	Pearson Correlation	**,427***	**,351***	1	,451**
	Sig. (2-tailed)	,015	,049		,010
	N	32	32	32	32
Age	Pearson Correlation	**,686****	**,652****	**,451****	1
	Sig. (2-tailed)	,000	,000	,010	
	N	32	32	32	32

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

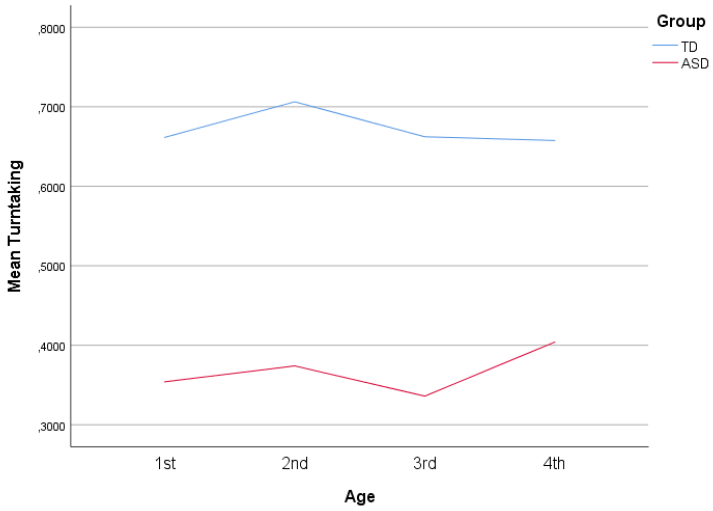
4.2. Comparison of TD and ASD subjects and groups

4.2.1. Turn taking performance: comparison between subjects



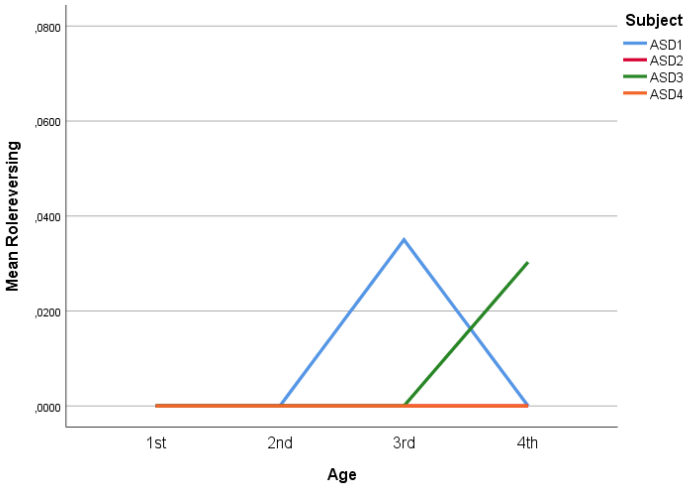
The first figure depicts turn taking performance in children diagnosed with ASD; the second, performance of TD children. The ASD figure shows that the performance is very different across participants. In other words, subjects do not seem to follow a consistent pattern of acquisition of turn taking. Moreover, only half of the participants increase their turn taking rate in relation to age, whereas the other half show a decrease in their turn taking performance. In the TD group figure, rate values are much more similar across participants. It is worth mentioning that all TD participants in the 4th time slot share highly similar rate values.

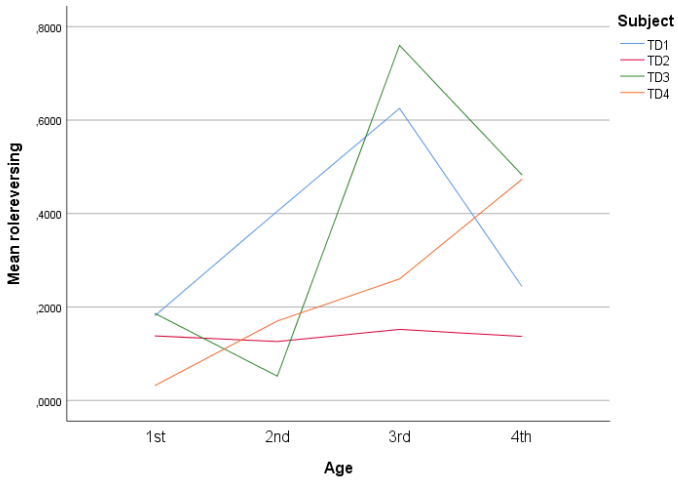
4.2.2. Turn taking performance: comparison between groups



It is noticeable that the values of this rate differ drastically between groups. The values obtained by the ASD group are much lower than those obtained by the TD group. Moreover, the performance in TD group stabilizes in comparison to the ASD group, since the values across time do not show notable variability. Nonetheless, there is an increase of the rate value across time in the ASD group, if we compare the values in the 1st and the 4th time slots. This does not occur in the TD group during these four time slots (it does occur over the course of the eight time slots).

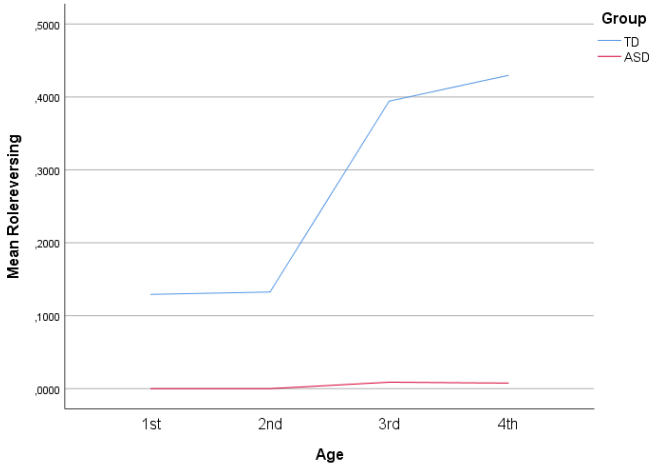
4.2.3. Role reversing performance: comparison between subjects





The first figure depicts the role reversing performance of ASD; the second one, the performance of TD. In the ASD figure, the lines at level 0,00 represent a null rate number: either because children did not ask any questions or because they did not reply to any. It is worth noting that only one subject presents a rate value increase at the 4th time slot. The rest of the participants either remain at a 0,00 level or decrease in their rate number over time. In the TD figure, the lines do not depict an continuous increasing pattern of values, except for one participant. Overall, the value at the 4th stage is higher than the value at the 1st stage.

4.2.4. Role reversal performance: comparison between groups



Again, when comparing the performance between groups, we can see that the rate values present a considerable difference. As observed in the turn taking performance, the values obtained by the ASD group are much lower than those obtained by the TD group. Moreover, the TD group presents a progression in role reversing across age, opposed to what we see in the ASD group, which can be deemed an invariable performance.

5. DISCUSSION

5.1. Analysis in TD group

5.1.1. Turn taking rate

Despite the large difference in performance in the first time slots, the most noticeable finding about the progress of turn taking competence is the overall increase of the rate number in every subject, which is in line with our third hypothesis. These findings appear logical, especially in a sample of typically developing children. One may argue that language competence at all levels is expected to increase, and that children gradually master language competence over time. Thus, it might not be a surprising finding to see that turn taking competence rates increase in all subjects. Moreover, these results might confirm the children's typically developing pattern of language acquisition.

Nevertheless, it is unclear why children show such difference in performance in the earlier time slots. Two main reasons could explain this finding.

On the one hand, this might be explained by the tendency for children to show more variance in the early stages in turn taking acquisition, and then converge later in their communicative behavior. Moreover, the communicative environment of some children in certain time slots involved more than one adult, and in others, only one adult. The number of adults present in the session is relevant for the rate number, since we take both the questions received and the replies into account. Thus, if more than one adult asks questions to the target child, this may have an effect on the number of replies. Multiple questions from multiple speakers could have increased the rate number, since two different speakers capture the child's attention and subsequently the child could be more prone to reply to every new speaker. This would explain higher rates in turn taking. However, this process could also have instigated a decrease in the rate number because children may have been confused about whom they are supposed to reply to.

It is important to keep in mind that the lack of participants may create an increased likelihood of biased findings. If the sample was large enough, the performance would be equally distributed and the average performance rate would be more reliable. Thus, a clear pattern could be detected during the earlier time slots.

Overall, we can say that there is an existent pattern of acquisition from the 3rd time slot onwards, since the variation between subjects is reduced and the rate numbers are gradually stabilized.

5.1.2. Role reversing rate

As findings suggest, rate values in all participants during the first four time slots are close to 0, and in some cases, they are 0. This means that no question has been uttered by the child, which indicates that children infrequently take on the role of *questioner*. Values close to 0 (not if they are 0) also indicate a bigger difference between the times they are *questioners* and the times they are *repliers*. Thus, during the first four stages, children do act as *repliers* and take part in the turn taking system, but they have not figured out that they can also be *questioners* and initiators of the speech act. After the fourth stage, rate values show a mild increase, which means they start asking more questions, but still not enough to consider that their role reversing competence is close to an adult one, which would show rate values of almost 1 (the speaker takes the role of *questioner* as often as *replier*). Only at the last time slot, two of the subjects increase their role reversing rate. This gives reason to believe that this increase would continue if we had additional transcriptions at our disposal. It is likely that participants would have continued to score higher rate values, since they would have continued increasing the times they become *questioners*.

Nonetheless, overall, our results support the third hypothesis, since we found an increase in role reversing rates across time in all participants.

Performance between subjects also shows a lot of variance, and each subject seems to depict a different pattern. One of the reasons that could explain this finding is the possible differences in the communicative situations. The number of questions children ask, that is, the times they are *questioners*, depends strongly on which activity they are doing during the sessions. For example, children might ask more questions when being told a story than when being fed. What they were doing in each session was different across participants and even between time slots; therefore, in future studies, the communicative situations should be more similar across sessions.

5.1.3. Correct personal deixis rate

The figure depicting correct personal deixis rate does not show a progressive increase of the rate values, which means that there seems to be a jump in the development of personal deixis competence, albeit only in our sample. Rate values radically increase from 0 to 1, but there is not a single case where the value returns to 0 at a later time slot. Some participants already start with a rate value of 1 or very close to 1. Two main reasons could explain these findings.

Firstly, correct personal deixis production could be linked to the amount of language production. Language production increases with age in typically developing language acquisition patterns; thus, productions at early stages are lower than in later stages. Therefore, the less children speak, the less probability there is to make mistakes in their productions. In some sessions, if children produced a single personal deictic and this happened to be correct, they would score a rate value of 1. Therefore, the calculation of this rate is not sensitive enough to the amount of deictics produced. This should be taken into account in future studies, since scoring 1 in this rate out of one single personal deictic produced leads to a misrepresentation of their personal deixis performance.

Secondly, finding rate values of 1 from the first time slots could also mean that children start with the speech-role-referring hypothesis (Sharpless, 1974) from the beginning, at least when it comes to production. Nothing can be said about comprehension from our results, but in the transcriptions, children produced correct personal deictics embedded in expressions – which they most likely did not comprehend – as well as (possibly) understood personal deictics. This combination might have helped them settle for the speech-role-referring hypothesis, and this might be the reason why some of them already score 1 in their first session.

Regarding rate values of 0, two reasons can explain this finding: the subjects did not produce any personal deictic, leading to a null correct personal deictic value; or they started with the wrong hypothesis about shifting reference, which they would have radically – as opposed to progressively – abandoned whenever in the next session they would score 1 or almost 1. Once children score 1, that is, once they have figured out the right hypothesis about shifting reference, their performance on personal deictics is settled like the adult one, and no further mistakes in production or comprehension are expected.

5.1.4. Overview of the three variables

As the previous results of each rate individually were pointing at, we can say that there is an overall increase in all rates across time, which supports our third hypothesis. That means these three competences are mastered with age. The question remains whether the increase we found in our results is representative enough to depict the mastery of these competences, or if they should have been tested in closer time slots, for a longer time, and earlier.

Moreover, the values of each rate seem to be at a different scale: role reversing values are lower than turn taking values, and turn taking values are lower than correct personal deixis values. Nonetheless, as stated in the methodology (section 3.2.), we expected different values

for each rate, since each rate codes different competences which are also measured differently. As discussed in the previous section, a correct personal deixis rate is expected to reach a value of 1 whenever the child has the correct hypothesis for role shifting, whereas a child will rarely reach 1 in role reversing – meaning that he asks as many questions as he answers – because of the diversity of contexts and interlocutors.

If data from later stages would be available, we could see if these rates that represent competences become stabilized at some particular age, which would mean that their performance at that point is equal to the adult one.

5.1.5. Correlation between variables

Turn taking and role reversing competences show a significant positive correlation with age above 0.6, $p = 0.01$, which means that the older the children get, the better they perform in these two competences. Although the correlation coefficient is still not strong enough (<0.7), these results support again our third hypothesis.

The correlation between correct personal deictics and age is not strong enough. Therefore, we cannot claim that correct personal deictics production increases with age, which may sound counter-intuitive. What explains this finding is the fact that some children already started with a fully correct performance on personal deictics; therefore, there is no change across time in this competence.

Another interesting finding is the very low correlation between turn taking and role reversing competences, which challenges our first hypothesis. We expected these competences to be correlated, since we hypothesized that turn taking plays a role for the mastery of shifting reference in personal deictics. By "playing a role" we meant that turn taking would be a competence that enables the understanding of role shifting for both the correct comprehension and production of personal deictics. Nonetheless, our results point to the non-existence of a correlation, which means that these two competences might not influence each other, and that they are independent. Three main reasons could explain these findings.

First, it is possible that turn taking does not interact with role reversing competence whatsoever. Thereby, we could infer that our hypothesized relationship between these two variables could be discarded. Turn taking constitutes the context in which languages are learned. However, it is possible that children can understand, produce and comprehend shifting reference in personal deictics without turn taking competence. This could also happen

the other way round: despite a lack of understanding of shifting reference, children may still be competent in the turn taking system.

Second, the sample is too limited to represent a clear pattern of performance of these two competences. It is highly likely that data leads to biased results; therefore, it should be questioned whether the findings of this research indicate that turn taking does not play a role for the mastery of shifting reference.

Third, the methodology used in this project could be inadequate. This would mean that observed rates do not correctly represent the three competences. Different parameters should be taken into account to create more suitable measurements that are sensitive to other aspects of competences other than question answering and question asking, for example.

Nonetheless, it is noteworthy to point out that turn taking and correct deixis production do show almost a 0.5 correlation coefficient. This means that, to some extent, the more competence the child acquires in turn taking implies that more correct deictics are produced. With a larger sample, we could perhaps find even a stronger correlation between these two rates.

The fact that turn taking and correct personal deictics show a stronger correlation than turn taking and role reversing does not seem very logical, nor does the low correlation found between role reversing and correct deictic production. In order to produce correct personal deictics, role reversing competence has to be established (thus, understanding the shifting reference), and this should be a non-debatable claim. Otherwise, how would a child produce correct personal deictics without making mistakes? Thus, role reversing and correct personal deictics should show a positive correlation. Since this is not the case in our results, this might point to the third reason discussed above: role reversing rate does not represent role reversing competence accurately because of an inadequate methodology, which also explains why turn taking and role reversing are not correlated.

Moreover, we should also be able to compare rate values with adult performance, which were not available for the current research. If we had access to average adult rates, we could have interpreted the rate values and observed when the performance in the three competences is established in children.

To conclude, the results depicting correlation between variables do not necessarily support or deny our main hypothesis, but rather point to the fact that rate calculation should be reviewed. One way to improve rate calculation for future studies would be the following: for the correct personal deictics rate, we should only count correct personal deictics in questions,

but not in all the dialogue; for the other two rates, we should first study adult performance in turn taking and role reversing to see if they properly represent these two competences.

5.2. Comparison of TD and ASD subjects and groups

5.2.1. Turn taking performance: comparison between subjects

We can easily observe that variation in performance across subjects is higher in the ASD group than in the TD. This means that, at the time slots where both groups are video-taped, the turn taking competence of TD children is probably settled already, whereas that of ASD children is not; otherwise the pattern of acquisition would be much more predictable since performance would not be as variable. What can be concluded from these results is that turn taking competence in ASD is far from the adult performance at this stage of their mental development. The variability across subjects in ASD group can be taken as evidence for this claim. Nonetheless, this should be further analyzed at later stages, thus, when participants are older, to see if variability is reduced in older, compared to younger children with ASD.

5.2.2. Turn taking performance: comparison between groups

Findings support our second hypothesis. As predicted, rate values in turn taking are much lower in the ASD group than in the TD group. Language delay in ASD logically predicts less linguistic competences manifested in different linguistic levels, since their verbal mental age is lower. Nonetheless, this is the first study to point out the difference in turn taking competence between TD and ASD children.

It is also important to point out that rate values in the ASD group, although overall lower than in the TD group, also increase over time. These findings suggest that ASD children could reach the levels in turn taking of the TD group at later stages. Thus, if both groups were matched on verbal mental age, we would expect them to perform similarly in their turn taking competence.

5.2.3. Role reversing performance: comparison between subjects

Variation across subjects is higher in TD than in ASD. Nevertheless, this cannot be interpreted as a settled performance in role reversing in ASD. Role reversing performance – children realizing they can be *questioners* as much as *repliers* – has not even started, since most of the participants do not utter a single question in any of the sessions they are tested. The numerous null rates in ASD group results can be taken as evidence for this claim.

Concerning the variation in the TD group, we can see that each subject depicts a totally different pattern from the other subjects. These results suggest the following: role reversing competence at the four time slots cannot be summarized in one single pattern of acquisition. Alternatively, one could argue that, once again, results might be biased because of the small sample size. Perhaps with more subjects, results would depict a clearer trend of performance.

5.2.4. Role reversing performance: comparison between groups

As observed in the turn taking comparison between groups, role reversing performance also shows higher rates in TD than in ASD, which supports our second hypothesis.

What seems to be different with turn taking performance is that the ASD group does not show any relevant increase in their role reversing rate, which challenges the third hypothesis. Against our predictions, the delay in ASD group role reversing competence does not seem to be overcome by age, at least in the four time slots where children are tested.

Moreover, the mean role reversing rate in TD also presents a difference with the mean turn taking rate. The former seems to start being settled in these four time slots in view of the noticeable increase between the 3rd and the 4th time slots, whereas the latter seems to be already settled. This fact that would not support our main hypothesis, since we predicted that turn taking should be at the base of – or mastered before – role reversing competence. These findings suggest, again, that role reversing rate in our study does not code role reversing competence correctly.

6. CONCLUSION

The purpose of the present research was to enlarge and improve the methodological toolkit to study the acquisition of role reversing in personal deixis in populations where linguistic production is low or limited. We studied the importance of turn taking competence for the understanding of shifting reference in personal deixis in TD and ASD groups. We suggested that turn taking can be used as a new proxy for this purpose, despite the sample size, for several reasons. Firstly, our results showed a significant, though moderate, correlation between turn taking and correct personal deixis production. Secondly, the results comparing TD and ASD children pointed out that there is a difference in turn taking performance, if participants are matched by age. This suggests that differences between these two groups not only occur at a linguistic level, but also at a pre-linguistic one. Finally, we found that turn taking competence increases with age in both groups, as expected with any aspects involved in the language acquisition process.

Nonetheless, some results on role reversing competence were unexpected. First, role reversing rate did not show a correlation with any of the other two rates, namely turn taking and correct personal deixis. Second, the ASD group did not show an increase with age and the TD performance was rather inconsistent across participants. Overall, this suggests that the way this rate was calculated does not represent the role reversing competence accurately. Thus, methodology to measure role reversing competence should be reviewed for further studies.

To our knowledge, this has been the first study to point out the importance of turn taking competence for the understanding of shifting reference in personal deixis. Therefore, following from the present study, more research could be done with appropriate longitudinal data correlating turn taking with other proxies used in this field of study, such as pronoun production analysis.

In sum, despite the methodological restrictions, our research suggests that turn taking is at the very base of speech acts. Thus, if these promising results can be confirmed in future investigations, this may ultimately imply more attention to children's competence in turn taking. It can be a useful new proxy for studying and measuring the acquisition of role reversing competence and personal deixis production.

7. REFERENCES

Bartolucci, G., & Albers, R. (1974). Deictic categories in the language of autistic children. *Journal of Autism and Childhood Schizophrenia, 4*(2), 131-41.

Bates, E., Camaioni, L. & Volterra, V. (1975). The acquisition of performatives prior to speech. *MPQ* 21. 205-26.

Blume, C., & Herbert, C. (2014). The HisMine-Paradigm: A new paradigm to investigate self-awareness employing pronouns. *Social Neuroscience,* 1-11.

Bosch, G., & Jordan, D. (1970). *Infantile autism : A clinical and phenomenological-anthropological investigation taking language as the guide*. Berlin [etc.]: Springer-Verlag.

Bruner, J. (1975). The ontogenesis of speech acts. *Journal of Child Language, 2*(1), 1-19.

Charney, R. (1980). Speech Roles and the Development of Personal Pronouns. *Journal of Child Language, 7*(3), 509-28.

Charney, R. (1981). Pronoun errors in autistic children: Support for a social explanation. *British Journal of Disorders of Communication*, 15, 39–43.

Chiat, S. (1981). Context-specificity and generalization in the acquisition of pronominal distinctions. *Journal of Child Language, 8*(1), 75-91.

Chiat, S. (1982). If I Were You and You Were Me: The Analysis of Pronouns in a Pronoun-Reversing Child. *Journal of Child Language, 9*(2), 359-79.

Clark, E. V. (1977). From gesture to word: on the natural history of deixis in language

acquisition. In J. S. Bruner & A. Garton (eds), *Human growth and development*. (Wolfson College lectures, 1976.) London: O.U.P.

Clark, H., & Clark, Eve V. (1977). *Psychology and language: An introduction to psycholinguistics*. New York [etc.]: Harcourt Brace Jovanovich.

Clark, E., & Sengul, C. (1978). Strategies in the acquisition of deixis. *Journal of Child Language, 5*, 457.

Cooley, C. H. (1908). A study of the early use of self-words by a child. *PsychRev* 15. 339-57.

Dale, P., & Crain-Thoreson, C. (1993). Pronoun reversals: Who, when, and why?. *Journal of Child Language, 20*(3), 573-589.

Foulke, K., & Stinchfield, S. (1929). The speech development of four infants under two years old. *Journal of Genetic Psychology,* 36, 140-161.

Fay, W. H. (1979). Personal pronouns and the autistic child. *Journal of Autism and Developmental Disorders*, 9, 247–260.

Flavell, J. H. (1992). Perspectives on perspective taking. In H. Beilin & P. Pufall (eds), *Piaget's theory: prospects and possibilities*. Hillsdale, NJ: Erlbaum.

Frith, & De Vignemont. (2005). Egocentrism, allocentrism, and Asperger syndrome. *Consciousness and Cognition, 14*(4), 719-738.

García-Pérez, R. M., Lee, A., & Hobson, R. P. (2007). On intersubjective engagement in autism: A controlled study of nonverbal aspects of conversation. *Journal of Autism and Developmental Disorders*, 37, 1310–1322.

Garcí-Pérez, R. M., Lee, A., & Hobson, R. P. (2008). Narrative roletaking in autism. *Journal of Autism and Developmental Disorders*, 38, 156–168.

Halliday, M. (1975). *Learning how to mean : Explorations in the development of language* (Explorations in language study 820408603). London: Edward Arnold.

Hobson, R. P. (1990). On the origins of self and the case of autism. *Development and Psychopathology*, 2, 163–181.

Hobson, R. P. (1993). *Autism and the development of mind*. Hove, Sussex: Lawrence Erlbaum.

Hobson, R. P., Lee, A., & Hobson, J. A. (2007). Only connect? Communication, identification, and autism. *Social Neuroscience*, 2, 320–335.

Hobson, R. Peter, Lee, Anthony, & Hobson, Jessica A. (2009). Personal Pronouns and Communicative Engagement in Autism. *Journal of Autism and Developmental Disorders, 40*(6), 653-664.

Hobson, R. Peter, Garcia-Perez, Rosa M., & Lee, Anthony. (2010). Person-Centred (Deictic) Expressions and Autism. *Journal of Autism and Developmental Disorders, 40*(4), 403-415.

Huxley, R. (1970). The development of the correct use of subject personal pronouns in two children. In G. B. Flores d'Arcais & W. J. M. Levelt (eds), *Advances in psycholinguistics.* Amsterdam: North-Holland.

Jespersen, O. (1922). *Language: its nature, development, and origin.* London: Allen & Unwin.

Kaye, K. (1979). Thickening thin data: the maternal role in developing communication and language. In M. Bullowa (ed.), *Before speech.* Cambridge: C.U.P.

Levelt, W. (1989). *Speaking : From intention to articulation* (ACL-MIT Press series in natural-language processing). Cambridge, Mass. [etc.]: MIT Press.

Levinson, S. (2016). Turn-taking in Human Communication – Origins and Implications for Language Processing. *Trends in Cognitive Sciences, 20*(1), 6-14.

Lewis, M., & Ramsay, D. (2004). Development of self-recognition, personal pronoun use, and pretend play during the 2nd year. *Child Development, 75*(6), 1821-1831.

Leopold, W. F. (1949). *Speech development of a bilingual child* (4 vols.). Evanston, Illinois: Northwestern University Press.

Livingston, & Happé (2017). Conceptualising compensation in neurodevelopmental disorders: Reflections from autism spectrum disorder. *Neuroscience and Biobehavioral Reviews, 80*, 729-742.

Loveland, K. A. (1984). Learning about points of view: spatial perspective and the acquisition of `I/you'. *Journal of Child Language* 11.3 (1984): 535-56. Web.

Loveland, K., & Landry, A. (1986). Joint attention and language in autism and developmental language delay. *Journal of Autism and Developmental Disorders, 16*(3), 335-349.

MacWhinney, B. (2005). The emergence of grammar from perspective. In: Pecher D, Zwaan RA, editors. *Grounding cognition: the role of perception and action in memory, language and thinking*. Cambridge: Cambridge University Press; 2005.

Mastrogiuseppe, M., Capirci, O., Cuva, S., & Venuti, P. (2015). Gestural Communication in Children with Autism Spectrum Disorders during Mother-Child Interaction. *Autism: The International Journal of Research and Practice, 19*(4), 469-481.

Mattison, R., Cantwell, E., & Baker, D. (1980). Dimensions of behavior in children with speech and language disorders. *Journal of Abnormal Child Psychology*, *8*(3), 323-338.

McNeill, D. (1963). The psychology of *you* and *I:* a case history of a small language system. Paper presented at APA Symposium on Child Language: Structural Aspects, August 1963.

Miller, G. (1990). The Place of Language in a Scientific Psychology. *Psychological Science, 1*(1), 7-14.

Mizuno, A., Liu, Y., Williams, D., Keller, T., Minshew, N., & Just, M. (2011). The neural basis of deictic shifting in linguistic perspective-taking in high-functioning autism. *Brain, 134*(8), 2422-2435.

Morford, J., & Goldin-Meadow, S. (1997). From Here and Now to There and Then: The Development of Displaced Reference in Homesign and English. *Child Development, 68*(3), 420-435.

Oshima-Takane, Y. (1988). Children learn from speech not addressed to them: the case of personal pronouns. *Journal of Child Language* 15, 95-108.

Oshima-Takane, Y. (1992). Analysis of pronominal errors: a case study. *Journal of Child Language* 19, 111-31.

Oshima-Takane, Y. (1999). The learning of ªrst and second person pronouns in English. In R. Jackendoff, P. Bloom, and K. Wynn, eds., *Language, logic, and concept: Essays in memory of John MacNamara.* Cambridge, MA: MIT press.

Özçaliskan, S., Adamson, L. B., & Dimitrova, N. (2016). Early Deictic but "Not" Other Gestures Predict Later Vocabulary in Both Typical Development and Autism. *Autism: The International Journal of Research and Practice, 20*(6), 754-763.

Ricard, M., Girouard, P., & Dcarie, T. (1999). Personal pronouns and perspective taking in toddlers. *Journal of Child Language, 26*(3), 681-697.

Rutter, M., Bartak, L., & Newman, S. (1971): Autism - a central disorder of cognition and language? In M. Rutter (Ed.), *Infantile autism: Concepts, characteristics, and treatment.* London: Churchill.

Ryan, J. (1974). Early language development. In M. P. M. Richards (ed.), *The integration of the child into a social world.* Cambridge: C.U.P.

Sacks, H., Schegloff, E., & Jefferson, G. (1974). A simplest systematics for the organization of turn-taking for conversation. *Language, 50*(4), 696-735.

Salomon, R., Malach, R., & Lamy, D. (2009). *Involvement of the Intrinsic/default System in Movement-related Self Recognition*.

Sharpless, E. (1974). Children's acquisition of person pronouns. Unpublished Ph.D. dissertation, Columbia University.

Shipley, E. F. & Shipley, T. E. (1969). Quaker children's use of *thee:* a relational analysis. *JVLVBS.* 112-17.

Sparrow, Balla, & Cicchetti (1984): Vineland Adaptive Behavioural Scales. A measure of adaptive behavior from birth to adulthood.

Stivers, T., Enfield, N., Brown, P., Englert, C., Hayashi, M., Heinemann, T., . . . Levinson, S. (2009). Universals and cultural variation in turn-taking in conversation. *Proceedings of the National Academy of Sciences of the United States of America,106*(26), 10587-92.

Sully, J. (1894). Studies of childhood. *The Popular Science Monthly* (1872-1895), 65, 323.

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

Tager-Flusberg, H., Rogers, S., Cooper, J., Landa, R., Lord, C., Paul, R., . . . Yoder, P. (2009). Defining Spoken Language Benchmarks and Selecting Measures of Expressive

Language Development for Young Children With Autism Spectrum Disorders. *Journal of Speech, Language, and Hearing Research, 52*(3), 643-652.

Tanz, C. (1976). The acquisition of deictic terms. Unpublished Ph.D. dissertation, University of Chicago.

Tomasello, M. (2009). Constructing a language. Harvard University Press.

Varlokosta, S., Belletti, A., Costa, J., Friedmann, N., Gavarró, A., Grohmann, K., . . . Yatsushiro, K. (2015). A Cross-Linguistic Study of the Acquisition of Clitic and Pronoun Production. *Language Acquisition, 23*(1), 1-35.

Van der Geest, T. (1975). *Some aspects of communicative competence and their implications for language acquisition.* Amsterdam: van Gorcum.

Vierkant, T. (2012). Self-Knowledge and Knowing Other Minds: The Implicit/Explicit Distinction as a Tool in Understanding Theory of Mind. *British Journal of Developmental Psychology, 30*(1), 141-155.

Wechsler, S. (2010). What "You" and "I" Mean to Each Other: Person Indexicals, Self-Ascription, and Theory of Mind. *Language, 86*(2), 332-364.

Werner, H. & Kaplan, B. (1963). *Symbol formation.* New York: Wiley.

Wuyun, Gaowa, Shu, Min, Cao, Zhijun, Huang, Wei, Zou, Xin, Li, Sheng, . . . Wu, Yanhong. (2014). Neural Representations of the Self and the Mother for Chinese Individuals. *PLoS ONE, 9*(3), E91556.