When do children begin to understand third person pronouns and do older siblings influence this comprehension?

Catherine Watson

Supervised by: Dr Kerstin Meints

March 2010

When do children begin to understand third person pronouns and do older siblings influence this comprehension

ABSTRACT

Previous literature has indicated that children with older siblings acquire pronouns more easily than first-born children. However, it has previously been assumed that children only begin to comprehend pronouns around the age of 3 to 5 years but this is due to the cognitive effort required by participants in the tasks used. This current study attempts to offer an age-appropriate methodology, combining preferential looking and eye-tracking, to test 2 and 3-year-olds' comprehension of the third person pronouns *him* and *her*. Looking behaviour towards the target and distracter stimuli indicated that both 2 and 3-year-olds were unable to comprehend *him* and *her* and birth position in the family had no effect on comprehension. It is suggested regardless of methodology, 2 and young 3-year-olds are not able to comprehend the third person pronouns *him* and *her*, supporting the notion comprehension is preceded by production. The combined methodology used here needs further validation, by testing older children, in order to help confirm its usefulness for measuring pronoun comprehension. Further research is needed to investigate the effect of having an older sibling on pronoun comprehension, as literature focuses predominantly on production. This will assist in the identification of language impairment and social difficulties.

KEY WORDS:	THIRD PERSON PRONOUNS	COMPREHENSION	SIBLINGS	PREFERENTIAL LOOKING	EYE-TRACKING

Introduction

The use of a particular pronoun is dependent upon the context it is used (Moore, 2001). This is affected by who the pronoun represents in terms of gender and the number of people involved (Moore, 2001). Who is speaking and who is or is not being spoken to also affect which pronoun is used (Oshima-Takane and Derat, 1996). For example the first person pronoun *I* refers to the speaker and the second person pronoun *you* refers to the individual the speaker is addressing (Oshima-Takane, 1988). Furthermore, grammatical influences such as a pronoun's role in the sentence can consequently affect the pronoun's case (Moore, 2001). Lastly, pronouns are not stable and consistent because they replace nouns and refer to different people at different times (Campbell, Brooks and Tomasello, 2000). As Oshima-Takane and Derat (1996) explain one person can be referred to using different pronouns depending upon all the factors mentioned above. This makes the acquisition of pronouns an interesting area of language development as it indicates a child's understanding of difficult linguistic rules concerning speech roles and how these roles influence which pronoun is used (Oshima-Takane and Derat, 1996). In addition, the study of pronoun acquisition also highlights the ability to deal with language which is unclear in the sense of whom it refers to (Arnold, Novick, Brown-Schmidt, Eisenband and Trueswell, 2001). This contrasts with other word classes such as nouns and verbs, which referents remain constant (Smiley and Johnson, 2006).

Pronoun acquisition has been shown to play a vital role in children's development of lexical formations such as transitive sentences (Childers and Tomasello, 2001). These involve an agent, in the subject position, acting upon a patient in the object position and this leads to a patient's state to change, for example '*she's* pushing *him*' (Childers and Tomasello, 2001). 30-month-olds in Childers and Tomasello's (2001) study who were given transitive utterances to listen to containing both pronouns and nouns were more likely to produce transitive sentences than those who were given utterances to listen to containing nouns only. In transitive utterances pronouns are more likely to appear in a particular place in the sentence either as the subject or object in comparison to nouns. These patterns can be learnt by children and aid their development of lexical formations (Childers and Tomasello, 2001).

Another important input of language is that from older siblings (Pine, 1995, Oshima-Takane, Godz and Derevensky, 1996). Jones and Adamson (1987) state children with older siblings often receive less language input directed to them than first-born children, as caregivers' attention is also directed at the child's older sibling. Nevertheless, as Oshima-Takane and Robbins (2003) explain, children with older siblings have different linguistic arenas than first-born children because they have the added language input of more linguistically complex conversations between their older siblings and caregivers. Discourse between caregivers and siblings is particularly useful as it is simpler and perhaps more relevant to the child than conversation between adults (Oshima-Takane et al., 1996), therefore a child may be more likely to attend to this speech (Oshima-Takane, 1988). Dunn and Shatz (1989) observed children at home and found between the ages of 24 and 36 months that they made intrusions, with a relevant utterance, into conversations between caregivers and siblings. This suggests children attend to and take action upon speech which is not directed to them, shown in the conversations between older

siblings and caretakers (Dunn and Shatz, 1989). Barton and Tomasello (1991) observed children as young as 19 and 24 months of age would respond to speech from their caregiver to a sibling just as often as when a caregiver was talking to them. This study shows that very young children are able to comprehend speech which is addressed to other people and not them (Barton and Tomasello, 1991).

This input of sibling and caretaker conversation may have an effect on the speed and order of language acquisition (Oshima-Takane and Robbins, 2003), including pronoun acquisition as shown by Pine (1995). Pine (1995) found children with an older sibling produced more pronouns in up to their first 100 words than first-born children but were slower than first-borns to reach a 100 word vocabulary. Contrastingly, Oshima-Takane et al. (1996) did not find a difference in overall language development between the eldest child and the second born child in the family but there was a significant difference in children's first and second pronoun production. As with Pine (1995), second born children showed better levels of pronoun production than the eldest child when observed at 21 and 24 months. Oshima-Takane et al. (1996) argue that second-born children benefit in their pronoun acquisition from overhearing conversations between their parents or guardians and their siblings.

This greater exposure to overheard speech for second-born children is seen as significant because it provides language input which is not solely directed at the child (Oshima-Takane et al., 1996). Speech directed at the child does not enable a child to learn the correct use of pronouns because for example, the second person pronoun *you* does not always refer to the child (Oshima-Takane, 1988). Consequently, this early comprehension of overheard speech can lead to useful language input which allows a child to become aware of how speech roles and pronouns relate to each other (Oshima-Takane, 1988, Oshima-Takane et al. 1996). This is particularly important when learning third person pronouns which typically involve an individual who is not part of the discourse. Oshima-Takane et al. (1996) found that children with an older sibling were exposed to more pronouns than first-born children, through discourse between their parent and siblings, than they were in their own dyadic conversations with parents. By overhearing parent and sibling conversations the child is also able to learn that third person pronouns can also refer to themselves when they are not part of the conversation. This is not possible in parent-child interactions alone. Previous literature has tended to investigate language development of the eldest children and therefore has concentrated on speech directed towards the child, thus ignoring the influence on language acquisition of overheard speech (Pine, 1995).

When children first comprehend pronouns is an important area of study especially when considering pronouns relevant to speech roles. This is because comprehension of pronouns is imperative for spoken communication between children and their caretakers (Brener, 1983). The acquisition of pronouns has been shown to be associated with other developmental abilities than just communication. For example, in terms of pretend play in children aged 15 to 24 months (Lewis and Ramsay, 2004) and in social interaction such as sharing during a child's third year (Hay, 2006). Hay (2006) observed children aged 18, 24 and 30 months old interacting with a peer and found children who used possessive pronouns at 18 months of age were more likely to share items with their peer at 24 months of age

(Hay, 2006). Additionally, as Hay (2006) explains, pronouns are often produced with a verb such as *want* to indicate the desire of an item and therefore can help children understand their own and others' motivations. These factors can benefit their social relations and enable an understanding of other people (Hay, 2006). This shows pronouns are not merely a linguistic tool. Pronouns are also interrelated with a child's social and cognitive development particularly in understanding other people's perspectives, the development of a theory of mind (Ricard, Giroud and Gouin Decarie, 1999), self-recognition (Lewis and Ramsay, 2004) and understanding of the self (Smiley and Johnson, 2006). Young children's use of pronouns may give an indication of their social cognitive abilities and understanding of others before it is evident on performance of theory of mind tasks (Campbell, et al., 2000).

Campbell et al., (2000) argue children aged between 30 months and 42 months are able to understand other people's knowledge states. This was shown by children at this age being aware of the effects of whether another person witnesses the event. Together with the differences in knowledge of an individual who asks a general question about an event such as "what's happened?" and a more precise question such as "what did the actor involved in the event do?" (Campbell et al., 2000). Use of a pronoun was more likely than a null reference when asked a general question about an event which does not contain any referents. This is because a child is aware a referent must be indicated if not present in the question and therefore unknown to the questioner (Campbell, et al. 2000).

Although pronoun acquisition has been shown to be associated with an understanding of other people (Campbell et al. 2000), Hay (2006) noted how children in his study used first and second person pronouns but no third person pronouns, when interacting with a peer. These results suggest participants only recognised those involved within their own discourse. Furthermore, this supports the idea that third person pronouns are said to be acquired after first and second person pronouns (Brener, 1983, Perex-Pereira, 1999). However, this was not the case for Girouard, Ricard and Decarie (1997) who found children aged between 18 months and 46 months comprehended third person pronouns at the same time as first and second person pronouns. Nevertheless, first person pronouns were produced before second and third person pronouns.

This assumption that third person pronouns are acquired later than first and second person pronouns has been made on the basis of production rather than comprehension. The difference between production and comprehension is important as Hendricks and Spenader (2005) discuss the two abilities develop at different rates, therefore findings concerning production are not applicable for comprehension of third person pronouns.

Scholes (1981) tested third person pronoun comprehension of 3 to 7-year-olds using a picture verification task. Children were able to comprehend gender in the single form such as *he* or *she* before case and number. 3-year-olds showed 59.7% accuracy and 7-year-olds displaying 90% accuracy in all trials. These results may be explained by the ambiguous line drawings used in Scholes' (1981) study which do not look typical and this may have affected younger children's performance on the task. The use of a more true to life representation of a male and a female would

have been more useful to measure comprehension of third person pronouns such as photographs or video clips.

Brener (1983) carried out further research into third person pronoun comprehension and concluded that third person pronouns are acquired after first and second pronouns. When identifying the third person pronoun, children found it easier if the speaker matched the gender of the individual representing the correct third person pronoun. Furthermore, children found it more difficult to identify the third person pronoun if the addressee was the same gender as the correct individual representing the third person pronoun (Brener, 1983). Brener (1983) argues that children of this age picked the speaker if he or she was the correct gender of the third person pronoun because their attention was drawn to the individual speaker. They did not have the understanding that a speaker cannot take the role of a third person pronoun. It would be useful therefore when testing third person pronoun comprehension of younger children to use the voice of a speaker to direct children to the correct individual without the speaker being visible and thus drawing the child's attention. Brener (1983) indicates children comprehend third person pronouns at a later age because adults frequently use proper nouns instead of third person pronouns to simplify language for their children. Additionally, when children finally understand the roles and non-participation of individuals in a conversation, this will allow full comprehension of all pronouns (Brener, 1983).

Along with errors concerning discourse participant roles as shown in Brener's (1983) study, children often make errors involving pronoun case (Rispoli, 1994, 1998). Moore (2001) tested children with a language impairment consisting of one year language production delay. These children were compared with younger children with a mean age of 40 months who had a similar level of language development and older children with a mean age of 54 months which was the same mean age as the participants with language impairment. Results indicated that the most frequent pronoun production errors in young children and children with a language impairment were the replacement of an objective case pronoun such as *him* and *her* with a nominative pronoun case such as *he* or *she*. Younger children and children with a language impairment produced *her* instead of she more times than *him* instead of *he* and made more errors with *she* than with *he*. This suggests a specific difficulty with the cases of the feminine pronouns (Moore, 2001).

This type of pronoun case error where the nominative form is replaced by the objective form is the most common children make, particularly the use of the objective *her* for the nominative *she* (Rispoli, 1998). Rispoli (1994, 1998) explains how this is the most common pronoun error using his paradigm building approach which involves children learning the number, gender, case and phonological rules of each English pronoun. These pronouns are separated into 'cells' which create paradigms for first, second and third person pronouns (Rispoli, 1994, 1998). For example the third person paradigm would contain 'cells' for *he, she, they, him, her, them, his, her, their* and *it* (Rispoli, 2005). As children learn the rules of how to use pronouns in a particular paradigm, these 'cells' become more accessible to the children in turn (Rispoli, 2005). The third person pronoun *her* is in two 'cells' of the paradigm as it can be used in the objective and genitive case (Rispoli, 1998). For example, in the objective case "She's chasing *her*" and the genitive case "*her* shoes." Rispoli (1998, 1999) argues that as *her* features twice in the pronoun

paradigm, *her* is more easily retrieved than *she*, hence leading to the use of *her* instead of *she* as the strength of the retrieval of *her* is too great to prevent. This is known as the double cell effect (Rispoli, 1998, 1999). This model was supported by Rispoli's (1998) study of children between 30 months and 48 months of age who produced *her* instead of *she* 49% of the time when *she* would be the appropriate pronoun whilst observed playing, reading and looking at photographs with their caregiver. When the pronoun he was appropriate, children only used the objective *him* 11% of the time. Consequently, children made significantly more pronoun case errors when using *her* for *she* than with *him* for *he*.

Pronoun case errors provide a way of measuring pronoun understanding (Rispoli, 1998). Establishing when children understand pronouns and in which order pronouns are learnt, aids indication of language impairment (Moore, 2001). If measurement and identification of normal pronoun acquisition at an early age can be achieved, this will enable earlier intervention in language impairment, leading to a more effective intervention for language impairments (Moore, 2001). There is a tendency in the literature to report pronoun acquisition at around 3 years of age, with an apparent lack of research into pronoun acquisition below this age. For example, Moore (2001) describes her younger group of normally developing participants in her study, who had a mean age of 40 months as still "mastering their pronoun systems" (Moore, 2001, p. 223).

The assumption that pronoun acquisition is achieved around 3 years (Moore, 2001) may be based predominantly on production data. Hendricks and Spenader (2005) argue that production and comprehension give very different portrayals of when children acquire pronouns and so should be treated independently. Children are able to produce pronouns in the right way from between 2 and 3 years. Comprehension data, however, indicates children cannot understand pronouns until around 6½ years (Hendricks and Spenader, 2005). Hendricks and Spenader (2005) argue this difference between fully accomplished production and comprehension is due to comprehension requiring children to be aware of both the potential pronouns that could have been given by the speaker and also the child's own options of pronoun choice in their understanding of what is said. Hendricks and Spenader (2005) term this as optimal bidirectionality where the child must have:- his or her own comprehension of the pronoun, an understanding of how other potential pronoun options should be discounted and an awareness of the speaker's options when deciding which pronoun to produce. This extra cognitive effort is not required in production and therefore is the cause of the delay in pronoun comprehension compared to production, according to Hendricks and Spenader (2005).

However, this apparent delay in comprehension may be an outcome of methodological weaknesses in comprehension tasks. These tasks require cognitive effort such as acting out tasks (e.g. Childers and Tomasello, 2001) which may not be suitable for children of younger ages who have not fully developed adult-like cognitive skills and thus could be detrimental to performance (Hendricks, 2010). This could lead to an inaccurate interpretation of when children begin to understand pronouns.

One of the comprehension tasks carried out by Ricard et al. (1999) to measure understanding of first, second and third person pronouns involved the experimenter

placing a raisin under one of three boxes. These boxes were labelled with a photo of either the experimenter to represent me, the caregiver to represent you and the child to represent *him* or *her*. The experimenter then told the caregiver that the raisin was under the picture of *me, you,* or *him* or *her* depending upon the child's gender and the child then had to find the raisin. This task relies on photographs representing the pronouns which may be confusing to young children because the individuals in the photos are present too. Ricard et al. (1999) explain that a look towards the child was made when saying *him* or *her* to make the statement more true to life. However, sometimes the third person is used when the referred to individual is not present or is not aware that they are being discussed, thus this may not be particularly realistic. Finally, Ricard et al. (1999) admit that their hiding task could only be used when participants reached 24 months of age. This shows these types of comprehension tasks may not be suitable for young children as they demand complex cognitive ability and are not always representative of the way pronouns are used in real life contexts. Furthermore, these tasks involve offline comprehension that fail to give an understanding of the comprehension process as it takes place in contrast to online processing tasks (Trueswell, Sekerina, Hill and Logrip 1999). Performance on pronoun comprehension tasks have shown to differ depending upon whether the tasks measure online or offline processing (e.g. Love, Sekerina, Stromswold and Hestvik, 2004). Consequently, offline tasks may not produce a true or insightful impression of comprehension abilities as they do not incorporate the ongoing processes involved within comprehension (Trueswell et al., 1999).

Sekerina et al. (2004) gave 4 and 7-year-olds pictures of sentences showing an action carried out by a boy, representing the action carried out to *himself*, and an accompanying picture showed the boy's action carried out to another male character, representing *him*. When asked to point to the correct representation of the sentence, children would more frequently point to the picture displaying the boy who had been previously mentioned in the sentence even if this was incorrect. However, when eye-tracking measures were used and therefore an online task was employed, children did look at the individual representing *him* when this was the correct representation. This study shows the benefit of the eye-tracking method which enables a greater understanding than offline tasks of the step by step comprehension processes involved. Offline tasks show merely the outcome of these processes. In comparison, eye-tracking permits investigation of processes which participants may not be consciously aware of (Sekerina et al., 2004). Children were slower than adults to consider the referent not previously mentioned, as shown by their eye movements. The eye-tracking method therefore also allows the developmental progression of comprehension processes throughout childhood (Sekerina et al., 2004).

Arnold, Novick, Brown-Schmidt, Eisenband and Trueswell (2001) also used eye-tracking to investigate pronoun comprehension and argued that the order of when a character was referred to was a less important factor than gender in children's understanding of pronouns. This is because gender has a categorical basis, where as order of mention of individuals only leads to a possibility rather than a certainty that the first individual mentioned is who the pronoun refers to. Children would have to learn the fairly complex association that first mentioned characters may be more significant to what is being spoken about than other individuals mentioned. Consequently, children may be more likely to use gender as a more certain cue in

understanding pronouns (Arnold et al. 2001). Arnold et al. (2001) used an eye-tracker to record looking behaviour as children were told a story with accompanying pictures. The results suggested that 5-year-olds use gender as an important cue to aid in the comprehension of pronouns rather than order of mention of individuals in a story (Arnold et al., 2001).

Arnold et al. (2001) explain discrepancies throughout the literature of children's early acquisition of pronouns may be caused by methodologies which interrupt the online processes involved in pronoun comprehension. Eye-tracking techniques allow an insight into how children process language input online without disrupting these processes (Arnold et al. 2001). This methodology also allows the identification of the role of factors such as semantics or syntax plays in pronoun comprehension and how understanding can change as the language input progresses (Trueswell et al., 1999). Consequently, this shows children's ability in dealing with the uncertainty of language and clearly pinpoints when and how clarity is achieved (Sekerina et al., 2004).

Unlike Arnold et al. (2001), Trueswell et al. (1999) found children tended to assume the individual referred to first will be referred to later in the discourse. Using an eye-tracking method, Trueswell et al. (1999) showed 5-year-olds did not have the ability to change their first understanding of a referential sentence as it progresses. This is known as the kindergarten path effect (Trueswell et al., 1999).

Song and Fisher (2005) found a similar result as Trueswell et al. (1999), through the use of another type of online comprehension task. This involved the employment of a preferential looking task to test 3-year-olds' ability to comprehend pronouns. Participants were given short story sequences to watch. The individual, who was named first in the story, would either remain the subject of the last sentence or instead the subject became the other individual in the story and the individual in the last sentence was referred to using a noun or pronoun. Children were presented with two pictures representing two versions of the last sentence of the story. Children's looking behaviour indicated whether they looked at the target and therefore understood who the subject of the sentence was even if the individual had been referred to using a pronoun. Song and Fisher (2005) suggest that the more dominant an individual was in the story, the more likely a pronoun referring to this individual was comprehended.

Song and Fisher (2007) replicated their 2005 study, slightly simplifying the stories used, with 2½-year-olds. 2½-year-olds, as did 3-year-olds, used the subject of the first sentence of the story, the previous discourse and the dominance of a character as the story progressed to interpret a pronoun (Song and Fisher, 2007). Song and Fisher (2007) show that children below the age of 3 years can comprehend third person pronouns in contrast to Moore (2001) and Hendricks and Spenader's (2005) theory of optimal bidirectionality.

Due to the successful application by Song and Fisher (2005, 2007) of looking preference tasks and the use of eye-tracking (Arnold et al. 2001), this current study will aim to be the first to combine both methodologies using an Intermodal Preferential Looking (IPL) task (Meints, Plunkett and Harris, 1999, 2008) and eye-tracking to test pronoun comprehension. A vast proportion of research which

discusses pronoun acquisition, including that of third person pronoun acquisition not only tends to concentrate on production but as Hendricks and Spenader (2005) highlight, there can be a difference in performance between production and comprehension. Furthermore, comprehension tasks tend to study individuals aged 3-5 years and older (e.g. Moore, 2001, Arnold et al. 2001, Scholes, 1981). This focus on the older age groups is an artefact of age-inappropriate methodology for children younger than this age group. This study attempts to use this combined eye-tracking and IPL (Meints et al., 1999, 2008) to provide a more accurate indication of when children truly start to comprehend third person pronouns.

Gender of an individual appears to be an important factor for pronoun comprehension of young children (Brener, 1983, Arnold et al. 2001) and therefore this study will investigate this further with children in the younger age groups of 2 and 3-year-olds. Comprehension of the pronouns *him* and *her* will be tested as they have received less attention in the literature than *he* and *she* (e.g. Song and Fisher, 2005, 2007). The preferential looking task will consist of two simultaneous video clips with each containing two actors carrying out actions and will be displayed on the Tobii eye-tracker screen. Accompanying audio prompts including a transitive sentence will direct the child to look at one of the two simultaneously presented video clips. For example: *"*Look! She's chasing *her!"* This would accompany the two visual stimuli representing the transitive sentences "she's chasing *her*" and "she's chasing *him*." Transitive utterances have been chosen as children aged 2-3 years have shown they are able to understand these types of utterances (Childers and Tomasello, 2001) and do not depend on children's abilities to remember previous discourse as in Song and Fisher (2005, 2007) and Arnold et al. (2001).

The agent of each transitive sentence will always be *she*. *She* will be used in relation to both *him* and *her*. This was chosen as young children of around the age used in this study (2 and 3-year-olds) have shown to make a large amount of errors with the pronouns *she* and *her* (Rispoli, 1998). The nominative *he* was not used, firstly as children tend to show fewer problems in comprehending *he* due to children being exposed to *he* at a high frequency (Rispoli, 1998, Childers and Tomasello, 2001). Secondly, *he* was not included due to time constraints in creating further stimuli and to ensure a smaller number of trials for children to attend to. Consequently, if children show comprehension of *her* and *him*; this will be in despite of children of similar age showing difficulty with learning the difference between *she* and *her* (Rispoli, 1998).

It is predicted 24-month-olds and 36-month-olds will comprehend the third person objective case pronouns *him* and *her*. This will be displayed through participants' longest look and total looking being directed to the target more than the distracter stimulus once the target has been named than before naming.

Data on participants' siblings in terms of whether siblings are older or younger and will also be collected to see if older siblings do play a role in pronoun comprehension in line with Pine (1995) and Oshima-Takane et al.'s, (1996) production data but with the focus here on third person pronoun comprehension. It is predicted children with older siblings will show better comprehension of the third person objective case pronouns *him* and *her* than those without older siblings. This is because those with older siblings have more opportunity than first-born children to overhear pronouns in

the conversations between their caretakers and older siblings (Oshima-Takane, 1988).

Method

Participants

Participants attended three nurseries and a Parent and Toddlers group in Lincolnshire and Nottinghamshire, UK who had previously agreed to take part. Twelve 24-35-month-olds (*M* = 27.08, SD = 2.10, 4 female and 8 male) and twelve 36-47-month-olds (*M* = 39.80, SD = 1.80, 9 female and 3 male) were tested, after seven children were excluded from the analysis due to inadequate looking at the stimuli in the pre-naming phase. Twelve children were first-born and twelve had at least one older sibling. The participants' native language was British English and they did not speak or were not spoken to in any other language. Parental consent was obtained before testing and parents completed a checklist based on Lincoln Infant Communicative Development Inventory (CDI) adapted from Fenson, Dale, Reznick, Bates, and Thal's (1994) to indicate children's understanding of the words: *she, he, her and him*.

Materials and Equipment

Stimuli were presented using Intermodal Preferential Looking (IPL) (Meints, et al. 1999, 2008) on a Tobii X120 eye-tracker. This allows automatic tracking of looking preferences towards visual stimuli, when placed simultaneously alongside each other, thus indicating comprehension. In this case comprehension of the third person pronouns *him* and *her*.

Visual Stimuli

Two adult female and one adult male actor were filmed carrying out fourteen typical actions. These represented fourteen transitive sentences with the same female actor acting upon either another female actor or male actor in each video clip. The verbs in the sentence had been checked for frequency in spoken English (Leech, Rayson and Wilson, 2001). The actions are *biting, calling, chasing, hearing, hitting, hugging, kicking, kissing, leaving, pushing, seeing, smelling, tickling and washing*. Frequencies for these verbs were between 10 and 61 per million word tokens, except for *biting, tickling, chasing and hugging*. However, Meints (1999) when commenting on the Bristol Child Language Corpus (Wells, 1971-1985, cited in Meints, 1999) indicates both *bite* and *tickle* have high frequency in children's spoken English but this is not reflected on the basis of adult frequency counts. Consequently, both *biting* and *tickling* are appropriate to be included. All of the verbs, including *hugging* and *chasing* appear in Fenson, et al.'s (1994) CDI and have also been used in verb comprehension studies (e.g. Meints et al., 2008), which had previously been checked for frequency, with children as young as 18 months of age. Actions were edited using Studio Plus 10 to create 6000 msecs clips. All stimuli were 376 x 288 pixels and 25 frames/second.

Audio Stimuli

Accompanying audio stimuli, approximately 3000 msecs in length, aimed to direct participants to look at one of the two video clips, for example "Look! She's chasing *him*!" or "Look! She's chasing *her*!" This accompanied the two visual stimuli

representing the transitive sentences “he’s chasing *him*” and “he’s chasing *her*.” Audio clips were recorded on the same day to ensure consistent production patterns of the female speaker. “Look” was recorded separately and copied into each audio stimulus to ensure similarity, with 2500 msecs between the offset of “Look!” and the onset of “*him*” or “*her*.” The audio clips were edited to ensure head and tail clicks were removed using Cool Edit Pro.

Experimental Design

Participants were then presented with the fourteen experimental trials. For each trial, participants were shown two stimuli, one on the left and one on the right of the Tobii X120 eye-tracker screen, with a 10cm space between them. The same female actor carried out the same action simultaneously in one clip towards the other female actor and in the other clip towards the male actor. One video clip was the target stimulus as directed by the audio stimulus, the other video clip was the distracter. Each trial lasted for 6000msecs, with the onset of the audio clip beginning with “Look!” at 500msecs after the start of the trial when the video clips began. The onset of the target word *him* or *her* was at 3000msecs. This ensured that both pre-naming and post-naming stages were equal in length (3000msecs). The side of presentation of the female-female clip and female-male clip and the target (*him* or *her*) for each action were counterbalanced; female-female and female-male clips and the target clip were shown equally on the left and right. For each verb half the participants had the target as *him* and the other half had *her* and therefore for each participant there was an equal number of *him* and *her* target stimuli. Consequently, four versions of the experiment were created.

Procedure

The children were asked if they wished to see some pictures on the computer of people doing some things. If the participant agreed he or she was seated on their parent’s or a nursery assistant’s lap, in a position suitable to ensure that their eyes were detected by the Tobii eye-tracker. The parent or nursery assistant was asked to close his or her eyes, move as little as possible and not direct the child in any way which may influence their looking behaviour.

Each participant was subject to the five point calibration process in which they were required to follow with their eyes a blue dot, as it moved around the eye-tracker screen. Participants were subject to recalibration, if any points were missed to ensure their eyes were fully detected at all five points.

When successful calibration had been achieved the experimental trials began. Before each trial, a red ‘splat’ shape and audio of chimes, if necessary, were used to gain attention and ensure that the child was looking at the centre of the screen. After testing participants were thanked for their participation.

Data Collection and Analysis

Preferential looking tasks such as IPL (Meints et al., 1999, 2008) are based on the premise that if participants comprehend the target word they will look at the target stimulus once the target is named (Golinkoff, Hirsh-Pasek, Caulcy and Gordon, 1987; Meints et al., 1999, 2008). The eye-tracker allowed automatic tracking and calculation of looking behaviour. Trials were separated into two stages: the pre-naming and post-naming stages which were before and after respectively the onset

of the target word *him* or *her* at 3000msecs as used by Meints et al. (1999, 2008). Looking behaviour was measured by total looking at the target and distracter in the pre-naming and post-naming stages as in Meints et al. (1999, 2008). A measure of the longest look at the target and distracter in the pre-naming and post-naming stages was also used to measure looking behaviour (Meints et al., 1999, 2008). These measures indicate whether the child is looking more at the target stimulus after naming and therefore comprehends *him* or *her*.

Data on participants' siblings, whether siblings are older or younger and the gender of both siblings was collected from the parental consent form.

Ethical Considerations

Ethical permission was granted before testing. IPL tasks (Meints et al., 1999, 2008) are frequently used throughout research and do not pose any risk, harm or discomfort to participants.

The researcher has a full clean Criminal Records Bureau check. At no time was the researcher alone with a participant as a parent or nursery employee accompanied the child during the testing process.

Fully informed written consent was obtained from the parents and the nurseries. The experimental task was explained to the children at an age-appropriate level to ensure understanding.

If at any time the child did not wish to continue participating in the study then testing was stopped immediately and the participant's data was not used. Parents were informed that if after testing they did not wish their child's data to be used it would be removed and disposed of. Participants' names were not used in any data recording and instead given a subject code.

Participants were not deceived in any way. No financial reward was given to participants, their parents and guardians or participating nurseries.

Parents and guardians and were given the necessary contact details if they have any queries about the study or would like to withdraw their child from the study at a later date.

Results

An average pre-naming and post-naming score, in msecs, was calculated across trials for each participant for both total looking and longest look measures. Pre-naming was considered the time from the onset of the trial to the onset of the target word: either *him* or *her* at 3000msecs. Post-naming is defined as the time between the onset of the target word *him* or *her* at 3000msecs until the end of the trial. A pre-naming and post naming score were calculated by subtracting looking at the target by looking at the distracter (T-D) for the pre and post-naming stages of the trial respectively as used by Meints et al. (1999, 2008). A positive score suggests more total looking or a longest look towards the target than the distracter and a negative score suggests the participant looked at the distracter more and for the longest look

than at the target. Any trials in which the participant did not look at both the target and distracter in the pre-naming stage were excluded from the analysis.

Table 1 shows that more participants' total looking and also their longest look was directed at the target after the target had been named (mean for total looking post-naming = 45.48 and mean for longest look post-naming = 53.05) than in comparison to pre-looking which showed looking towards the distracter more than the target for both measures (total looking pre-naming *M* = -2.15 and longest look pre-naming *M* = -7.62). This increase in looking towards the target in the post-naming stage indicates understanding of the target words *him* and *her*.

Table 1
Means and standard deviations for total looking pre and post-naming longest look pre and post-naming measures for all participants.

	Total Looking Pre-naming (msecs)		**Total Looking Post-naming (msecs)**		**Longest Look Pre-naming (msecs)**		**Longest Look Post-naming (msecs)**	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
All participants	-2.15	59.15	45.48	68.94	-7.62	279.28	53.05	335.42

2-year-olds showed more total looking towards the target post-naming (*M* = 5.90) than at the distracter but less than at the pre-naming stage (*M* = 34.79) as shown in Table 2. Longest look measures, in Table 2, indicate that participants looked longest at the target during the pre-naming stage (*M* = 38.42) than in the post-naming stage (*M* = -38.94), where the longest look was at the distracter.

Similarly, 3-year-olds looked at the target more than the distracter at the post-naming stage (*M* = 85.06) than the pre-naming stage (*M* = -39.09) as shown by the total looking measures in Table 2. Unlike 2-year-olds, 3-year-olds longest look measurements (Table 2) indicated more looking at the target than the distracter after the target was named (post-naming *M* = 145.04) than in the pre-naming stage *(M* = -53.66). 3-year-olds looked at the target more than two year olds during the post-naming stage for both the total looking and longest look measures as shown in Table 2. This suggests children in the 3 year old group showed better understanding than 2-year-olds of *him* and *her*.

Table 2
Means and standard deviations for total looking pre and post naming and longest look pre and post naming for each age group: 2 and 3-year-olds.

Age Group	Total Looking Pre-naming (msecs)		Total Looking Post-naming (msecs)		Longest Look Pre-naming (msecs)		Longest Look Post-naming (msecs)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
2-year-olds	34.79	423.56	5.90	390.04	38.42	352.33	-38.94	398.76
3-year-olds	-39.09	295.46	85.06	359.23	-53.66	185.26	145.04	240.34

In terms of the influence of siblings, Table 3 displays participants with older siblings looked longer at the target in the post-naming stage for both total looking (*M* = 94.00) and longest look (M = 58.26) than in the pre-naming stage (pre-naming total look *M* = 46.95 and pre-naming longest look *M* = 51.18). First-born children's longest look measurement also followed this pattern with the post-naming longest look (*M* = 47.83) being directed at the target, in comparison to the pre-naming longest look (*M* = -66.43) at the distracter. However, post-naming total looking (*M* = -3.03) indicated more looking at the distracter than the target as had been the case in the pre-naming stage (*M* = -51.25) which also showed participants looked more at the distracter. Participants with older siblings showed more post-looking at the target than the distracter in comparison to first-born children for both total looking and longest look measures as shown in Table 3. This result suggests that participants with older siblings showed better comprehension of *him* and *her* than first born participants.

Table 3
Means and standard deviations for total looking pre and post naming and longest look pre and post naming for first born and participants with older siblings.

Birth Position	Total Looking Pre-naming (msecs)		Total Looking Post-naming (msecs)		Longest Look Pre-naming (msecs)		Longest Look Post-naming (msecs)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
First Born	-51.25	370.83	-3.03	449.99	-66.43	274.51	47.83	390.37
Late born (has older sibling)	46.95	356.26	94.00	277.45	51.18	283.17	58.26	287.73

Table 4 indicates that female participants (*M* = 121.01) showed a higher total looking at the post naming phase than male participants (*M* = -43.77). In addition, the longest look measurement showed that females' post-naming longest look (*M* = 161.25) was directed at the target where as males' post-naming longest look (*M* = -74.83) was directed at the distracter. Interestingly, this suggests female participants showed better comprehension of *him* and *her* than male participants by looking at the target more than male participants in the post naming stage (see Table 4).

Table 4
Means and standard deviations for total looking pre and post naming and longest look pre and post naming for male and female participants.

Gender	Total Looking Pre-naming (msecs)		Total Looking Post-naming (msecs)		Longest Look Pre-naming (msecs)		Longest Look Post-naming (msecs)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Male	42.45	335.73	-43.77	364.977	49.75	270.87	-74.83	381.59
Female	-39.89	387.20	121.01	369.32	-56.17	287.72	161.25	258.10

To further analyse these results a mixed repeated measures 2 x 2 x 2 x 2 analysis of variance (ANOVA) with the repeated measure of stage of total looking (pre-naming of target and post-naming of target) x age group (2-year-olds and 3-year-olds) x birth order (first born and with sibling) x gender of participant (male and female) was carried out. A second mixed repeated measures 2 x 2 x 2 x 2 ANOVA of the repeated measure stage of longest look (pre-naming of target and post-naming of target) x age group (2-year-olds and 3-year-olds) x birth order (first born and with sibling) x gender (male and female) was also carried out. Age group, birth order and gender were the independent measures.

For the total looking ANOVA, the stage of total looking main effect was not significant [$F(1,16) = 0.324$; $p=0.577$] as shown in Figure 1. Total looking towards the target did not differ between before and after the target was named.

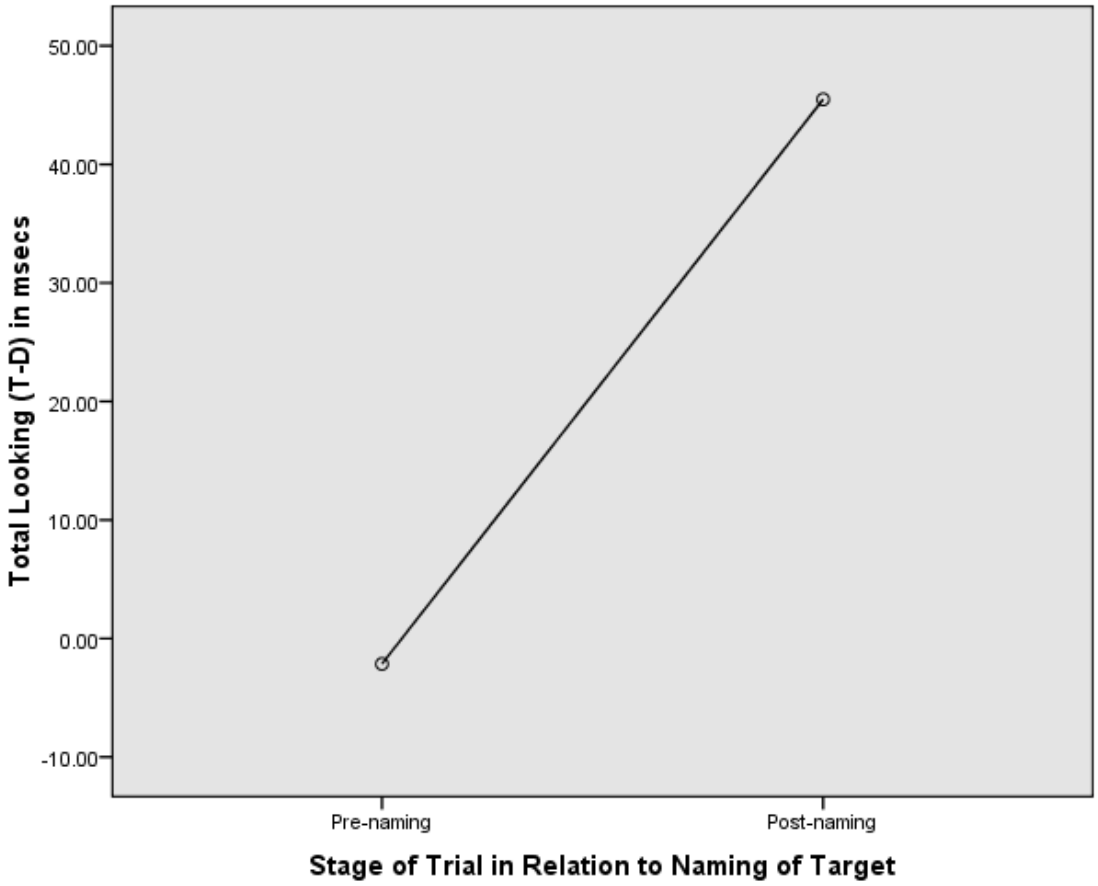

Figure 1: Mean total looking scores (msecs) at target (target total looking – distracter total looking T-D) during the stages of pre and post-naming of the target.

There was no significant main effect of age group [$F(1, 16) = 0.002$; $p = 0.964$].
2 and 3-year-olds did not differ in their total looking at the target or distracter as shown in Figure 2.

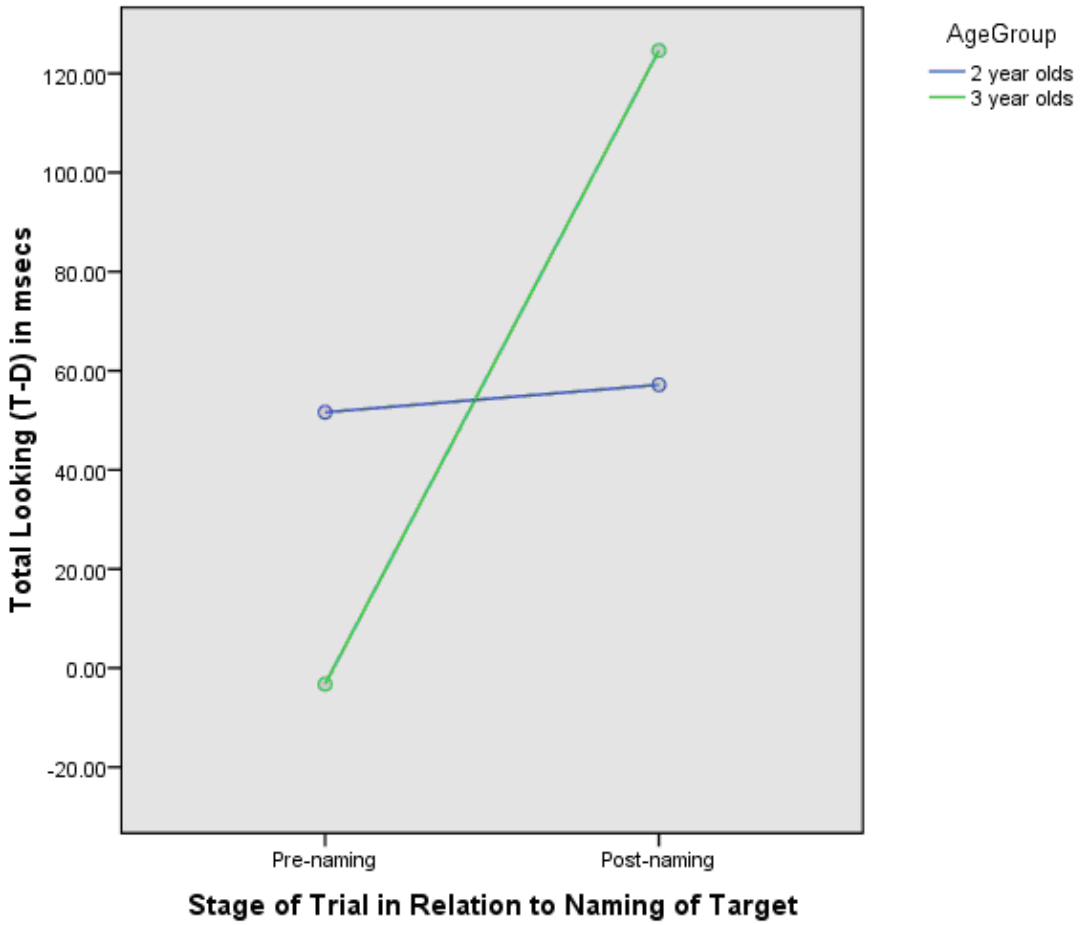

Figure 2: Mean total looking scores (msecs) at target (target total looking – distracter total looking T-D) during the stages of pre and post naming of the target for two and three-year-olds.

There was no main significant effect of birth order [$F(1 , 16) = 0.227$; $p = 640$] as displayed in Figure 3. Participants with an older sibling did not display significantly different total looking towards the target or distracter did not significantly differ in comparison to first born participants.

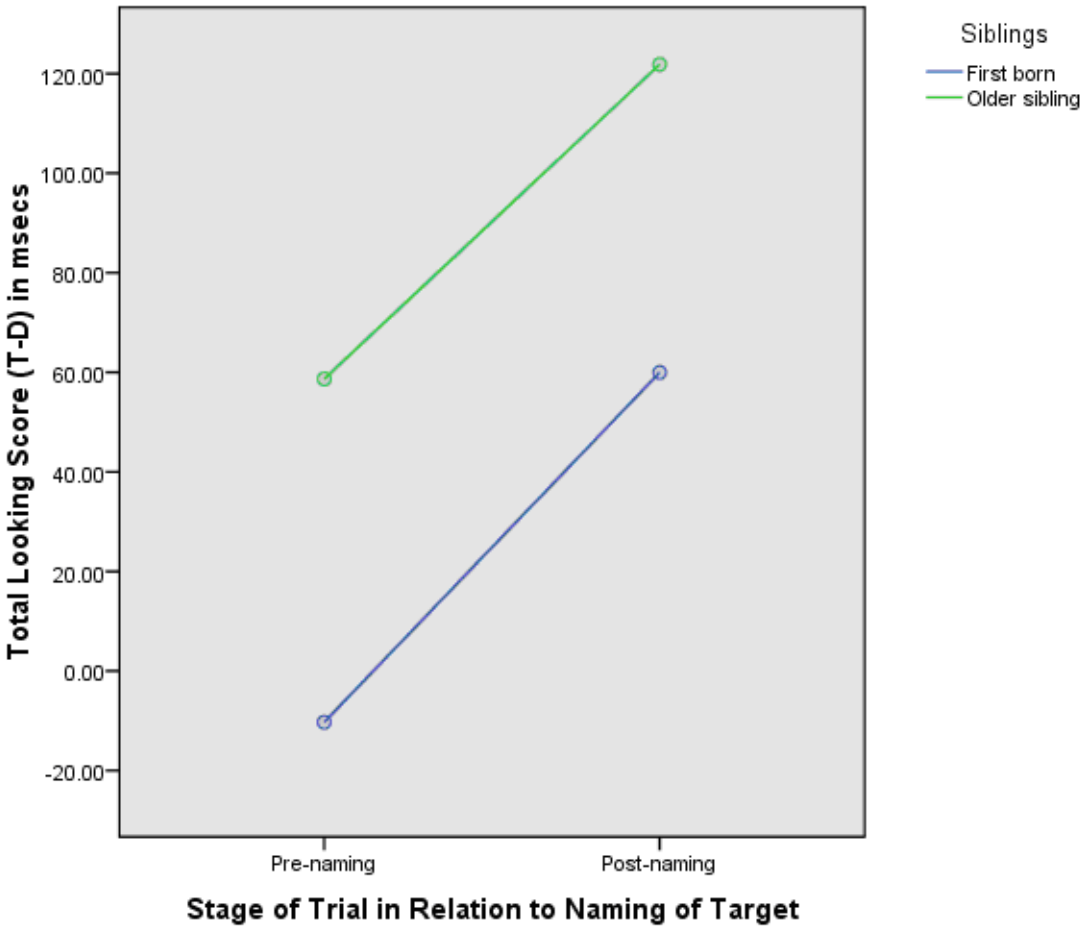

Figure 3: Mean total looking scores (msecs) at target (target total looking – distracter total looking T-D) during the stages of pre and post naming of the target for participants with and without and older sibling.

The main effect of gender was not significant [F(1, 16) = 0.059; p = 0.811]. There was no difference in total looking at the target between male and female participants.

There was no significant interaction effect between age group and total looking [F(1, 16) = 0.273; p= 0.609]. This means two and three-year-olds did not significantly differ in their total looking towards the target in the pre and post-naming stages.
The interaction effect between siblings and total looking was not significant [F(1,16) = 0.001; p= 0.976]. Children with older siblings and first-born children did not significantly differ in terms of total looking towards the target during the pre and post-naming stages.

The interaction effect between gender and total looking was not significant [F(1, 16) = 0.427; p = 0.523]. There were no significant differences between males' and females' total looking towards the target in the pre and post-naming stages.

All other interaction effects were not significant.

For the longest look ANOVA, the stage of longest look main effect was not significant [F(1, 16) = 0.595 ; p = 0.452] as shown in Figure 4. Longest look towards the target did not differ between before and after the target was named.

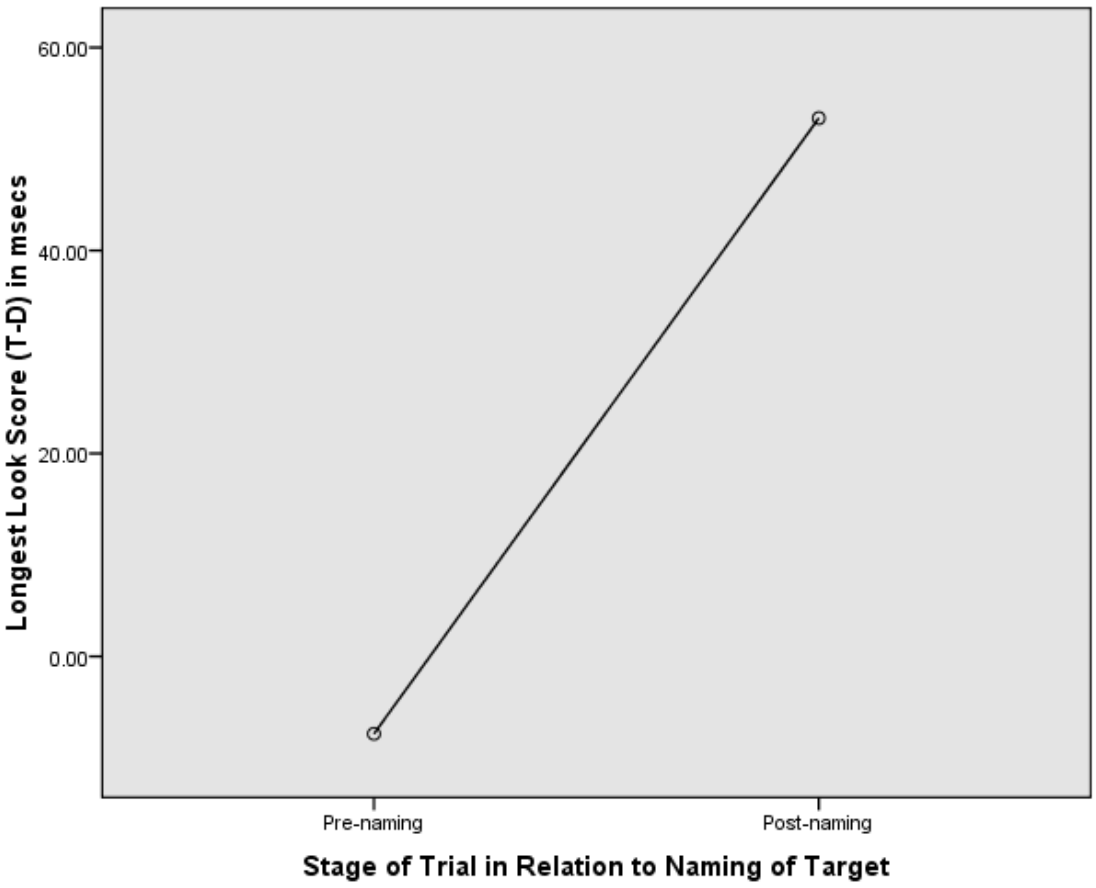

Figure 4: Mean longest look scores (msecs) at target (target longest look – distracter longest look T-D) during the stages of pre and post-naming of the target.

There was no significant main effect of age group [F(1, 16) = 0.111; p = 0.743] showing 2 and 3-year-olds did not significantly differ in longest look towards the target or distracter, as displayed in Figure 5.

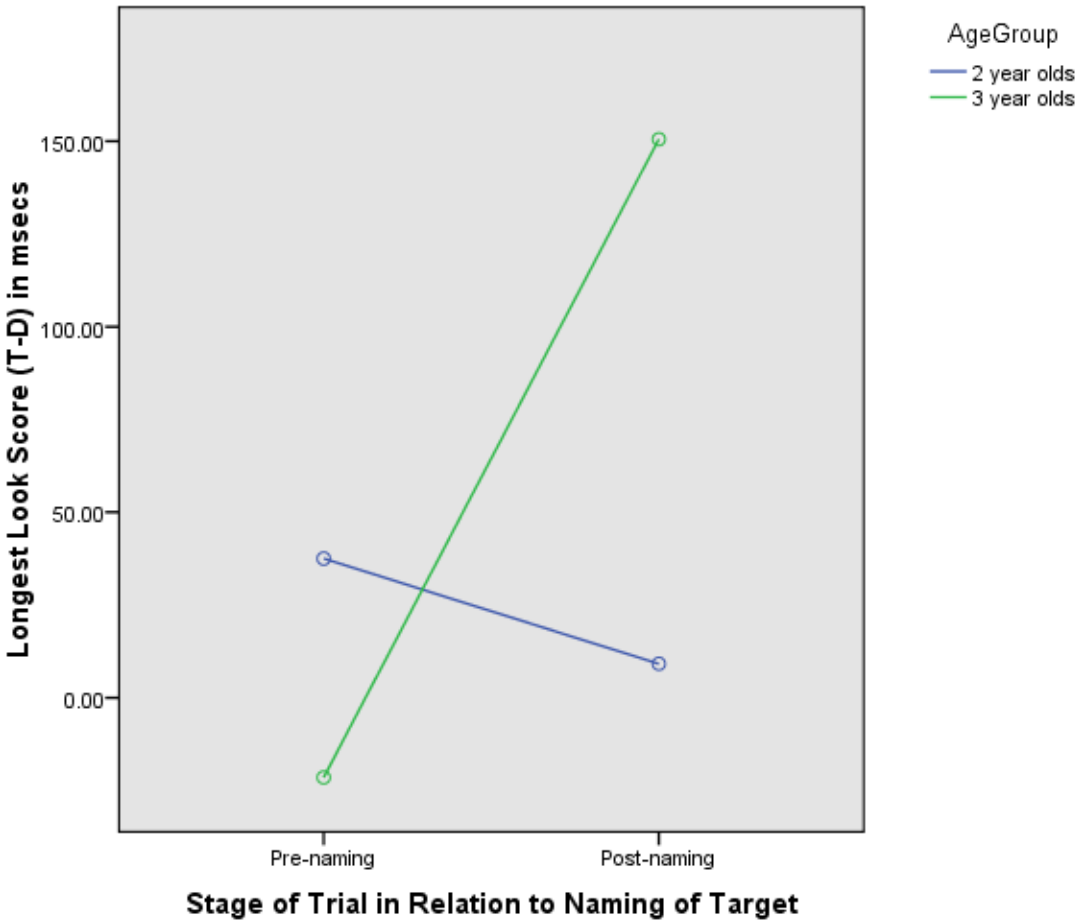

Figure 5: Mean longest look scores (msecs) at target (target total looking – distracter total looking T-D) during the stages of pre and post-naming of the target for two and three-year-olds.

Birth order was also not significant[F(1, 16) = 0.204; p = 0.657] and so participants with older siblings and first-born participants did not significantly differ in their longest look towards the target or distracter, as shown in Figure 6.

There were no differences in male and females longest looks as the main effect of gender was not significant [F(1, 16) = 0.106; p = 0.748].

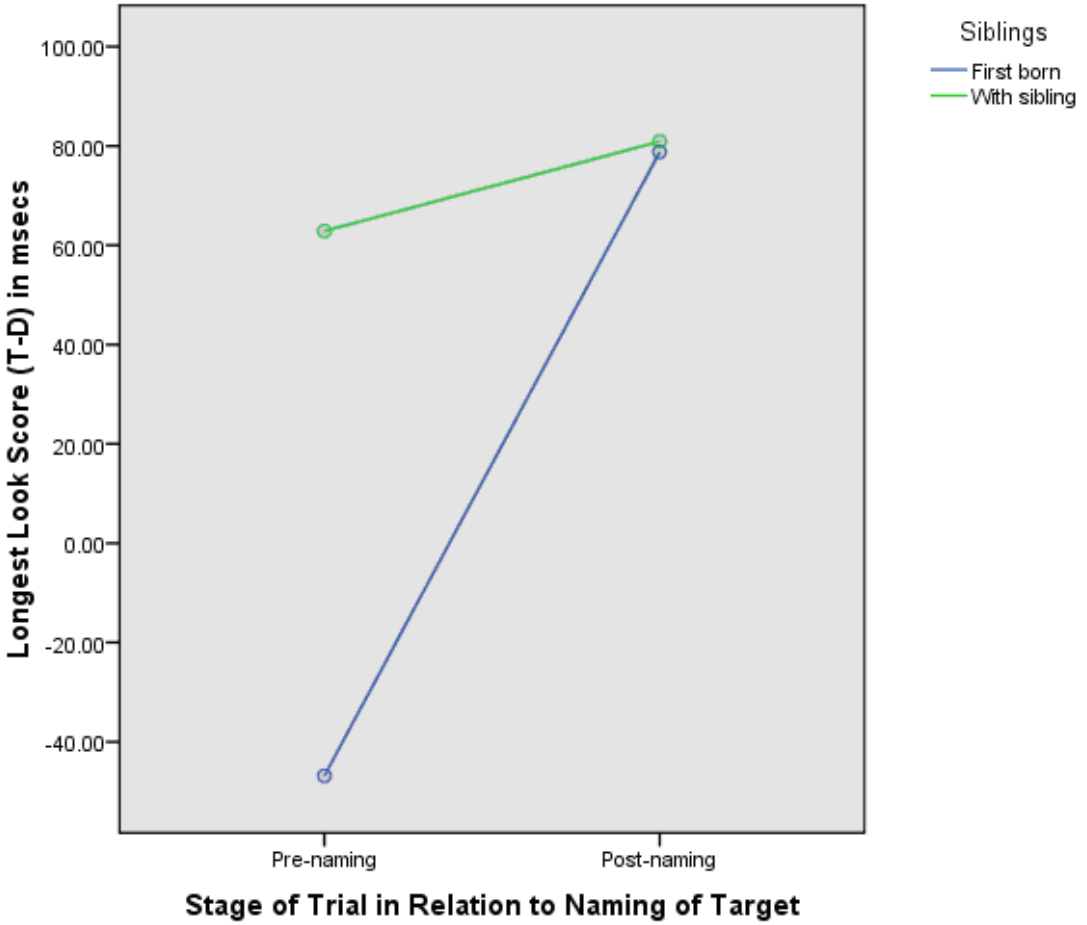

Figure 6: Mean longest look scores (msecs) at target (target longest look – distracter longest look T-D) during the stages of pre and post- naming of the target for participants with and without and older sibling.

There was no significant interaction effect between age group and longest look [F(1,16) = 1.158; p = 0.298]. 2 and 3-year-olds longest looks towards the target or distracter were not significantly different in the pre and post-naming stages.

The interaction effect between siblings and longest look was not significant [F(1, 16) = 0.334; p = 0.572]. Participants with a sibling did not have significantly different longest looks towards the target or distracter than first-born children in the pre and post-naming stages.

Gender and longest look did not display a significant interaction effect [F(1,16) = 1.541; p = 0.232]. The longest look of males and females did not significantly differ in the pre and post-naming stages.

All other interaction effects were not significant.

It was predicted children as young as 2 years old would show comprehension of *him* and *her*. Consequently, planned comparison paired samples t-tests with Bonferroni adjustment were carried out to see if there was a significant difference for both total

looking and longest look, between pre and post naming stages, of 2 and 3-year-olds independently from each other. All results indicated there were no significant differences.

A second planned comparisons paired samples t-test Bonferroni adjustment also showed that for all results there was no significant differences for both total look and longest look at the target at the pre and post naming stages for participants with an older sibling and first-born children, when analysed separately.

Discussion

This current study investigated comprehension of the third person pronouns *him* and *her* of 2 and 3-year-olds. The adoption of an age-appropriate method to test comprehension attempted to highlight how the pronoun comprehension of 2 year olds had been underestimated through the use of offline methods, which required task specific cognitive processing beyond 2-year-olds' capacities. This age-appropriate method consisted of the combination of IPL (Meints et al., 1999, 2008) and eye-tracking and the study would help judge the effectiveness of this combined methodology. Furthermore, the effect of having a sibling on young children's third person pronoun comprehension was also explored.

The results indicated that 2 and 3-year-olds could not comprehend the pronouns *him* and *her*. This finding was indicated by participants' looking behaviour which showed no significant difference in looking at the target image in the stages of pre-naming phase and post-naming of the target. Furthermore, there was no difference in participants' ability to comprehend *him* and *her* depending upon whether they had an older sibling or were the first-born child in their family.

2-year-olds exhibited an inability to comprehend third person pronouns. These results contradict previous findings which suggest that 2-year-olds are able to comprehend third person pronouns (e.g. Song and Fisher, 2007; Girouard et al., 1997). This may be explained by the children's ages in this study and previous literature. In this current study the mean age for the 2-year-olds was 27 months with ages ranging 23 months to 30 months compared to a mean age of 31 months with ages ranging between 28 months to 46 months in Song and Fisher's (2007) study. Similarly, in Girouard et al. (1997) the earliest when children completely understood all pronouns was at 28 months of age, despite some children being aged 18 months when testing began. This indicates that the children used in the current study are clearly younger than those 2-year-olds previously tested. These differences suggest, regardless of methodology, children below the age of 28 months are unable to comprehend third person pronouns. Furthermore, young 2-year-olds' inability to comprehend pronouns may not simply be due to age-inappropriate methodology used in previous literature as first thought but, simply a consequence of 2-year-olds' lack of understanding. It appears that only from the age of 30 months children begin to develop the cognitive processing required to understand third person pronouns, such as understanding other people's knowledge states (Campbell, 2000) and the roles of individuals within a sentence (Brener, 1983). By using an age-appropriate method, this study has provided an opportunity to disentangle true performance of 2-year-olds' comprehension of third person pronouns, from results of tasks which were

too cognitively demanding and thus hampering 2-year-olds' performance; or were simply not administered to children as young as 2 years old for this very reason (Ricard et al. 1997).

In contrast, the finding that 2-year-olds cannot comprehend pronouns supports Moore (2001), who believes that comprehension of pronouns is not achieved until children are 3 years old. These results may be a consequence of, at 2 years of age, parents referring to other people and themselves using proper nouns rather than pronouns to simplify their talk to their child (Brener, 1983). Without this consistent pronoun input, it can be difficult for children to learn the pronoun system (Brener, 1983). As the child develops, parents perhaps begin to use a less simplified manner to refer to individuals, through the use of pronouns and this may aid in the learning of the pronoun system (Brener, 1983).

Hendricks and Spenader's (2005) findings also support this current study's results that children aged 2 years are unable to comprehend pronouns. This is because they lack the ability for optimal bidirectionality; where comprehension occurs when all the possible pronoun options for both the speaker to produce and the listener to consider are processed by the comprehender (Hendricks and Spenader, 2005).

Similarly, according to Hendricks and Spenader (2005), 3-year-olds also lack this cognitive ability of optimal bidirectionality and therefore do not possess a fully accomplished pronoun system. The results of this current study support this idea by there being no significant difference in 3-year-olds' looking towards the target in the post-naming stage in comparison to the pre-naming stage. Once again, this suggests that previous literature which studied older children (e.g. Arnold et al. 2001, Sekerina et al. (2004, Trueswell et al., 1999) were not incorrect in doing so as it appears 3-year-olds as well as 2-year-olds lack the ability to comprehend the third person pronouns *him* and *her*.

However, research has shown 3-year-olds do possess some of the necessary cognitive skills for pronoun comprehension (Moore, 2001). Campbell et al. (2000) showed that 3-year-olds had the capability of understanding about knowledge states, which is vital for the understanding of pronouns. Equally Brener (1983) also argued 3-year-olds could comprehend third person pronouns on the basis of gender, which was tested in the current study. Song and Fisher (2005) showed that 3-year-olds could successfully comprehend the third person pronouns *he* and *she*, using a preferential looking technique, on the basis of how dominant a character was in a story. This is further supported by Moore (2001) who believed full pronoun acquisition was achieved by 40 months of age which considering the mean age of the three year olds in the current study was 39 months of age means some of the younger children were not quite at this stage.

There is a possibility that the participants failed to fully understand the sentence, particularly the roles of the agent and patient. However, this is unlikely as these are verbs children as young as 18 months can understand (Meints et al., 2008) and Childers and Tomasello (2001) had previously shown how pronouns aided comprehension of transitive utterances in 2-year-olds. Moreover, other studies had previously used more cognitively demanding stimuli such as stories and had shown 3-year-olds' comprehension (e.g. Song and Fisher, 2005)

A more possible explanation for 3-year-olds lack of comprehension of *him* and *her* may have been their confusion with the nominative *she*. As Rispoli (1998) and Moore (2001) found 2 to 4-year-olds often confuse the nominative *she* and objective *her*, which frequently leads to pronoun case errors. This is due to what Rispoli (1994, 1998, 1999) refers to as the 'double cell effect' of *her* in his paradigm building theory (Rispoli, 1994). *Her* can be used in the objective and genitive form and is therefore more easily retrievable and thus often used in replacement of *she* (Rispoli, 1994). The nominative *she* was included for this reason, as it would show participants were still able to understand her despite the inclusion of the frequently confused *she*.

However, the inclusion of *she* could have had an important effect on the results. This is because the study is actually testing for understanding of *she* and that a more suitable alternative would have been to use a noun to represent the subject and agent of the transitive sentence, for example the lady, in a similar way to the noun phrase the boy used by Sekerina et al.'s (2004). This would ensure that comprehension of *him* and *her* was tested only. Nonetheless, further analysis could separate trials into *him* and *her* targets. It could then be seen if participants had more difficulty with comprehending *her* than *him*, which may be due to frequent feminine pronoun case errors made by children of this age, in line with Moore (2001) and Rispoli (1998). Carrying out such an analysis would be useful as it would see if errors in comprehension follow the production data from both Rispoli's (1994) paradigm building theory and Moore's (2001) findings. If comprehension and production errors were comparable this would contradict the notion that production and comprehension data should be considered separately (Hendricks and Spenader, 2005). Furthermore, pronoun comprehension provides a vital indicator of children's language impairments, which may be masked by the production of pronouns.

Additionally, to truly fathom third person pronoun case errors in comprehension, a combination of stimuli representing *him*, *her, he and she,* in the same way as the current study, could be used. This would be of particular interest as 2-year-olds and 3-year-olds were able to comprehend the other singular third person pronouns *he* and *she* in Song and Fisher's (2005, 2007) studies. This may suggest children learn the nominative case before the objective case and therefore requires more testing.

Future research should also test older children, aged from 3½ to 6 years old. This would enable a true evaluation of the combined method of IPL (Meints et al., 1999,2008) and eye-tracking as these results could be compared with the vast array of literature which supports children at this age group can comprehend third person pronouns (e.g. Arnold et al., 2001; Brener, 1983, Moore, 2001, Sekerina et al. 2004). This is because children from around the ages of 4 and 5 years develop the complex cognitive abilities necessary to comprehend third person pronouns such as an understanding of others' thoughts (Campbell et al., 2000), the role of referents in sentences (Moore, 2001), the role of speaker, listener and others (Brener, 1983) and the options available to speaker and listener (Hendricks and Spenader, 2005). If the results of future research with older children support previous literature then this will help validate the method used in this current study. Discovering the exact age of pronoun comprehension will not only assist in the identification of language impairment it can also assist in the detection of early social difficulties. As (Campbell

et al., 2000) argues comprehension of pronouns also indicates children's abilities to understand others' perspectives before theory of mind tasks.

Another possible reason why participants did not display comprehension of *him* and *her* may be due to a methodological issue. Unlike previous literature which relied on pictures to represent referents (e.g. Scholes, 1981; Sekerina et al., 2004; Song and Fisher, 2005, 2007), the present study used a more ecological valid approach. The use of video clips of real life human actors ensured a clear gender distinction between individuals, unlike the animal cartoon characters of Song and Fisher (2005, 2007). The human actors also were similar to the referents that are represented by pronouns in children's everyday lives. Even with the use of such stimuli, participants did not appear to comprehend *him* and *her*. A potential explanation for this may be that the trials were only 6000msecs long, with only three seconds for the pre and post-naming phases. Although six seconds for action video clips similar to these have been used successfully in previous research, these have tended to involve one actor (Meints et al., 2008). Each clip in the current study involves two individuals with one carrying out an action towards another with a second clip occurring simultaneously alongside. Participants will have needed time to interpret the video clips in terms of the role of each actor in each clip, which would require an understanding of the action being performed and then a differentiation of gender between patients in the two clips. These various cognitive processes may have benefitted from a longer trial time and pre and post-naming stage to process this information due to younger children's cognitive inefficiency (Sekerina et al., 2004; Hendricks, 2010). Further analysis of eye movement data could show where children looked at in the stimuli during processing as in Trueswell et al. (1999) and Sekerina et al. (2004) to see whether it was possible for children to process the video clips within the time constraints of the trial. This more in depth analysis of eye movements could show how children process the stimuli step by step (Trueswell et al., 1999, Sekerina et al., 2004) and could help give an indication of why participants did not fully comprehend the pronouns *him* and *her*. Particular difficulties in each of the stages and processes of pronoun comprehension could be highlighted.

In relation to siblings, there was no significant difference in the comprehension of *him* and *her* regardless of whether participants had an older sibling or was the first-born child in the family. This is despite Oshima-Takane and Robbin's (2003) proposal that children who have an older sibling have a different and beneficial linguistic arena for learning pronouns. This arena provides more learning opportunities of third person pronouns through the overhearing of easily accessible sibling and caretaker's conversations (Oshima-Takane, 1988). This contradiction in the current study's results and previous literature may be due to the current study measuring comprehension where as previous studies (Oshima-Takane et al., 1996) have concentrated solely on production. Once again, as previously discussed, production and comprehension involve different cognitive processes (Hendricks and Spenader, 2005) and therefore findings concerning the influence of siblings on production of pronouns may not be applicable for comprehension.

Alternatively, as Jones and Adamson (1987) argue, children with older siblings are hampered in their language acquisition through their caregivers' attention being shared with another child. This may have meant the children in this study showed no benefit of an older sibling in their comprehension abilities. However, as Oshima-

Takane (1988) indicates overhearing conversations between caretakers and siblings provide children with the opportunity to hear speech not directed to them. In doing so, this provides the crucial learning opportunity concerning the relationship between speech roles and pronouns, which first-borns do not have as easy access to (Oshima-Takane, 1988; Oshima-Takane et al., 1996). As there is such a well documented effect of siblings on the production of pronouns (Oshima-Takane et al., 1996; Pine, 1995), further research needs to investigate whether siblings also have an influence on comprehension of pronouns too.

The results indicate therefore 2 and 3-year-olds appear to be unable to comprehend the third person pronouns *him* and *her*. This suggests perhaps production does precede comprehension (Hendricks and Spenader, 2005) yet more in depth analysis of the eye-tracking data would indicate the online processes involved. Longer trial lengths and a noun phrase for a subject of the utterance instead of *she* may have provided different results. Further testing of the comprehension of third person pronouns needs to concentrate on older children in order to validate the combined IPL (Meints, Plunkett and Harris, 1999, 2008) and eye-tracking methodology. This will enable the early detection of language impairment and social difficulties. Finally, future research must involve the effects of older siblings on children's comprehension, not just production, of third person pronouns.

References

Arnold, J. E., Novick, J. M., Brown-Schmidt, S., Eisenband, J. G., & Trueswell, J. C. (2001). Knowing the difference between girls and boys: The use of gender during online pronoun comprehension in young children. In A. H. -. Do, L. Domínguez & A. Johansen (Eds.), Proceedings of the 25thAannual Boston University Conference on Language Development , vols 1 and 2. (pp. 59-69). Somerville, MA US: Cascadilla Press.

Barton, M. E., & Tomasello, M. (1991). Joint attention and conversation in mother-infant-sibling triads. Child Development, 62(3), 517-529.

Brener, R. (1983). Learning the deictic meaning of third person pronouns. Journal of Psycholinguistic Research, 12(3), 235-262.

Campbell, A. L., Brooks, P., & Tomasello, M. (2000). Factors affective young children's use of pronouns as referring expressions. Journal of Speech, Language, and Hearing Research, 43(6), 1337-1349.

Childers, J. B., & Tomasello, M. (2001). The role of pronouns in young children's acquisition of the English transitive construction. Developmental Psychology, 37(6), 739.

Dunn, J., & Shatz, M. (1989). Becoming a conversationalist despite (or because of) having an older sibling. Child Development, 60(2), 399.

Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., & Thal, D. (1994). Variability in early
communicative development. Monographs of the Society for Research in Child Development, 59(Serial No. 242), 1-85.

Girouard, P. C., Ricard, M., & Décarie, T. G. (1997). The acquisition of personal pronouns in English-speaking and English-speaking children. Journal of Child Language, 24(2), 311-326.

Golinkoff, R. M., Hirsh-Pasek, K., Cauley, K. M., & Gordon, L. (1987). The eyes have it: Lexical and syntactic comprehension in a new paradigm. Journal of Child Language, 14(1), 23-45.

Hay, D. F. (2006). Yours and mine: Toddlers' talk about possessions with familiar peers. British Journal of Developmental Psychology, 24(1), 39-52.

Hendricks, P. (2010). What does eye-tracking reveal about children's knowledge of linguistic structure? Retrieved 8th December, 2009, from http://www.let.rug.nl/Hendricks/papers/eyetrackingsquib.pdf

Hendricks, P., & Spenader, J. (2005). When production precedes comprehension: An optimization approach to the acquisition of pronouns. Language Acquisition: A Journal of Developmental Linguistics, 13(4), 319-348.

Jones, C. P., & Adamson, L. B. (1987). Language use in mother-child and mother-child-sibling interactions. Child Development, 58(2), 356.

Leech, G., Rayson, P., & Wilson, A. (2001). Word frequencies in written and spoken English: Based on the British National Corpus. Harlow: Longman.

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.

Love, T., Walenski, M., & Swinney, D. (2009). Slowed speech input has a differential impact on online and offline processing in children's comprehension of pronouns. Journal of Psycholinguistic Research, 38(3), 285-304.

ts-Verlag.

Meints, K., Plunkett, K., & Harris, P. L. (1999). When does and ostrich become a bird? The role of typicality in early word comprehension. Developmental Psychology, 35(4), 1072-1078.

Meints, K., Plunkett, K., & Harris, P. L. (2008). Eating apples and houseplants: Typicality constraints on thematic roles in early verb learning. Language & Cognitive Processes, 23(3), 434-463.

Moore, M. E. (2001). Third person pronoun errors by children with and without language impairment. Journal of Communication Disorders, 34(3), 207-228.

Oshima-Takane, Y. (1988). Children learn from speech not addressed to them: The case of personal pronouns. Journal of Child Language, 15(1), 95-108.

Oshima-Takane, Y., & Derat, L. (1996). Nominal and pronominal reference in maternal speech during the later stages of language acquisition: A longitudinal study. First Language, 16(48), 319-338.

Oshima-Takane, Y., Goodz, E., & Deverensky, J. L. (1996). Birth order effects on early language development: Do secondborn children learn from overheard speech? Child Development, 67(2), 621-634.

Oshima-Takane, Y., & Robbins, M. (2003). Linguistic environment of secondborn children. First Language, 23(671), 21-40.

Pérez-Pereira, M. (1999). Deixis, personal reference, and the use of pronouns by blind children. Journal of Child Language, 26(3), 655-680.

Pine, J. M. (1995). Variation in vocabulary development as a function of birth order. Child Development, 66(1), 272-281.

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

Rispoli, M. (1994). Pronoun case overextensions and paradigm building. Journal of Child Language, 21(1), 157-172.

Rispoli, M. (1998). Patterns of pronoun case error. Journal of Child Language, 25(3), 533-554.

Rispoli, M. (1999). Case and agreement in English language development. Journal of Child Language, 26(2), 357-372.

Rispoli, M. (2005). When children reach beyond their grasp: Why some children make pronoun case errors and others don't. Journal of Child Language, 32(1), 93-116.

Scholes, R. J. (1981). Developmental comprehension of third person personal pronouns in English. Language and Speech, 24(1), 91-98.

Sekerina, I. A., Stromswold, K., & Hestvik, A. (2004). How do adults and children process referentially ambiguous pronouns? Journal of Child Language, 31(1), 123-152.

Smiley, P. A., & Johnson, R. S. (2006). Self-referring terms, event transitivity and development of self. Cognitive Development, 21(3), 266-284.

Song, H., & Fisher, C. (2005). Who's 'she'? discourse prominence influences preschoolers' comprehension of pronouns. Journal of Memory and Language, 52(1), 29-57.

Song, H., & Fisher, C. (2007). Discourse prominence effects on 2.5-year-old children's interpretation of pronouns. Lingua, 117(11), 1959-1987.

Trueswell, J. C., Sekerina, I., Hill, N. M., & Logrip, M. L. (1999). The kindergarten-path effect: Studying online sentence processing in young children. Cognition, 73(2), 89-134.