Attention redirecting strategies

What do deaf parents prefer?

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Abstract

Most of the deaf children born in the US, are born into hearing families. Within these families, there is a language mismatch between the hearing parents and the def child. This can lead to a wide variety of problems. The parents are not sure how to deal with this new way of communicating, and often fail to parent to the best of their abilities. Previous research has found that there are many differences between parents that share their hearing status with their child and those families that experienced a language mismatch. This study set out to explore one aspect of sign language to hopefully gain insights that could help hearing parents in the future. This study uses clips from a database that has videos of deaf parents. These clips were annotated and analysed based on five different types of strategies deaf parents use most. It concludes that there are no conclusive trends visible in the data, most likely due to the small dataset, but there are some tendencies visible. Such as the preference for physical and visual cues.

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Chapter 1: Introduction

In the USA, more than 90 percent of the children that are born deaf, are born in a family with hearing parents (Depowski, 2015; Kushalnagar et all. 2010). According to Spencer (1992), effects of early childhood deafness impacts all aspects of their life and development but primarily affects the communication and language development. In these families, language development of the children is often delayed because the parents have no prior experience with sign language and visual communication. They must adjust to the hearing status of their child (Depowski, 2015; Kushalnagar et all. 2010). In her book *The deaf child and his family*, Susan Gregory (1976) covers different aspects of the life of a deaf child in a hearing family. Although the book focusses on families that mostly communicate orally, the concerns of the parents are the same as any other parent of a deaf child. All parents' initial concern is how they would communicate with their child. This was named as the number one concern of the parents questioned for the book. Another problem they faced, was that they would not be able to fully explain what they meant, they could not sing to a child and were often limited to basic and easy to follow vocabulary.

For parents that first find out that their child is deaf, there are different options of communicating with their child depending on how much the child can still hear, and whether the nerves still can catch sound. Parents may choose to stick to oral communication and teach the child to read lips, they can choose for a cochlear implant (CI) in combination with spoken speech, or they might choose to use sign language as their main mode of communication. Orally communicating and a CI are only possible if the child is not completely deaf. Parents might also choose for a combination of these options (Depowski, 2015).

The initial months after a child has been born are crucial for later development. Language input is important for the language development of a child and should happen immediately to ensure correct development (babysfirsttest.org). Studies have shown that if a child gets the special care needed within the first six months after birth, the language development (spoken or signed) is similar to that of their hearing pears. Sadly, the problems of raising a deaf child in a hearing family, do not stop after the diagnosis has been made and early care has been provided. Besides special care, the parents also have to adjust to this new situation. Parents suddenly find themselves unable to communicate with their child, and according to Depowski (2015), this can lead to high stress levels for both the parents and the infant. In turn, high levels of stress can lead to further problems such as social and emotional development problems.

To help both the deaf children and their parents, it is important to make sure the family gets the correct support. Parents must learn how they can communicate with their child, how their child now experiences the world, and how they can support their child in his development. Parents need the guidance of medical, linguistic and educational professionals (Kushalnagar et all, 2010). In turn, it also means that the parents need to learn a sign language to communicate with their child and are also the ones providing sign input at home. Hearing parents also need to keep in mind that the child relies heavily on visual stimuli and cues and that these are used differently from the audio-visual cues hearing parents are used to.

Using a visual manner to communicate, already seems to be a challenge for most hearing parents (Depowski, 2015; Spencer 1992; Harris 1992)). They are inexperienced with this mode of communication and fail to notice certain aspects that are important for a smooth development.

Luckily, studies (Spencer, 1992) have shown that when deaf children are born to deaf families, many test scores are similar to the test scores of hearing children born to hearing parents. This shows that the problems that arise in the above-mentioned families, are not inherent to the children being deaf. This is why this thesis turns to deaf parents and their techniques. Based on the behaviour and habits of deaf parents, this thesis hopes to give recommendations to hearing parents of deaf children so they can ensure the correct development of their deaf child.

In the next chapter, a short but broad background is given to explain the acquisition process of both spoken and signed language and why sign language has been so controversial for years and why the deaf community has had to fight hard for their right to use it. Chapter three will delve deeper in one specific aspect of sign languages: focus. Focus is an important skill children need to learn early on in the acquisition process. It is also an area that shows differences between deaf and hearing families and will be the main focus of this study. Chapter four explains the goal of this study, after which, the methodology is explained. The results are shown in chapter five and a conclusion is given in chapter six. Finally, chapter seven discusses the implications of the results for further studies and end with some concluding remarks of advice for hearing parents with deaf children

Chapter 2: background

Being deaf brings many complex challenges along with it. Problems may arise in terms in language acquisition, communication, self-confidence and literacy development among others. Before we delve deeper into the problem hearing parents face, this chapter first discusses deaf culture and education, sign language and its acquisition and general problems deaf people face communicating with others. The chapter will also discuss why deaf parents can act as a model for hearing parents.

2.1 A historic overview

To fully understand why it is so important that deaf children learn to use proper sign language, one needs to understand how deaf people and sign language were regarded in the past as this has a large impact on the deaf identity. It is important to realise the deaf identity is regarded as being its own culture. Parents that raise their children with sign language have to understand that deafness is part of the child's identity and with it comes a whole sub culture and history. Education in general, is influenced by culture and also influences culture. Education and the discussion on the use of sign language is an important aspect of deaf culture.

Deaf studies as a field has not existed for long. This is partly due to the fact that sign language was long regarded as hindering deaf people and the use of it should thus be discouraged. Even though nowadays, sign language is generally accepted as a form of communication necessary for the deaf, it still does not have an official status as a language in many countries. This means that it is not recognised as an official language of that country and may not have a protected status in education. Below is an overview of how deaf education has changed and how the public opinion on sign language has affected this.

Deaf people have always used some kind of visual way of communicating in their home environment. These so-called home-signs vary from family to family and were often a basic way of communicating that was only familiar to those living with the deaf person. Home signs arise when a deaf child does not have a model or formal language education (Goldin-Meadow, 2003).

The first mention of a formal sign language was around 1750 (Stokoe jr.; 2005). The Frenchman Abbé de l'Épée saw two deaf girls signing to each other and noticed how the girls seemed able to freely convey any message. The realisation hit that sign language was the key to educating deaf people. Abbé de l'Épée used his own money to establish a school that would educate the deaf. What made this school different, is that it only used French sign language to teach. This way a stark difference with other schools that educated the deaf using orthography and the pronunciation of the spoken French language. A famous school that had used this method, also known as the oral method, is Braidwood Academy in Scotland. The students of this academy were often from important and influential families that felt that deaf people should learn to communicate like hearing people as to not put attention to the disability.

An important side note is that before the oral method became so popular, there is earlier evidence that deaf people mostly used a form of sign language to communicate. Most notably is the attempt to educate the deaf by a Spanish monk in the 16th century. Sadly, in the time of Abbé de l'Épée people looked down on deaf people who would use sign language and have used the oral method in deaf education.

The school founded by Charles Michel de l'Épée proved to be successful and the students that attended the school were brought to a very high level. Soon after starting their education, students were able to perfectly dictate words and once their education had finished they were able to translate written French into sign and back without much trouble.

Seeing how deaf students were able to achieve much more than the public expected, positively affected the public opinion towards the deaf community. Until then, most people viewed deaf people the same way Aristotle did. They assumed deaf people to be dumb and bothersome to society. Now that the method used by Charles Michel de l'Épée had proven successful, this view slowly turned around.

Around this time, Gallaudet met a deaf girl in America named Alice Cogswell. This

girl inspired him to also start a school for the deaf and he started to travel around Europe to find the most effective way to teach deaf children (Crouch, 2007). Traveling to Europe, he encountered schools like Braidwood Academy that used the oral method to teach (Crouch, 2007). He refused to teach on the academy and travelled to France to visit the school founded by Charles Michel de l'Épée. Here he learned about the manual method and how effective it could be. He brought these ideas back to America and founded his own school. The Alice that inspired him, was one of the first few students at his schools (Marschark, 2002) This school would use the manual method, just like Charles Michel de l'Épée and had even taken some of the French Sign language. This is the reason that American Sign language, and many other sign languages, share signs and characteristics with the French sign language used by Charles Michel de l'Épée (Britannica.com). Gallaudet founded what is now known as Gallaudet university and with the help of a French Cleric that came with him, established another school that used sign language to teach.

For the remainder of the 19th century, the preferred method in deaf education was the manual method and more and more schools opened to educate the deaf. At these schools, a large part of the teachers and staff were deaf themselves. This gave deaf people job opportunities and improved the education of sign language (ASLinfo.com 2011). It created small deaf communities with deaf models to learn from.

This positive outlook changed after the American civil war (Bayton, 1995). After the war ended, people had a less positive outlook on the world and the future and grew more concerned with the Darwinist view on humanity. The darwinits view said that people need to adjust to fit in with society. Of course, having deaf people that had no way of communicating with the rest of the hearing population, did not fit with this view. Besides, they saw sign language as being similar to the gestures babies and young children make. They thought that sign language was comparable to the babbling of babies and the broken sentences young children make. In short, sign language was not a real language, it did not represent the modern language of that time (Bayton, 1995; Britannica.com). For this reason, people started to argue in favour of the oral method again. This shifted the opinion on manual teaching. Throughout the century, the support for Oralism grew. (Bayton, 1995) The hearing population and the deaf community began to drift apart. The gap between the hearing and deaf community increased when hearing people started to take offence to deaf people having their own way of communicating and with it an own group identity (Winefield, 1987) they saw the deaf community as refusing to integrate with the rest of the hearing population (Winefield, 1987)

Oralism was supposed to make deaf people more 'normal' (Winefield, 1987) people in favour of using the oral method advocated tat deaf children should learn to live in spite of their disabilities by learning how to read lips, and promoting speech to communicate. Using the oral method would help children integrate into society, something that was hindered by manual communication. (Winefield, 1987)

An important historical event in the history of the deaf community, is the Second International Congress on Education of the Deaf in 1880. This Congress was a meeting of deaf educators from several countries. It was organised by the Pereire Society, a group that was against the use of sign language and it is no surprise that most of the invited educators were against the use of sign language as well. The Congress was biased to towards oralism from the start (Sturley, 2010). It is not surprising that most if not all resolutions that were voted on, were in favour of using the oral method in deaf education. In the end, the Congress ruled that the oral method was the preferred method of teaching (Sturley, 2010)

Soon after the ruling of this congress, teachers that were in favour of the manual

method were forced out and replaced with educators that taught using the oral method. Students that were used to the manual method were forced to learn with the oral method and were restricted in their use of sign language. The oral method would prepare deaf children for a life in the hearing world. This life would require them to understand English, know how to lipread and speak English. Strict oral programs would punish students that were caught signing, for example, by forcing them to wear gloves that were tied together, effectively preventing them from signing.

Those deaf students that were unable to successfully learn the oral method, were deemed failures and put into manual classes. They were regarded as dumb and unable to make it in the real world . This period is considered the "Dark Age or Oralism" by some in the deaf community.

Soon, protests from within the deaf community started against the strict use of oralism in education. An example of such protest was a book published by the deaf Edith Mansford Fitzgerald. She was strongly opposed to the use of Oralism and felt that it actually hindered her learning. She published her book in 1926 and it became very influential in the field of deaf education as it gave insight into the deaf perspective.

The use of this strict oralism in education continued until the term "total communication" was coined in the late 1960s. This is described as a method that allows a child to communicate in the way that works best for them given their needs. For deaf children, this meant that if signs fit better to their learning and hearing status, they would be educated using the manual method and would be able to freely communicate in sign language without or with less strict restrictions. On the other hand, for those students that actually referred the oral method, were still taught how to lipread and speak. This changed the educational programs in oral schools. Some schools switched to a curriculum using Total Communication while others simply added some sign language to their existing program while some only allowed students to sign outside of class and among themselves.

Nowadays, there are many options for deaf children. Both the manual and oral method are still used in schools for the deaf. But know more is known about possible risks of oral education. A new way of looking at deafness, is not seeing it as a medical issue, but as it being a cultural one. In bilingual-bicultural education, the emphasis lies on ASL and English as equal languages. They teach that deaf children have ASL as their native language while they learn written English and sometimes spoken English as their second language. This new type of education actively involves the idea that being deaf comes with a different culture. Deaf culture as its own history, customs and beliefs.

Another new type of education, is mainstreaming and the inclusion of deaf children. Instead of going to a specialised school for the deaf and hard of hearing, the child can enter a regular school and get extra help to attend classes. Help can be in the form of interpreters, note takers and aides that help the child in understanding the regular classes. The benefits can be that the child is closer to the hearing community and often closer to home, but being the only deaf child can also cause isolation (Nowell & Innes, 1997). Mainstream education helps integrating the child into the hearing population, but the lack of deaf connections, often also lead to a feeling of isolation. The child is the only one who is unable to hear and may find it hard to follow all classes and has to rely on others to aide them.

Overall, this short summary of deaf education and how it has effected the deaf community shows how important it is for the deaf community to have the freedom to choose their way of communicating. They feel that sign language is the best option and should not be

repressed by the hearing population.

2.2 What is sign 'language' ?

Until the 1960s, sign language was believed to be complex pantomimes (gupress.gallaudet.edu/stokoe). It was not seen as a real language until Stokoe published his book on sign language structure. In this book, Stokoe argued that just like spoken languages, sign language, are made up of small meaningless units instead of only pantomimic gestures as was thought before. It was generally thought that signs were taken from the real world of the country's language and acted out as some kind of pantomime. Stokoe, on the other hand, argued that there are small units that are similar to what is called phonemes in spoken language. He described five different parameters that form the basis of every sign. Following this publication, scholars studied the structure of different sign languages and all came to the same conclusion: Sign languages are fully grammaticalized languages (Goldin-Meadow, 2003). They have several structural levels but also follow syntactical rules such as a specific word order. Word order, just as in spoken languages, is not universal and can vary across languages.

Another important conclusion that helped solidify sign language's place as real language, is that sign languages serve the same purpose as spoken languages. Deaf people can use sign language to talk about day-to-day activities but also to talk about things that exist out of this world. Sign language can be used to joke around, advise on the future or look back in time (Goldin-Meadow, 2003). This means that sign languages fulfil the same purposes as spoken languages and should thus be regarded as a real and complex languages.

As mentioned above, Stokoe shook the world with his publication on the structure of sign language. Where it was considered as a simplistic way of communication by conveying whole images, his work proofed that sign languages were much more complex and had rules and structure just like spoken languages. In the next part Stokoe's findings on phonemes are discussed as well as some other characteristics of sign language. At the same time, the similarities and differences between spoken language and signed languages is discussed. It is important to see how sign language is comparable to spoken language and should thus also be regarded as such.

Phonemes: the five parameters
The smallest level of any language is the phonemic level (Goldin-Meadow, 2003). Phonemes are the smallest meaningless units of a language. In spoken languages these are the sounds of that particular language. Sounds on their own do not have meaning, but putting them together creates words. At first glance sign languages do not seem to have meaningless units as many signs seem to convey a whole message. Still, Stokoe discovered five parameters that make up all signs. Stokoe named these: handshape, movement, location, palm-orientation and non-manual signs. On their own a parameter means nothing, but together they create signs and can also make the difference between almost identical signs, so-called minimal pairs.

Handshape is the shape the hand makes during the sign (Goldin-Meadow, 2003). There are many different handshapes and these can differ per sign language. Just like spoken languages have different sounds in their inventory. Common handshapes are a fist and an open hand with fingers spread or not or an L-form as shown in Figure 1 below. Figure one showcases three handshapes found in ASL but are also common handshapes in other sign languages.. The second parameter is the movement. As the name suggests, this is the movement within the sign, the movement the hand(s) make. This can be a single short

movement, or a more continuous movement were the movement is repeated for a few times. Movements can be up and down, sideways, a type of circle motions and many more. The movement can be done with only one hand or done with two. The third parameter is location. Again, the name is very transparent and refers to the location where the sign is made. Most signs are made within what is called the 'signing space' (see Fig. 2). This space covers the area of the top of the head, shoulders and the chest area of the signer. Signs are not only made on the body, but also slightly away from the body, creating 3D signing space as shown in Figure 2. The signing space is the neutral space for signing. Very few signs are made outside of this space.
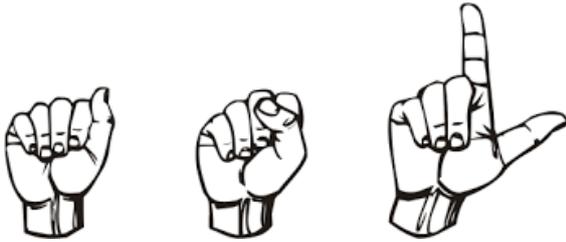
Fig. 1 Examples of handshapes in ASL

Fig. 2: The signing space (taken from Nijen Twilhaar, 2009)

Location, the third parameter, can be anywhere on the upper body or the face, on the arms or in a neutral space. This neutral space is in front of the chest. The lower body is rarely used for signs. The most likely explanation for this is that the lower body is hard to see when signing with a partner. Signers are often mostly focussed on the face, in particular around the eyes (Emmorey, 2008) which means that signs that are made around the face or the upper body are much easier to see and take in than signs made on the lower body and require the conversation partner to move their eyes away from the face. The face is important in sign language as it conveys extra meaning, usually adjectives and adverbs but it can also show grammatical information (Baker-Schenk, 1985).

The fourth parameter Stokoe described, is palm-orientation. Palm-orientation, as the name suggest, refers to the way the palm is orientated. Some signs require the hand to face

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outwards, as is the norm for finger spelling, while some require the hand to face to the signer. This distinction can make the difference between FIVE and TEN in sign language of the Netherlands. In some signs the palm faces upwards while in others the palm should face the ground.

The fifth parameter are non-manual markers. Non-manual means that these are markers that are not made by the hand but are for example expressed in the face or with the stance of the signer. A signer can use facial expression to show adjectives and adverbs. (Baker-Schenk, 1985) For example, a happy face shows that the action was done happily while a sad facial expression can show the opposite. Facial expressions can also be more grammatical in function, so can furrowed eyebrows signal a wh-question while raised eyebrows can signal a yes/no question in ASL.

The five phonemes mentioned here are based on the five categories Stokoe distinguished. Currently, there are even more ways researchers can categorise different signs but most are related to handshape. It is not necessary to go into detail as this would fall outside of the scope of the current study. To give an example of how these parameter can be further divided in subcategories, it is possible to note which fingers are selected in a sign or how big the aperture is within a handshape. These details can be very helpful in categorising signs but do not add to the current study.

These findings by Stokoe are to show that sign language is indeed real languages in that they have similar features as spoken languages and are also structured like them. These phonemes were proof that signs were not complex pantomimes but part of a visual language. Stokoe changed the way people think about what counts as language.

Besides the important discovery of phonemes, other characteristics of sign languages also solidify sign language as a real language. Sign language can make distinctions between nouns and verb and has a way to inflect verbs. Verb inflections are made by changing the direction, location and/or orientation of the sign toward the recipient in question. When wanting to sign I GIVE YOU, a signer will make the verb TO GIVE and will make this while moving toward to the conversation partner. To sign YOU GIVE HIM, the signer will make a motion from the person he or she is talking to, towards a third person that may or may not be in the existing space (Goldin-Meadow, 2003). Verbs can also have morphemes. Bound morphemes are small units of a language that can be added to words to add meaning. They have a meaning on their own but cannot stand on their own. In English the plural -s is a morpheme as well as -ing which denotes a continuous motion. In spoken languages, these morphemes are added to words, often at the end, while in sing languages these morphemes are incorporated into the sign (Goldin-Meadow, 2003). This can be done by continuously repeating a verb or by repeating the sign for a noun to express a multitude.

The iconic signs

The most striking feature of sign language for many that get in contact with it, is probably the icnonicity of many of the signs. For adults learning or seeing sign language, they will find themselves being able to tell or guess what a sign means based on the link to the real-world referent. An example may be the sign for CAR in sign language of the Netherlands. This sign is made by holding an imaginary steering wheel, an action that very much mimics the real-world action of driving. The high number of iconic signs was also the reason why sign languages for long were regarded as being complex pantomimes. In spoken languages, the link between word and referent is arbitrary. This means that there is no link between the form of the word and the referent. For example, there is nothing in the word *car* that represents the actual form of a car. Exceptions to this rule this are onomatopoeia. These are descriptions of

sounds that do represent the actual sound. It may be surprising, but signs are not always iconic. Many of the signs found in signed languages are as arbitrary as words in spoken languages (Goldin-Meadow, 2003).

It is important to note, however, that sign languages are not simply derived from the spoken language of their surroundings (Goldin-Meadow, 2003). So is ASL not simply a manual version of American English and sign language of the Netherlands is not simply the visual version of Dutch. The most notable evidence is the fact that although sign languages and spoken languages share similar structures, ASL has a different word order than American English. This same phenomenon can be found with Dutch and the sign language of the Netherlands where Dutch employs an SOV order with verb second while sign language of the Netherlands usually uses an SOV word order.

2.3 Spoken language acquisition

To understand more about sign language acquisition, it is good to have a referent to spoken language acquisition that is seen as the norm. This allows for a comparison of developmental stages between signed and spoken language acquisition. This helps setting up the current study as it is important to understand what developments children go through at what ages and how this may affect language acquisition.

Spoken language acquisition starts in the womb (Goldin-Meadow, 2003). In the womb the child is able to pick up the prosodic structure of the language it is surrounded by. The prosodic structure of a language covers intonation, tempo and pitch, among other features. Studies done on new-born babies have shown that babies exposed to their own language outside the womb are much more excited than when they are exposed to a language they have not heard while in the womb (Goldin-Meadow, 2003). Babies seem to favour the familiar, so this evidence suggests that babies already pick up their native language far before they are born. Of course, deaf children are unable to pick up the language around them and are also not able to pick up any sign language before they are born.

Hearing children do not specify between sounds until around six months of age. Before this, babies are open to all sounds and can distinguish between contrasts that are not native to their own language (Goldin-Meadow, 2005; Clark, 2009). So is a baby able to distinguish between contrasts found in Hindi or Mandarin Chinese which is almost impossible for any adult that is not native to that language. After the six months mark, the child learns the sounds of their native language as well as learns how to produce those sounds. This is the babbling stage as they are not able to produce a recognisable word until they are around one years old. The interaction between mother and child has mostly been face-to-face in the first few months, but around the six months mark, the attention pattern changes (Waxman, 1997). The child starts to become more and more interested in objects that are around and will want to look at the world surrounding them. Parents will find it harder and harder to get the full attention from the child and face-to-face interaction decreases.

Around their first birthday, children start to produce single words in isolation. In some cases, these words are not real words, but so-called proto-words. These words may not even resemble real words or be verbal at all but they do convey meaning for the child (Goldin-Meadow, 2003; Clark, 2009). At this point, children are able to somehow zero in on the exact meaning of different words. They are able to understand that *dog* refers to the whole animal and not just a part of the animal such as the leg or tail. It is possible that children have an innate constraint or device that helps with their understanding or it might be context related. The current debate on how words are exactly acquired falls outside the scope of this thesis. What is clear is that words only appear in certain linguistic contexts and these frameworks help children narrow down the possible meanings of the word. So can a parent refer to a nice

dog on the street, but then say that the child has to be careful petting the head of him. These frameworks help defining the exact meaning of words.

After this, children learn that words can be made up of different parts, the morphemes. Children that acquire English, learn that -s at the end of words adds a form of plurality. Young children often take these rules and overuse them, creating new words. This makes it not unusual to hear children say *foots or *eated (Goldin-Meadow, 2003). It is clear from these words that children learned about using -ed to turn verbs into the past tense and that adding an -s generally creates a plural form. They apply the rules they know to every word, until they are corrected by adults that something is not correct. This makes that children usually learn the exceptions of rules much later than they learn these rules in general. This phenomenon has also been tested by researchers using a specially designed test that. (Goldin-Meadow, 2003). The 'wug-test' was developed to test whether children would use these language rules on nonsensical words that do not exist in the language. The results show that children do apply the rules the know. Also, the reverse wug-test, that tested whether children could derive meaning from different words based on the morphemes of their language, showed that children understood how morphemes work and were able to correctly identify their meaning. Instead of asking children to make new words based on meaning, they were now given the word and then asked to choose from two different pictures depicting two different meanings of the word. These tests have shown that at this age, children do have the skill and knowledge to work with different levels of their language.

Around 1,5 years of age, children move from the one-word stage to the two-word stage and start to string together short phrases. Interestingly, the order of these words are usually syntactically correct. Meaning that even if a child can string together nouns and adjectives, or verbs and adverbs, they order of these, is usually syntactically correct and following the same patterns as adults. Children do ask for a 'blue ball', but rarely for a 'ball blue' in English. Around their third birthday children are able to make full, syntactically correct sentences and can interpret subtleties in a sentence. This means that around this age, a child has the skills and knowledge to have an adult-like conversation with others (Clark, 2009). The vocabulary is not yet adult like, but the child is able to use full sentences with ease.

2.4 Sign language acquisition

Spoken language acquisition starts before birth, but because of the nature of sign language, deaf babies cannot start the acquisition process until after birth. This may seem like a large disadvantage, but it takes hearing children half a year to start recognising and producing the sounds of the language. This leaves a similar timeframe for deaf children to start the acquisition of sign language.

When a baby is exposed to sign language from birth, it seems that they go through the same developmental stages as hearing children do and the acquisition of sign language is not delayed (Meier, 2016). Just like hearing children start to babble and experiment with the different sounds of their language, children exposed to sign language will move their hands and fingers in a meaningless way. This manual babbling then turns into single signs just like the babbling of hearing children turns into their first words around 12 months. Both deaf and hearing children get to this stage at the same time although signs are made slightly earlier than hearing children produce their first words. (Goldin-Meadow, 2003; Meier, 2016). This might be because manual signs require less fine motor skills than producing sounds does. The iconicity of certain signs might seem as an important contributing factor to this earlier development of sign. Surprisingly, children do not necessarily acquire iconic signs first and arbitrary signs later. Only a third of the initial signs, are iconic (Goldin-Meadow, 2003) and these cover the same objects as hearing children talk about at that age. Children learn the

words for objects they see every day. Words like *milk, ball, bear* or *food.* It just happens to be that in sign language these words are also iconic. It seems that to children acquiring sign language, iconicity is not necessarily an advantage as there is no evidence that iconic sign are learned earlier because of the iconicity of them.

Just like hearing children, deaf children go from the one-word stage to the two-word stage as well as moving on to this stage around the same age, around the twenty-four month mark (Meier, 2016). When making two signs, the signs usually follow a certain pattern that follows certain rules, even if the input they receive is rather flexible (Goldin-Meadow, 2003). Children seem to favour the most unmarked and neutral word order they know. This means that children who learn ASL fall back on SVO word order, while the children learning sign language of the Netherlands fall back on SOV word order. This means that around 30 months, deaf children are familiar with the most common word order pattern and use these correctly (Meier, 2016).

Language acquisition continues the rest of someone's life (see Meier, 2016), but for this thesis only early language acquisition fall within the scope of this study. Therefore are later developmental stages not discussed further.

It seems that generally, children that are exposed to sign language from birth develop their language in the same way and in the same pace as hearing children develop their spoken language. This points towards sign language being just like any spoken language and that there seems no reason for a child to fall behind on language development just because it is learning a sign language. The trick is that these developmental stages line up, only when babies are exposed to the language from birth. Problems can arise when a child does not immediately have the correct input. The problems that may arise when a deaf child is not exposed to a sign language early on or when the use of sign languages is not normalised, are discussed in the following chapter.

Chapter 3: Teaching a child to focus

In the previous sections, the acquisition process of both spoken and signed language is described. The chapter showed that there seems to be only a small number of essential differences in the acquisition process besides the difference in modality. This is confirmed when looking at the language characteristics of signed languages. Sign languages and spoken languages have many similarities and share the same concepts such as phonemes, grammar and syntactic rules. The previous sections focussed on the similarities between the two modalities, but there is one important factor that differentiates between spoken and signed language that has not been discussed yet: the need to divide attention in signed language. With this is meant that people that use sign language, mostly rely on the visual modality for information. Information in the form of language input but also to take in the world around them. This can cause problems for young children when they try to divide their attention between objects of interest and signed input. The skill to successfully divide attention between objects is thought to be the foundation of other skills as well such as reading (Bodner-Johnson & Sass-Lehrer, 2003). Sadly hearing parents seem to often struggle with this aspect. It is an aspect new to them, and without any experience is it hard for parents to teach this skill to their children (Guarinello, 2006).

Almost all deaf children born in the USA, are born into hearing families (Depowski, 2015). These families usually have no prior experience with sign language and must find a

way to adjust to the hearing status of their child. Still, many parents seem to naturally make adjustments to their behaviour when communicating with their deaf infant. They often exaggerate their movements and gestures (koester et al. 1998) or they may place objects in the child's line of vision or use a physical touch to gain the attention of their child (Waxman and Spencer, 1997).

Still, many studies have found that there are major differences in terms of communication style and strategies between parents that differ in hearing status from their child, and those that do not. And even between those parents that share their hearing status with their child, studies have found differences between hearing dyads and deaf dyads is certain aspects. Below are some examples of the variation found in previous studies.

3.2 What hearing parents do

In general, first communication between a mother and parent is eye-to-eye contact (Bruner, 1983). This is the main form of communication for the first few months, after which the mother starts introducing objects that are usually placed between her and the infant. At this point, spoken language is introduced to the child and it learns to connect sounds to meaning or reaction. Next, the mother begins to routinely prepare the child to react to sounds or words when the child does not have eye-contact with her. This is usually the child's name. Slowly, small sentences and expressions are added as a vocal cue for a switch in focus (Guarinello et al, 2006).

Of course, when an infant is deaf, sound as a cue for a change in attention, most often does not work, especially if the child is unable to pick up any sound. The child is unable to comprehend these cues and has to rely on a visual type of cue. For hearing parents this can be a challenge as they are used to rely on spoken input. Surprisingly, a later study by Depowski (2015) found no evidence that hearing parents of deaf children do actually mostly speak to their deaf children. Results in this study suggest that they actively try and use a combination of audio-visual input to communicate.

The language mismatch can also lead to more serious issues in communication between parent and child. According to Spencer (1992), the characteristics of interaction between parent and child, are completely different when both mother and child share the same hearing status from those families with a language mismatch. He found that when both the child and parent are hearing, the interaction could be described as maternal responsiveness. This means that the parent responded to their child's behaviour as if it was meaningful and the mother would produce language that is meaningful to the child's object of attention. This means that a mother might react to her infant kicking his leg or would talk about the toy car the child is focussing on. In short, they respond to the actions and interests of their child.

Similar interaction patterns can be found when both the parent and the child are deaf. Just like in the previous situation deaf parents seem to respond to what their child does, but now sign instead of speak. They might sign about the child's teddy bear like hearing parent talk about the toy car. The problem arises for hearing parents with a deaf child. Instead of responding to their child, they seem to more frequently instruct and request things of their child. These parents are less patient in communication with their child than deaf mothers are and do not notice it when a child is focussed on an object (Spencer, 1992), with it missing the opportunity for language input and interaction. When they did respond to an object gaze, they often gave feedback during this gaze. This is natural, as hearing mothers do the same but deaf children need to divide their attention and cannot pick up two types of visual input that are

provided at the same time.

Spencer's study showed that hearing parents find it challenging to correctly interact with their deaf infant. The language mismatch makes it hard for the parents to use the correct approach. This is even worsened by the challenges parents face when they need the child to pay attention. According to Harris (1992), Hearing parents and deaf parents, differ immensely in terms of the successful attempts at redirecting the attention of their deaf child. In the study, patterns of attention and attention redirection were compared. Deaf and hearing mothers of 18-month olds, were asked to interact with their child and get it to switch their attention from a toy towards the mother. Focussing on the child's side of the interaction, categories were made for the reaction of the child and trigger that made a child behave a certain way. The behaviour was either *elicited*, when the mother actively sought to redirect attention, *responsive*, when the child responded to their mother without her actively seeking this out or *spontaneous* where the child spontaneously looked up at the mother without any stimulus. A fourth category encompassed any failed active attempt of the mother to redirect attention. Within these categories, subcategories focussed on the manner through which it was done. This could be a physical touch, through movement of body or hand, through object movement, through sounds or lastly, through vibration.

The results of this study showed that attracting the attention of a deaf child can be a challenge for both hearing and deaf parents alike. Most of the reactions of the children were responsive, but they sadly responded to object movement. This meant that unless the parent was able to redirect the attention from the object to her face, it did not allow for good opportunities for communication. After all, when a child is focussed on an object, they are largely unable to pick up the signed feedback from their mother. More opportunities for communication emerged when the mother elicited attention or when the child looked up to the mother spontaneously.

There are also families that do not use sign language as their main mode of communication but use an auditory-oral approach. Depowski (2015) studied how both hearing and deaf parents accommodated the needs of their deaf child. The study found that duo's of hearing mothers with hearing children (HH) actually spent more time in joint attention than deaf mothers (DD). This means that HH dyads spent the most time focussing on the same object as their child. Joint attention is an important aspect of the interaction between parent and child as it allows for language input based on the shared object of attention. This helps the acquisition of vocabulary and helps the child link sounds to meaning (DeLuzio & Girolmetto, 2006). HD dyads seem to spent less time in joint attention, which is a problem for the development of the deaf infant. For deaf children it is harder to correctly link meaning to sign as this is more complex. When a parent signs or speaks, the infant has to notice and retain this information to memory, then it has to link this to the object by shifting their focus and then have to intergrade this information (Guarinello et al, 2006). The information is always presented sequentially and makes the process more complex. It is therefore important that infants get enough opportunities to process (DeLuzio & Girolmetto, 2006).

3.3 What deaf parents do

In general, it seem that hearing parents try to adjust to their child's hearing status by exaggerating movements and gestures, communicating in an audio-visual way and by placing objects in the child's line of vision. Still, is it seems that what they do is different from what

deaf parents do, or even from what hearing parents do with their hearing children. So, then what is it that deaf parents do when interacting with their deaf child?

Deaf parents are much more patient than hearing parents (Harris, 2001; Spencer, 1992; Harris, 1992). When analysing the different characteristics of interaction between mothers and infants. Spencer (1992) coded the different types of behaviour he mothers displayed. He differentiated between 4 types of reactions: responsive, directive, waiting and continuing. He noted down the time spent in each category. The results showed that the HD dyads spent most time being directive while DD dyads spent significantly longer waiting for their child. HH dyads spent significantly more time responding to their infant (Spencer, 1992). Interestingly, DD dyads spent a significant amount of time more waiting for their child to interact than any of the other parents in the study. This might be because they are more sensitive to the attention and gaze of their child (Bodner-Johnson & Sass-Lehrer, 2003). These parents seem to constantly wait for the child to look at them instead of always eliciting a switch in attention. Being experienced with eye-gazes, they will have less trouble identifying opportunities to interact with their child as it spontaneously looks at them.

Harris also found that in the study, deaf parents were the most successful in attracting the attention of their child but were also the ones that had the most failed attempts. This means that they kept trying to elicit the correct response from their child and did not give up when this failed. Their total number of attempts at eliciting attention was more than the hearing mothers, as they kept trying the get the child to focus on them instead of letting it go (Harris, 1992). It seems that they feel the need to make sure a child learns to react to cues early on and are not deterred by a few failed attempts.

A second common feature is that deaf parents in general use different strategies when interacting with their infant. Hearing parents are used to have two modalities available to them and be able to use simultaneous communication: through visual and through audio input. Deaf parents are used to communicate only visually and thus have developed certain strategies. They will purposefully move themselves into the field of vision of the child to redirect their attention (Guarinello, 2005). This can be accompanied by a physical touch as well. When the infant has directed their attention to their mother, the mother signs the name of the object before pointing to it. This increases the chances that the child is able to make the connection between the sign and the object (Guarinello, 2005). Other parents may see that a child is focussed on an object and wait till they have the attention of their child before signing the name of the object (Harris, 2001; Spencer, 1992). This gives the child the option to fully inspect the item and train them to look at the parent for input. But, it might happen that it takes so long for a child to look up, that the link between the sign and object disappears for the child. Both strategies can be used by parents.

Deaf parents also use their body to redirect the focus of their child. They use facial expressions to attract their child's attention, especially positive facial expressions (Lartz & Lestina, 1995; Spencer, 1992). Deaf parents also do not shy away from physical contact with their child. They often touch the child's body to redirect their attention or even sign on the infants body (Harris, 2001; Spencer, 1992). Deaf parents also tend to sign slower and move their signs into the field of vision (FoV) of their child. These parents focus on producing salient and visible signs (Harris, 2001). This is probably because they are more sensitive to when their child pays attention or makes eye-contact with them. This allows for more opportunities and also better opportunities to make salient signs. Deaf mothers seem to assume that around one-and-a-half years of age, children turn to look at their mother. It is why they use more physical contact to make sure the child turns and makes eye-contact and pays

attention to the mother. Harris's study found that indeed around 18 months, some children were more attuned to their mother's signing and turned to her regularly. They will look up to their mother during play time or when walking around, seeing if their mother needs their attention to allow for input, or they might want some attention and looking at their mother has developed into a cue for this.

After the 30 month mark, usually around their third year, deaf parents expect their children to have the skills needed for an adult like conversation. The children are expected to make full, grammatical sentences and hold a conversation. Besides this, they should also be more accustomed to adult rules of interaction. This means that to get the attention of someone, a physical touch or a visual cue is used in most adult conversations.

Chapter 4: The current study

The previous chapters made clear that there are quite some differences between deaf parents raising deaf children, and hearing parents raising deaf children. In general is seems the hearing parents have trouble adjusting to the hearing status of their child. They find it hard to respond to their child's behaviour in the same way deaf parents would or hearing parents of hearing children would. This is most likely due to hearing parents not being able to identify with their child the same way due to a language mismatch. Because it has been shown, that on a language level, sign language and spoken language are very similar it is highly unlikely that there is something innate about sign language that is the reason for the problems in itself. And indeed, looking at deaf parents that raise their children using sign language, no evidence suggests that sign language in itself, causes problems. It must be due to the circumstances of a language mismatch and the little experience hearing parents have with the use of sign language that is at the root of these problems. In particular do hearing parents of deaf children find it hard to make their child pay attention, and do not know how this could be done best. They miss eye-gaze opportunities and are not persistent in redirecting their infant's attention. Being able to switch attention between different objects of interests is an important skill to have for children as it teaches them to divide their attention, and this skill can be used later in life as well, for example with reading.

It is therefore important that hearing parents learn how to teach their child to divide their attention, properly. The current study will explore this to more detail in the hope that it can provide some form of advice or direction for hearing parents of deaf children. After all, most deaf children are born to hearing parents.

To help these parents, the current study uses a corpus that is set up by the Max Planck institute and has videos of a dozen or so deaf families. These families have been filmed every other week or so, to track the acquisition process of sign language in young children. Because these families generally have deaf parents, they offer a great opportunity to observe how deaf parents teach their children to redirect their attention. The videos are filmed inside their house and without any experimental set up. This allows for a natural environment that is as close to daily life as possible. This makes the corpus an excellent point of reference and a good place to observe the natural inclinations of deaf parents when raising children.

Other studies have mostly focussed on what the difference between hearing parents and deaf parents is and what is more effective. This skips the question what deaf parents prefer to do when trying to redirect the attention of the child and how these preferences may change over time. The current study will not focus on the most effective strategies, but will take age into account to see how deaf parents may change their behaviour and their preferred strategies as the child grows older. Literature suggest that there are certain developments taking place at certain ages and that this could affect what parents expect of a child. Around nine months, the infant becomes very interested in the world around and will spend more time looking away from the parent. This means that around this age, parents need to start to actively ask for the attention of the child. Before this stage, children are mostly focussed on the parents. Another development that could affect the communication between parents and child, is around one-and-a-half years old. Around this age, the child is able to walk around freely and starts to explore the world on its own. This means that there is more often more distance between parent and child and that the parent has to adjust to this accordingly. At the same time it is expected that around this age, the child also has learned to sporadically look back to the parent without being asked to. This creates an interesting dynamic where the child will spontaneously redirect their attention, but at the same time may be further out of reach from the parent that want to cue a attention switch. A third development starts around two-and-a-half years old. Around this age, parents start to expect the child to be able to follow the same communication rules as an adult. This does not mean that a child is expected to sign like an adult, but that it is able to react to mostly visual and physical cues, just like in adult signed conversations. They are also more sensitive to different possible cues, such as an active signing pose or a slight wave of hand.

Besides looking at differences in age, the current study will also explore the affect of different activities. Three common and daily activities are explored. It is expected that the nature of the activity will also affect the type of strategies parents use to redirect the attention of their child. In a one-on-one conversation, it is expected that the strategies will mostly be visual or physical as both parties are already invested visually in each other. Contrary to playing with toys, where both parties are not invested in each other, but are focussed on items close by. Reading a story should also give way to different strategies being used, as this situation demands the constant switch in focus between the book and the parent telling the story.

In a last section, this study will also explore the position parent and child are in. In sign language, being able to pay attention to all parties involved is of huge importance as almost all communication is visual. Being able to make eye-contact is therefore really important when positioning. So far, no studies have been found that explored this part of singed interactions. The current study will provide a first look into how deaf parents make sure that a child is able to pick up sign language. Observing deaf parents may help hearing parents of deaf children.

This leaves the following research questions for this study:

1. What are the most popular strategies per age category, and how does this change

2. What are the preferred strategies for different activities (book reading, play time and conversations)?

3. What can be noted about the positioning of child and parent?

It is expected that parents prefer different strategies as their child grows up. Because physical touches and visual cues are used in adult conversations as well, it is expected that these are preferred in general. Other strategies are expected to be mostly used when the child is younger because at that age the child still needs to learn how to divide attention and what the cues for this are. Especially in the videos of two-and-a-half year old, it is expected that physical and visual touches are the most common strategies.

In terms of activities, the ones chosen for this study, vary in terms of complexity. It is expected that the least complex activity, holding a conversation, will have mostly visual cues as this is the main aspect of interaction. For the most complex activity, a book story, it is expected that parents would favour physical touches of visual ones.

For positions, it is naturally expected that parents try to position themselves and the child so they can both see each other's face. Besides this expectation, it is also expected that at an older age, the child will position themselves in a more appropriate way than when they are younger.

4.2 Methodology

The purpose of this study is mostly exploratory, as very few studies have looked into the different techniques deaf parents use to attract and keep the attention of young children. So far, no known study has focussed on these techniques' relation to age or activity. For this reason, the following research questions will be answered in this thesis.

1. What are the most popular strategies per age category, and how does this change
2. What are the preferred strategies for different activities (book reading, play time and conversations)?
3. What can be noted about the positioning of child and parent?

The first two questions focus on how parents learn their children that they should pay attention to their parents when they are signing but also to pick up any cues that arise when someone wants to sign. With this is meant that children should learn to be sensitive to people signing and wanting to sign. This eases the communication process when a child can easily focus on the signer when they need to.

The focus a child has, grows over time. A young child cannot be expected to be as focused as a three-year-old. It is also something that needs to be specifically taught as otherwise, children do not learn to keep eye-contact and/or attention. This is why the first part will look at the strategies that are used over time by the parents. This may show whether parents change strategies as a child becomes older and needs fewer reminders, or if they stick to a certain strategy for the sake of consistence for example.

The second research question deal with a similar situation, but instead of looking

differences per age category, this focuses on three different types of activities, parents often engage in with their children. The three activities choses for this study are: book reading, play time and some form of daily conversations. These activities were chosen as they were thought to be common activities parent and children are involved in together, but also because they can offer a variety of interaction forms. Book reading focusses on how parents interact with the child while both also need to focus on the book. This activity is the most complex and interesting one, as it forces both parent and child to share an object of attention, the book, but also to keep changing their attention from to book to each other as the story is told in sign language. The book supplies a certain story, certain information, that the parent wants to convey to the child. This forces the child to either solely focus on the sign input from the parent or to constantly switch their attention between the signs and the book. The main interest is how parents switch their focus and that of the child between the book and themselves.

The third research question focusses more on the position between parents and children to ensure easy communication. Parents may make sure that the child is always facing the parent, or maybe they will make sure the child turn whenever they need to. This third part will mainly focus on the position and how this may also affect the strategies used by the parents.

The data

The data used for this study comes from a large database set up by Radboud University. IPROSLA is part of a large initiative to learn more about the acquisition and use of sign language in the Netherlands. IPROSLA specifically, is a database filled with 563 videos (and counting), filmed in the home environment of deaf families. These families have one or two deaf parents and may have a deaf child. These families rely on sign language to communicate within the family. The videos are filmed by one or two researchers connected to the database and were initially filmed every other week. The original goal was to film these children for the first few years, but so far, videos have been made far beyond that point. Some of the families are still in the process of being filmed as of March 2018.

So far, the database has videos from 8 different families, with some families being filmed from the first few months up to 7 years of age, while others only participated for a few months. On average, the children were followed for about four to five years, starting around five or six months old.
This allows researchers to closely follow the acquisition process and the development of the children.

It has to be noted that the videos do not focus on the development of speech in hearing children and only on sign language so there were no sessions filmed that explicitly focussed on the acquisition of speech in deaf families. The database is also fairly new and not yet used. This means that the clips are not yet annotated with any type of information

The families

For this particular study, three families were chosen based on the availability of the clips and the ages of the children. Based on earlier research, children go through developmental stages at specific ages. Those that could affect the focus of a child are around 9 months of age, around one-and-a-half and around two-and-a-half years of age. This means that for this study,

clips had to be available of around these ages.

There were no specific requirements for the data except for the ages of the child. Age was the main topic of interest for this study, and thus became the main requirement when selecting video clips. This allowed for variety between the families in terms of hearing status and family composition.

The first family has two children that are both in the database, known in the database as Cato and Isabel whose parents are both deaf. For this study, only the videos of Cato were used. Cato herself is hearing, as is her younger sister. The second family only has one child, Keke, who is deaf but has a CI. Her parents are both deaf as well. The third family, is Eva's family. This family has two girls, Eva and her older sister. This sister is visible in videos but is not filmed for the database herself. One of the parents is deaf, the other is hearing but was raised in a deaf family, a CODA (Child Of Deaf Adults).

The videos from these three families that were used, were the ones that were recorded closest to the ages of nine months, one-and-a-half and two-and-a-half years old. The videos themselves ranged from only 15 minutes to just over an hour. All videos with the exception of one, displayed at least some of the activities that are needed to answer research question 2. Tables (1-3) show the length of each video and the corresponding age of the child in terms of years, months and days old.

Table 1. Length of each Cato video

Age of Cato in video (YY MM DD)		Length of video in minutes
1	00 09 17	26
2	01 06 01	61
3	02 06 09	40

table 2. Length of each Eva video

Age of Eva in video (YY MM DD)		Length of video in minutes
1	00 09 22	34
2	01 05 26	37
3	02 06 15	32

Table 3. Length of each Keke video.

Age of Keke in video (YY MM DD)		Length of video in minutes
1	00 09 13	22
2	01 06 01	15
3	02 06 09	41

The videos were received raw, meaning without any type of annotation that explains the meaning of a sign or other met information about what is happening in the video. This meant that before strategies could be analysed, these strategies first had to be categorised and

annotated in the video clips.

The annotations were done in ELAN (https://tla.mpi.nl/tools/tla-tools/elan/). ELAN is a programme developed by the Max Planck Institute for Psycholinguistics in Nijmegen, The Netherlands together with The Language Archive, to help annotate videos.

The videos were annotated for different characteristics. Firstly, annotations were made to mark what type of activity the parent and child were involved in. This could be book reading, conversation or playtime with a toy among other activities. These annotations allowed for quick access to the different activities and the strategies that were used by parents for answering research question two. Secondly, observations were made about the position of the child and parent. This could be face-to-face or maybe the child facing away from the parent. This was done with a more general goal in mind and thus small details are left out, the focus remained on the position of the child's body compared to that of the parent and when necessary the position of the head.

Thirdly, the videos were annotated for the type of strategy the parent used to gain the attention of the child. This is done in two parts. To make it clearer and easier to grasp, different strategies were divided into 5 categories. These categories were based on those used in earlier studies such as Harris (1992). The following categories were used: body, sign, sight, object and a left-over category.

The *body* category, is used for any type of strategy that relies on physically touching the child. This could be slightly tapping the arm or hand, rubbing over the arm or maybe tickling the child to pay attention. In general, any physical touch was put in this category. The next category, *sign*, has all the times parents started signing to get the attention or when the parents actively modified their signs to make a child look at them. This could be enlarging a sign, repeating it or using it outside the usual sign place. The third category focused on the sight of the child. In this case, parents would make effort to redirect the line of vision of the child, often by pointing towards an item, or by moving an item towards their own face. Another common strategy is waiting in an active position or starting to sign waiting for the child to redirect their focus. The last real category is the category reserved for strategies that involve manipulating an object. For example, a parent may play with a toy car. The fifth category was used to place any strategy that could not easily be placed in any of the other categories. It turned out that most of the strategies used some type of sound or vibration to gain attention of the child. Below is table 4 with the five created categories and some examples of strategies that belong to each.

Table 4. The five categories with examples

Body	**Sign**	**sight**	**Object**	**Misc.**
Touching the child's arm	Repeating a sign	Moving a toy in front of the child to pull the attention towards something	Pointing towards the object of attention	Hitting a table or chair to create sound or vibrations
Softly rubbing the child's back	Exaggerating a sign	Wriggling the fingers on the edge of the FoV of the child	Interacting with the toys	Making noise through calling the child
Tapping the	Signing away	Waving a hand		

hand of a child	from the usual signing place	close to the child		
		Moving into an active signing position		

 In some cases parents used strategies that could fit in more than one category by combining different strategies or were a combination of two or more actions in quick succession. In the first case, both actions were annotated in the same annotation. For example a parent may be physically touch the infant as well as moving themselves into the line of sight of the child. This particular example would be annotated to be belonging to both the physical category as the visual one. These were later analysed as being two separate strategies since parents felt the need to use two or more strategies and it felt like the most appropriate way of analysing. When multiple actions were observed, and with multiple is meant that there were several distinct actions in very quick succession without more than a second or so in between, they were annotated as multiple actions within one annotation to differentiate them from distinct actions following each other. For example, a parent might tap a child followed by immediately rubbing the arm softly. Like the ones discussed previously, these would be annotated in a single annotation in the form of body + body.

Besides annotating the clips with these five categories, annotations were also used to give a more detailed description of the strategy used by the parent. This could be a simple "pointing to book" or "waving hands" or a more complex "parent softly taps the child's arm." This allows for a more detailed look at what parents do and how this varies between families.

Research questions one and two were mainly answered using the five categories as these allowed for easy analyses. Research question three will be more qualitative of nature to allow for interpretation of the detailed information on position.

What was annotated were only interactions that were initiated by the parent. These were actions to attract the attention of the child in a certain way. This means that interaction initiated by the child is not taken into account for this study. Interaction between siblings or interaction with a researcher visible in the video, was also ignored for the purpose of this study. On top of that, the actions performed by the parents also had to be clearly visible on the video. When there was any doubt about the exact action because the image was obstructed or because of a wrong camera angle, no annotation was made.

Because of the small number of participants, it is not useful to apply any type of statistical test to test significance or correlation. There is just too much variety within and between subjects, no clear conclusions would come from it. That is why the results will be described and analysed hereafter.

Chapter 5: Results

Data per participant per video

Cato

Table 5. CATO 00 09 17

Body	Sign	Sight	Object	Misc.	**Total**
30 (19,11%)	64 (40,76%)	18 (11,46 %)	38 (24,20 %)	7 (4,46%)	**157**

Table 6. CATO 010601

Body	Sign	Sight	Object	Misc.	**total**
24 (31,58%)	5 (6,58%)	5 (6,58%)	40 (52, 63%)	2 (2,63%)	**76**

table 7. CATO 020609

Body	Sign	Sight	Object	Misc.	**total**
22 (35,48%)	5 (8,06%)	14 (22,58%)	9 (14,52)	12 (19,35)	**62**

Table 5 shows that this video had a total of 157 times a strategy was used by the parents. Of the total, a physical touch was used 30 times, this equals about 19 percent of the total amount. The parent used a variation on normal signs 64 times (40,76%) while playing with the line of sight of the infant 18 times (11, 46%). An object was used to attract attention 38 times (24,20%) and used a strategy that could not be place under one of the other headers seven times (4,46%). The most frequently used category at this time was the category *sign* what equals to almost 41% of the total number of tries.

Table 6 shows that the total number of tries has decreased and that there also seems to be a shift visible. In this video where the child is 18 months, the parents mostly used an object to redirect attention. This strategy was used 40 times which is 52,63 percent of the total number of tries. the category *body* has the next most number of tries, 24 times in this video (31,58%). In third place are the categories *sign and sight* that both were used 5 times (6,58%). The category *miscellaneous* was used the least; only 2 times did parents use a strategy that could not be placed under one of the other categories.

The numbers in table 7, total to 62 times that a parents tried to redirect attention. The parent used a physical strategy the most: 22 times (35,48%). The next most used strategy, was the one that involved the line of sight of the child. The parents used this one 14 times (22,58%). Interestingly, the parent used miscellaneous strategies almost as often. They tried attracting attention this way 12 times (19,35%). The last two categories that were used lest were surprisingly *object and sign*, each used 9 and 5 times respectively. This comes down to 14,52 and 8,06 percent respectively.

The data is summarised in the following graph
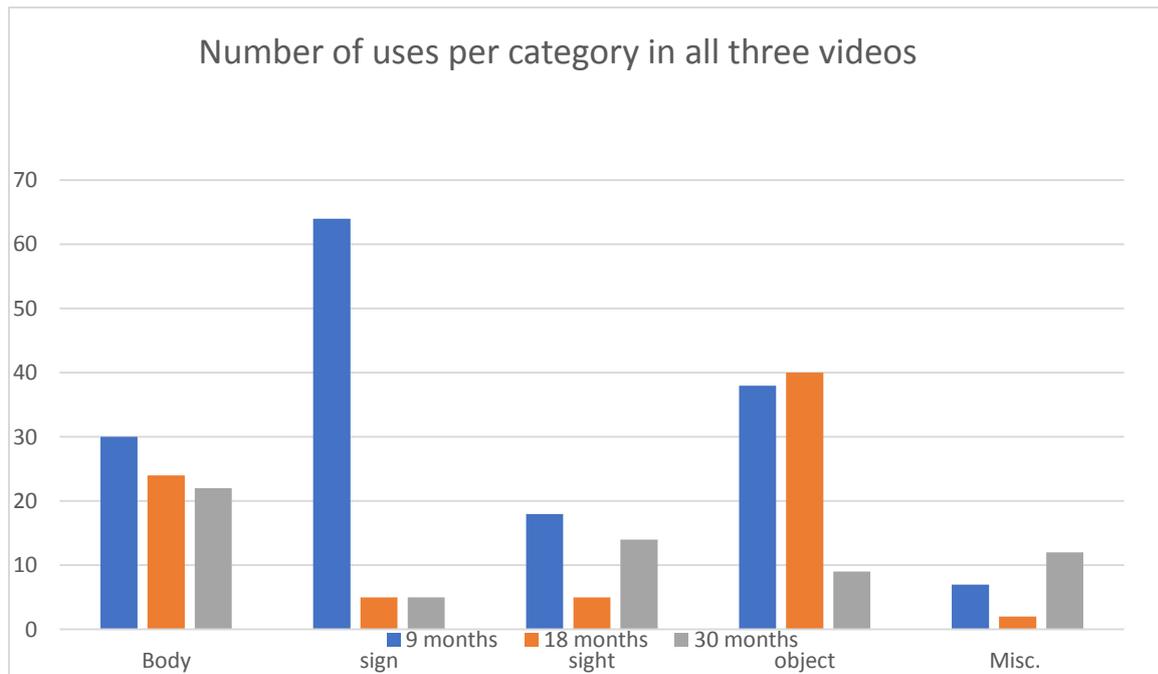
Fig. 3 number of uses in the Cato videos

Eva

Table 8. EVA 00 09 22

Body	Sign	Sight	Object	Misc.	total
14 (14,14)	13 (13,13)	35 (35,35)	25 (25,25)	12 (12,12)	**99**

Table 9. EVA 01 05 25

Body	Sign	Sight	Object	Misc.	total
24 (39,34)	6 (9,84)	4 (6,56)	27 (44,26)	0	**61**

Table 10. EVA 02 06 15

Body	Sign	Sight	Object	Misc.	total
24 (48,98)	0	18 (36,73)	6 (12,24)	1 (2,04)	**49**

Table 8 shows the resultsof Eva at nine months of age. In this video, the category *sight* was used the most. 35 times (35,35%) tried the parents redirect the infant's attention by playing in or at the edge of her field of vision. The parents also used objects often to redirect attention: 25 times were objects used (25,25%). The rest of the categories are really close to each other in terms of number of tries. *Body, sign and miscellaneous* were used 14, 13 and 12 times respectively.

Table 9 shows the results from the video made at around 18 months of age. In this video, parents mostly used objects to redirect attention. This strategy was counted 27 times (44,26%). A close second is the use of physical touch. This was used 24 times (39,34%). The other

categories were used much less. *Sign* was used six times, *sight* only four times and there were no visible strategies that felt under the category miscellaneous.

Table 10 shows the number of strategies used at two-and-a-half years of age. The total number of times a strategy was used is only 49. Of this 49, 24 times the parents used a physical touch to redirect the attention. This is almost 50 percent of the time. *Sight* was the second largest category, used 18 times (36,73%) throughout the video. Objects were only used in six cases (12,24%) and there was one instance of a strategy that fell under miscellaneous (2,04%). In this video there were no instances that fell under the category *sign*.

The data above is summarised in a graph below
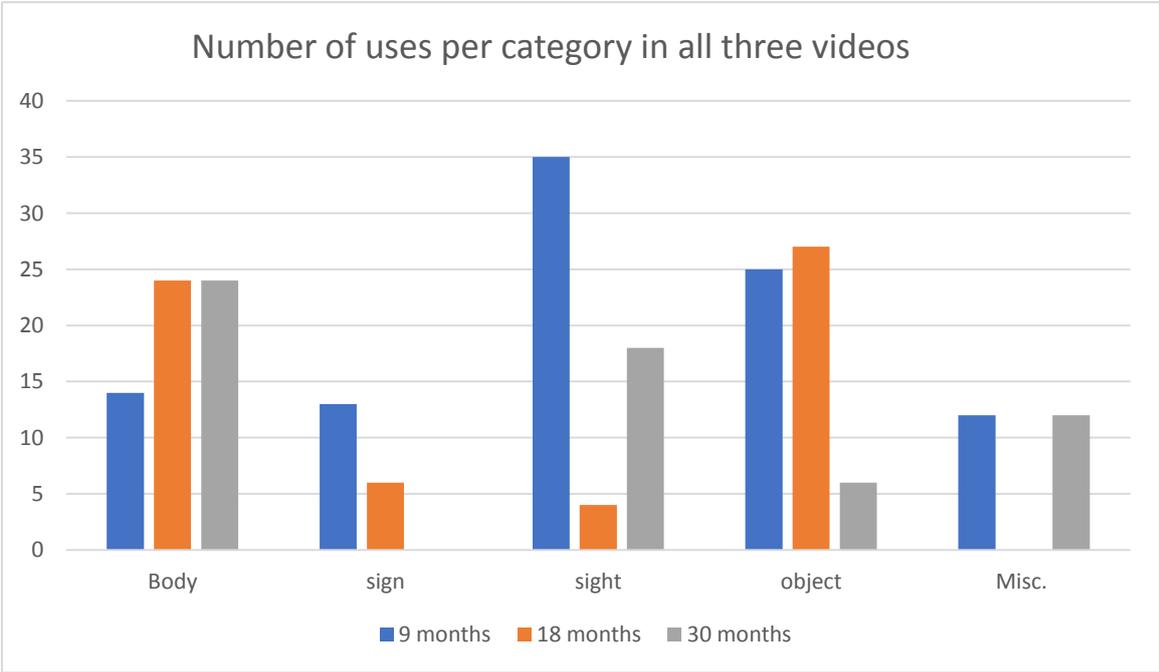
Fig. 4 number if uses in the Eva videos

Keke

Table 11. KEKE 00 09 13

Body	Sign	Sight	Object	Misc.	total
28 (25,45)	14 (12,73)	31 (28,18)	31 (28,18)	6 (5,45)	**110**

Table 12. KEKE 01 06 01

Body	Sign	Sight	Object	Misc.	total
7 (29,17)	0	10 (41,67)	2 (8,33)	5 (20,83)	**24**

Table 13. KEKE 02 06 2

Body	Sign	Sight	Object	Misc.	total
24 (35,29)	4 (5,88)	14 (20,59)	23 (33,82)	3 (4,41)	**68**

Table 11 shows the data associated with the video of Keke at nine months of age. This video had a total number of 110 times the parents tried to redirect attention. The parents mostly used strategies that belong to the categories *sight and object*. This means that they mostly tried to use moving or pointing towards object or they made gestures or made hand gestures in the infant's line of sight to redirect attention. These categories were both used 31 times (28,18%) each. Almost equally as popular was the use of physical touches to redirect attention. 28 times did the parents use a physical touch. *Sign* was a less popular category and only 14 tries belong to this category. The parents did make use of strategies that were miscellaneous. Six of the attempts to redirect attention belong to this category.

Table 12 shows the data from when Keke is about one-and-a-half years old. This video only has 24 instances of attention redirection. The most popular type of strategy in this video is *sight*. The parents used this type of strategy 10 times (41,67%) throughout the video. The category *body* was the next favourite category, with 7 tries throughout the video. In this video, the parents used miscellaneous strategies five times (20,83%). Interestingly, objects were only used 2 times to make the child switch attention and there were no visible attempts that involved the modification of signs.

Table 13 is the last table in this dataset. In total, there were 68 attempts at redirecting the attention of the child. The most popular way, was through physical touch as this category was counted 24 times (35,29%). Close behind is the category *object* with 23 attempts in this category. The category *sight* fall right in the middle with 14 attempts while the categories *sign and miscellaneous* were only used 4 and 3 times respectively.

The keke data in the tables above are also summarised in a graph
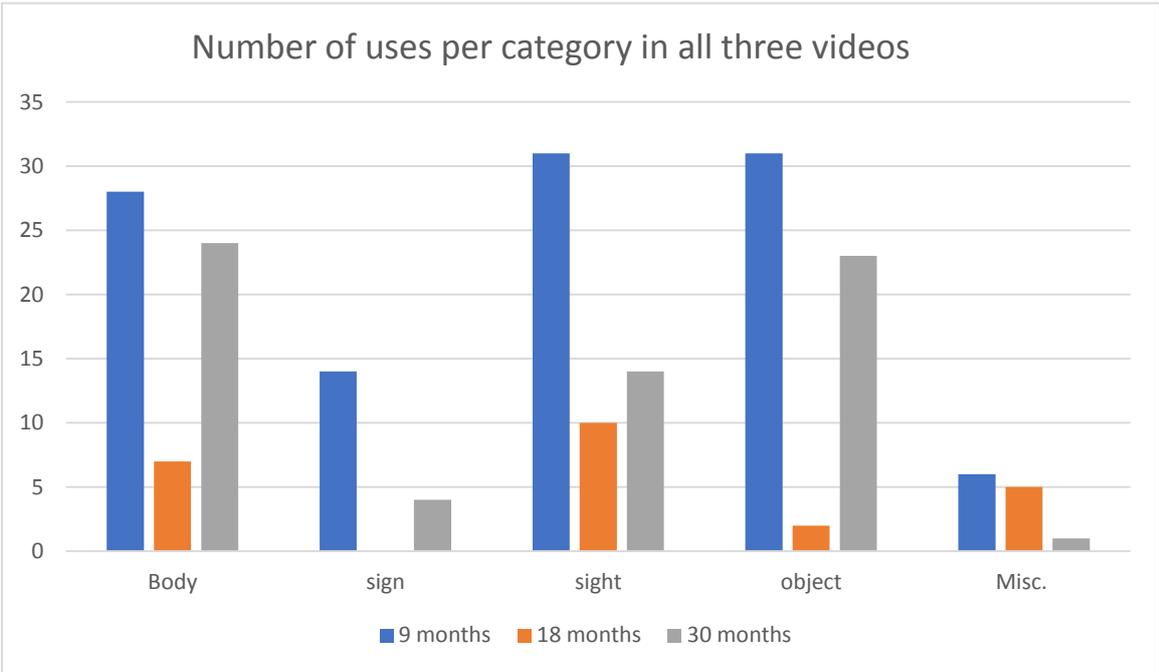
Fig. 5 number of uses in the Keke videos

Data per activity per participant

Table 14. CATO READ

	Body	Sign	Sight	Object	Misc.	**total**	Time (min)
1	6	46	4	25	5	**86**	10
2	2 + 13	1 + 4	1 + 2	12 + 22	0 + 2	**16 + 43**	5+ 10
3	4 + 1	0 + 0	1 + 0	4 + 2	4 + 1	**13 + 4**	5 + 3
tot	**26 (16,05)**	**51 (31,48)**	**8 (4,94)**	**65 (40,12)**	**12 (7,41)**	**162**	**33 min**

Table 15. CATO PLAY

	Body	Sign	Sight	Object	Misc.	**total**	Time (min)
1	2 + 0	2 + 3	1 + 1	0 + 2	1 + 0	**6 + 6**	1 + 2
2	-	-	-	-	-	**-**	-
3	3	0	3	3	0	**9**	7
tot	**5 (23,81)**	**5 (23,81)**	**5 (23,81)**	**5 (23,81)**	**1 (4,76)**	**21**	**10 min**

Table 16. CATO TALK

	Body	Sign	Sight	Object	Misc.	**total**	Time (min)
1	1	2	1	0	1	**5**	1
2	7	0	2	5	0	**14**	4
3	0	0	1	0	0	**1**	2
tot	**8 (40,00)**	**2 (10,00)**	**4 (20,00)**	**5 (25,00)**	**1 (5,00)**	**20**	**7 min**

Table 17. EVA READ

	Body	Sign	Sight	Object	Misc.	total	Time (min)
1	-	-	-	-	-	-	-
2	4	0	2	18	0	24	6
3	8	0	6	2	1	17	10
tot	**12 (29,27)**	**0 (0,00)**	**8 (19,51)**	**20 (49,78)**	**1 (2,43)**	**41**	**16 min**

Table 18. EVA PLAY

	Body	Sign	Sight	Object	Misc.	total	Time (min)
1	-	-	-	-	-	-	-
2	13	3	0	8	0	24	7
3	-	-	-	-	-	-	-
tot	**13 (54,17)**	**3 (12,50)**	**0 (0,00**	**8 (33,33)**	**0 (0,00)**	**24**	**7 min**

Table 19. EVA TALK

	Body	Sign	Sight	Object	Misc.	total	Time (min)

1	-	-	-	-	-	-	-
2	0	1	0	4	0	5	1
3	9	0	10	3	0	22	17
tot	**9 (33,33)**	**1 (3,70)**	**10 (37,04)**	**7 (25,93)**	**0 (0,00)**	**27**	**18 min**

Table 20. KEKE PLAY

	Body	Sign	Sight	Object	Misc.	**total**	Time (min)
1	28	14	31	31	6	**110**	22
2	1 + 2	0 + 0	0 + 1	3 + 0	0 + 1	**4 + 4**	2 + 5
3	1	0	1	2	1	**5**	6
tot	**32 (26.02)**	**14 (11,38)**	**33 (26,83)**	**36 (29,27)**	**8 (6,50)**	**123**	**35 min**

Table 21. KEKE READ

	Body	Sign	Sight	Object	Misc.	**total**	Time (min)
1	-	-	-	-	-	**-**	-
2	2	0	1	2	0	**5**	4
3	3 + 12	1 + 3	3 + 9	8 + 13	0 + 1	**15 + 38**	4 + 10
tot	**17 (29,31)**	**4 (6,90)**	**13 (22,41)**	**23 (39,66)**	**1 (1,72)**	**58**	**18 min**

Table 22. KEKE TALK

	Body	Sign	Sight	Object	Misc.	**total**	Time (min)
1	-	-	-	-	-	**-**	-
2	-	-	-	-	-	**-**	-
3	7+ 1	0+ 0	1+ 0	0 + 0	0 + 0	**8 + 1**	8 + 3
tot	**8 (88,89)**	**0**	**1 (11,11)**	**0**	**0**	**9**	**11 min**

Chapter 6: Conclusion

What can be seen from the numbers discussed above, is that there is a lot of variety within these three videos. In the first video, the parents try to redirect the infant's attention 157 times, while in the third video, they tried to redirect her attention for a total of 62 times. So far, there also does not seem to be a favourite strategy that the parents use as in all three videos; a different category was used the most at each age. What is interesting is that strategies from all five categories were used, and also used multiple times. This suggests that deaf parents try in many different ways to attract attention and do not necessarily stick to one or two types.

Looking at the data associated with Eva, it is clear that there is a lot of variation in parental preferences. But, both in the Eva dataset and in the Cato data set, the categories *body and object* were generally preferred. Interesting is the last video in the Eva data set. In this video there seems a clear dividing line between the two most used strategies (*body and sight*) while the other three categories were hardly used. This could mean that the parents found these most effective for their child or were the strategies that fit their parenting style the best. Again, this study has not looked at the efficiency of different strategies. It has only counted how often a particular strategy was executed. So these high number may actually also denote

that a certain strategy did not work and had to be repeated multiple times. Even if this is the case, the fact stays that parents stuck to the strategy and found this probably to be the most useful or practical one in that situation.

The dataset associated with Keke shows a lot of variety. The total number of attempts different greatly as one video had 110 counted attempts, while another only had 24 attempts counted in total. What is also surprising, is how the number of strategies in each category differs so drastically from one video to another. Where objects were one of the most-used strategies at 9 months, this strategy was hardly found in the video filmed at 18 months. Objects were then again used a lot in the last video at two-and-a-half years of age. Something similar can be said for the use of physical touch. It is highly likely that these strange numbers are the result of a short video compared with the situation in the video.

Research question 1: What are the preferred strategies at different ages?

To answer the first research question, the data of the participants in each age category will be compared. This allows for a comparison to see whether there is a shared change going on as the child grows older or not. If a change is visible across the three families, this might mean that some types of strategies are more appropriate for a certain age or that a child has learned to react to a certain cue more than others.

9 months

Below the table that are associated with 9 months, are replicated for each participant.

Table 5. CATO 00 09 17

Body	Sign	Sight	Object	Misc.	**Total**
30 (19,11%)	64 (40,76%)	18 (11,46 %)	38 (24,20 %)	7 (4,46%)	**157**

Table 8. EVA 00 09 22

Body	Sign	Sight	Object	Misc.	**total**
14 (14,14)	13 (13,13)	35 (35,35)	25 (25,25)	12 (12,12)	**99**

Table 11. KEKE 00 09 13

Body	Sign	Sight	Object	Misc.	**total**
28 (25,45)	14 (12,73)	31 (28,18)	31 (28,18)	6 (5,45)	**110**

The first thing that stands out, is the number of total attempts at redirecting attention. The videos filmed at 9 months of age, have the largest number of total attempts, all being around a hundred or more per video. This shows that at 9 months the child is looking around. The infant is curious about the world around them and is not purely focussed on their parents anymore. If they were mostly focussed on them, then it would not be necessary to keep trying to redirect the infant's attention.

When ignoring the exact numbers that fall under each category, there seems to be

some consensus in terms of what strategies are more preferred than others. The most popular categories for each video are highlighted in the table. It seems that the families do not necessary agree on the most preferred strategy but they do agree on the general order. In all videos, the second most popular type of strategy, is the one that involves objects. It seems that at this age, because children are so interested in the world around them, parents make use of this curiosity by using small objects to attract and redirect the infant's attention. Using objects also helps build vocabulary and understanding of sign language as the child has an object to focus on and a sign to connect it to. This strategy allows for a playful way of learning sign as well as redirecting the attention. It is also less intrusive as the child is not physically touched. Still, a physical touch is the next favourite way of getting attention from an infant. At this age, the child is just starting to understand that sign language is a way of communicating and has not learned any of the cues yet. The easiest way to get an infant to look at someone, is by touching as this is a clear signal for most people as well as children. It is also the most intrusive way of attracting attention and should not be done in excess or without tact, especially when dealing with an infant. It is therefore likely that deaf parents use this tactic when an earlier less intrusive tactic did not work as planned. Deaf parents also visibly use this is the least intrusive way possible. The infant is often softly caressed, softly tapped on or even tickled. The touch is also always done in a non-intrusive place. This means that a child may be touched on the arm, hand or back, but is not touched on the face or stomach. A third overall agreement can be found in the little use of miscellaneous strategies. This of course is also partly due to the set-up of the categories for this study, but as mentioned before, many of the attempts that belong to this category are those that use a form of sound or vibrations. This category overall is rarely used and at nine months.

It may be surprising that signs are rarely used at this age to attract or redirect attention, with the exception of Cato, where the most popular strategy were modified signs. This may be because of the age of the infant. At 9 months they are just now opening up to language so signs are fairly new. It might also be personal preference of not wanting to expose the infant to incorrect signs or not being comfortable with this.

1,5 years of age

Below are the tables for each participant at 1,5 years of age.

Table 6. CATO 010601

Body	Sign	Sight	Object	Misc.	total
24 (31,58%)	5 (6,58%)	5 (6,58%)	40 (52, 63%)	2 (2,63%)	**76**

Table 9. EVA 01 05 25

Body	Sign	Sight	Object	Misc.	total
24 (39,34)	6 (9,84)	4 (6,56)	27 (44,26)	0	**61**

Table 12. KEKE 01 06 01

Body	Sign	Sight	Object	Misc.	total
7 (29,17)	0	10 (41,67)	2 (8,33)	5 (20,83)	**24**

The tables above show the number of attempts parents made to redirect attention throughout the videos.

What is most striking, is the variety between participants but also within participants. The Cato video has a total number of 76 attempts at redirecting attention. Almost all of these attempts were done with strategies that belong to two categories: 40 belong to *objects* and 24 belong to *body*. That means that only 12 attempts were done with one of the other three categories. This is a huge difference and clearly shows a preference for strategies involving physical touch or the use of objects to attract the attention of the child. A similar pattern is visible in the Eva video. Here again, almost all of the attempts are made using either a physical touch or using items. Only ten attempts were made using modified signs. On the other hand, the data from the Keke video showed a completely different picture. In this video, the parents mostly tried to redirect the attention by signing or waving their hands in or on the edge of the child's field of vision, in the hope the child would turn to make eye-contact. The use of physical touch is the second most favourite way of redirecting the attention of the child. Surprisingly, the parents also made sounds or vibration to redirect the child. It must be noted that in this video, the child is playing and walking around the living room when they move towards objects they are not supposed to touch. At this point the parents try to frantically make the child move away from these objects by making sounds and slamming their hand on furniture to create vibrations. At the same time these wild movements may have acted as visual cues. This cannot be determined by the video. This tactic does help as the child turns around after a while and leaves the objects alone. This situation has greatly increased the use of sound or other miscellaneous strategies, which may explain why the data in Keke's video is so different from the other videos.

Something else that is noteworthy, is that throughout the video, Keke's parents seem to be waiting and observing their child most of the time, only interacting sporadically. This may explain the low number of attempts at redirecting the attention of the child, together with the length of the video.

2,5 years of age

Finally, we will take a look at the tables associated with the participants at 30 months of age. Tables 6, 9 and 12 are replicated below.

Table 7. CATO 020609

Body	Sign	Sight	Object	Misc.	total
22 (35,48%)	5 (8,06%)	14 (22,58%)	9 (14,52)	12 (19,35)	**62**

Table 10. EVA 02 06 15

Body	Sign	Sight	Object	Misc.	total
24 (48,98)	0	18 (36,73)	6 (12,24)	1 (2,04)	**49**

Table 13. KEKE 02 06 2

Body	Sign	Sight	Object	Misc.	total
24 (35,29)	4 (5,88)	14 (20,59)	23 (33,82)	3 (4,41)	68

A striking find is that in all tables, the same category is marked as the most frequently used one, the preferred tactic to attract attention. In all videos, parents mostly use a physical touch to redirect attention and to make sure the child focusses on the parents when needed. What may also stand out, is that the number of attempts is decreasing as the age goes up. This indicates that the child has learned to look up at the parent without the need of a physical or visual cue from the parent and when they did get a cue, they responded without the need of an endlessly repeated cue. This makes it easier for parents to communicate with their children as they are focussed on them relatively quickly and without much need for constant reminders.

In terms of preference, physical tactics are favoured in all three videos. The second most favourite strategy seems to be what falls under the category *sight*. Even in the Keke video, where the *sight* category is in third place, it still accounts for over 20% of the total number of attempts. This can probably explained by the age of the child. Around 2,5 or 3 years of age, deaf parents seem to expect their child to communicate like an adult. With this is not meant that they should know all the signs and sign these perfectly, but that the communication rules should be established by now. In this case it means that they react to adult types of attention redirection: hand waving and slight physical touches. This idea is reflected in the tables above.

It is clear that modified signs are rarely used in all three videos, and there is not even visible evidence of it in the Eva video. This can probably be explained as well by the age of the child. By now sign language is established as a form of communication and the child is able to produce and comprehend a large number of signs. This makes modifying signs to attract attention futile and may even disrupt the acquisition process. There have been a few instances where the parents did modify the sign, but this was usually repeating the sign or signing slightly away from the normal signing space.

What is also interesting, is the drop in the use of objects to redirect the child attention. Where is was one of the most popular tactics in the earlier videos, it is now used much less compared to other strategies. Compared to the other videos, Keke's parents used objects relatively often. Again, this can be just the context of the video as for a large part of the video, the parent talks and plays with the child on the couch and somewhere in the video, the sock becomes the object of conversation and interaction. So it is possible that this caused an extremity.

It is hard to say anything about the position of the miscellaneous strategies and their position. They almost account for a fifth of the attempts in Cato's video but are rarely used in the other two videos. This is a category that is always hard to place because of the lack of definition of this category.

Strategies overall compared

Looking at the use of the different strategies in general, it is clear that there is a lot of variation between participants but also within participants. There seems to be a general consensus that strategies that involve a physical touch are always used, no matter what the age of the child is. Using objects is also a favourite tactic that is especially used before the

children are two-and-a-half years old. It is not possible to get a more detailed age due to the available data in this study. Still, the data seems to suggest that there is a change happening between 1,5 years and 2,5 years of age, where parents move from using items to redirect the child's attention to using more adult forms of attracting attention. There is also few instances found where the parents modified their signs to attract attention. This might be because parents are uncomfortable doing so, or it may just be hard to detect on the videos. Using visual cues to ask for their child's attention is also rather common throughout the videos. Especially in the later videos do parents use this type of strategy more often. This is probably because at this age, the child is familiar with the workings of sign language and the rules surrounding it. This opens up the possibility to use visual strategies as the children will be rather sensitive to visual cues by now. It is hard to say something about the last remaining category because it has multiple strategies that fall under this category. What can be said, is that the fact that this category is used by parents, means that there are some strategies that fall outside the categories established for this study. Strategies such as speaking, making vibrations or other forms of sound, where used by parents.

There is still quite some variation between participants that show that parents do not strictly follow the same development in terms of changing strategies as the child grows older. It is of course possible that once more participants are added, a clearer development is visible across participants. Some variation should always be expected, still, as this is closely related to parenting style and personal preferences.

Research question 2: The preferred strategies per activity

To understand the impact of the situation when using sign language, this study also compared three different kinds of activities that are common for parents to do with their children. These activities represent daily activities that each have specific characteristics that could affect the interaction between parent and child. So is reading a story a challenge, because both the child and the parent should focus on the book that gives information, but the child and parent must also switch their focus to each other, as the parent will give sign language input to the child. This requires both parent and child to constantly switch their focus between the book and each other, making for a complex situation. A less complex situation, is the activity playing with toys. In this activity, the child is focussed on the toys and the parent may want to either interrupt this play time or add input. Still, both parties share the same object of attention. The least complex situation is a face-to-face interaction between parent and child. Here, there are no other items that demand the attention from either party and should be relatively simple.

Of course, these are expectations. The tables below show the numbers associated with each category. These data are taken from the exact same videos as the data above, but are filtered on activity. As is apparent, not all videos showed all three activities. The amount of tries to redirect is also smaller than the total number of tries in the previous part. This is because the videos consisted of daily tasks that fell outside the three activities chosen for this study. So was there a part where the child was playing on its own while the mother was conversing with a researcher from the corpus. There was also a part where mother and child were focussed on vocabulary. This activity was a hybrid of playing with toy, interaction with the mother as well as a teaching moment. For that reason this clip, and a few others, were left out of the current analysis but was included in the one above.

One-on-one conversation

Table 16. CATO TALK

	BODY	Sign	Sight	Object	Misc.	**totaal**	Time (min)
9 months	1	**2**	1	0	1	**5**	1
18 months	**7**	0	2	5	0	**14**	4
30 months	0	0	**1**	0	0	**1**	2
tot	**8 (40,00)**	**2 (10,00**	**4 (20,00)**	**5 (25,00)**	**1 (5,00)**	**20**	**7 min**

Table 19. EVA TALK

	BODY	Sign	Sight	Object	Misc.	totaal	Time (min)
9							
18	0	1	0	4	0	5	1
30	9	0	10	3	0	22	17
tot	**9**	**1**	**10**	**7**	**0**	**27**	**18 min**

Table 22. KEKE TALK

	BODY	Sign	Sight	Object	Misc.	**totaal**	Time (min)
9	-	-	-	-	-	**-**	-
18	-	-	-	-	-	**-**	-
30	7+ 1	0+ 0	1+ 0	0 + 0	0 + 0	**8 + 1**	8 + 3
tot	**8 (88,89)**	**0**	**1 (11,11)**	**0**	**0**	**9**	**11 min**

Each table above, shows the number of strategies parents used for each of the three videos of the participant. In these tables, the first row represents the earliest video of the participant at 9 months old. The following rows represent the other videos at 18 and 30 months respectively. The table also shows the total number of attempt of each category as well as the total number of attempts in each video. Added to this is the amount of time parent and child spent doing this activity. This helps create a more complete picture.

Below is table 23. This table represents the numbers of the three tables above combined. This gives the general picture of how much time is spent doing this activity an what the total number of attempts at redirecting attention were

Table 23. Summary of total number of attempts per category

	Body	Sign	Sight	Object	Misc.	**Total**	Time (min.)
9	1	2	1	0	1	**5**	1
18	7	1	2	9	0	**19**	5
30	19	0	12	3	0	**34**	30

total	27	3	15	12	1	58	36

Table 23 shows that most attempts at redirecting attention were made using a physical touch on the body. These cover almost half of the total number of tries form parents. There is quite a big gap between the most popular tactic and the second most popular one. 15 attempts were made by obstructing the field of vision of the child. Again, this is most likely a form of waving the hand or the individual fingers to get the attention from the child. In third place is the use of objects to change the focus of the child. Modified signs or other miscellaneous strategies were barely used in this situation. This seems logical as any conversation is based on signing so any modified signs might affect the understandability of the conversation. One-on-one conversations usually also have the speakers facing each other or at least in close proximity, this makes it more likely that parents would prefer to use some form of physical touch more or wave their hand or fingers to get the attention.

Playing with toys

Below are the tables replicated from the result section.

Table 15. CATO PLAY

	BODY	Sign	Sight	Object	Misc.	**totaal**	Time (min)
1	2 + 0	2 + 3	1 + 1	0 + 2	1 + 0	**6 + 6**	1 + 2
2	-	-	-	-	-	**-**	-
3	3	0	3	3	0	**9**	7
tot	**5 (23,81)**	**5 (23,81)**	**5 (23,81)**	**5 (23,81)**	**1 (4,76)**	**21**	**10 min**

Table 18. EVA PLAY

	BODY	Sign	Sight	Object	Misc.	totaal	Time (min)
1							
2	13	3	0	8	0	24	7
3	-	-	-	-	-	-	-
tot	**13**	**3**	**0**	**8**	**0**	**24**	**7 min**

Table 21. KEKE PLAY

	BODY	Sign	Sight	Object	Misc.	**totaal**	Time (min)
1	28	14	31	31	6	**110**	22
2	1 + 2	0 + 0	0 + 1	3 + 0	0 + 1	**4 + 4**	2 + 5
3	1	0	1	2	1	**5**	6
tot	**32 (26,02)**	**14 (11,38)**	**33 (26,83)**	**36 (29,27)**	**8 (6,50)**	**123**	**35 min**

To get a better picture of what types of tactics the parents have used, the above tables are combined in table 24 below.

Table 24. Summary of total number of attempts per category

	Body	Sign	Sight	Object	Misc.	**Total**	Time (min.)
9	30	19	33	33	7	**122**	25
18	16	3	1	11	1	**32**	14
30	4	0	4	5	1	**14**	13
total	**50**	**22**	**38**	**49**	**9**	**168**	**52**

The table shows that a total of 168 attempts at redirecting the attention were made over all 9 videos. This means that there were more attempts made during play time than during one-on-one conversations in these videos. Still, the number of minutes spent playing has also increased compared to the one-on-one conversations. 168 attempts over a total of 52 minutes gives a little more than 3 attempts per minute. For each age the average comes down to a little under 5 attempts per minute, about two attempts per minute and about one attempt per minute respectively.

Looking at the table, the five categories are close in terms of number of attempts made with each tactic. The preferred strategy seems to be a physical touch but the use of objects during playtime is almost as popular under the parents. That these two come out on top is not that difficult to understand. During play time, parent and child were usually close to each other, with the child sitting in the lap of the mother or next to her. This makes physical touch an obvious choice of strategy. The use of objects is also straightforward as the child is playing with a variety of objects or toys. These objects are readily available to the parent as well. These toys were also easy topics of conversation that parents often used to ask questions or teach vocabulary to the child.

The third most popular strategy where those that fell under the category *sight*. Again, most of the found attempts were found in a single video, and the other videos barely showed any evidence for the use of this strategy during play time.

It may be surprising, that there was also regular use of modified signs during play time. As a side note, most of the attempts were made during the earliest videos. Still, modified sign are not completely out of the ordinary at later ages. As mentioned above, play time is a good opportunity to teach children new vocabulary as mother and child share the same object of interest. This makes the vocabulary acquisition process easier. This is also what I visible in some of the videos. The parents actively play with the child but also make sure they involve the correct signs. They are seen to repeat a sign, turn the sign into a mime or just enlarge the sign so it attracts attention when the child is focussed on something else.

The last strategy is the miscellaneous category. This category had not as many hits as the other categories, which shows that parents rarely used sound or vibrations during play to attract attention. This seems logical, as the parent and child were usually seated close to each other, rendering such big strategies redundant. There were instances in the video where the mother made noise to attract the attention of a sibling. This was because the younger child was seated in the lap of the mother and she was unable to move over to the sibling. This incident was not counted for this study as it involved the sibling of the participant in question.

Story time

Table 14. CATO READ

	BODY	Sign	Sight	Object	Misc.	total	Time (min)
1	6	46	4	25	5	**86**	10
2	2 + 13	1 + 4	1 + 2	12 + 22	0 + 2	**16 + 43**	5+ 10
3	4 + 1	0 + 0	1 + 0	4 + 2	4 + 1	**13 + 4**	5 + 3
tot	26 (16,05)	51 (31,48)	8 (4,94)	65 (40,12)	12 (7,41)	162	33 min

Table 17. EVA READ

	BODY	Sign	Sight	Object	Misc.	total	Time (min)
1	-	-	-	-	-	-	-
2	4	0	2	18	0	24	6
3	8	0	6	2	1	17	10
tot	12	0	8	20	1	41	16 min

Table 21. KEKE READ

	BODY	Sign	Sight	Object	Misc.	total	Time (min)
1	-	-	-	-	-	-	-
2	2	0	1	2	0	5	4
3	3 + 12	1 + 3	3 + 9	8 + 13	0 + 1	15 + 38	4 + 10
tot	17 (29,31)	4 (6,90)	13 (22,41)	23 (39,66)	1 (1,72)	58	18 min

Below is a table that shows the total number of tries taken from all nine videos.

Table 25. Summary of total number of attempts per category

	BODY	Sign	Sight	Object	Misc.	total	Time (min)
1	6	46	4	25	5	**86**	10
2	21	5	6	40	2	**74**	25
3	28	4	19	29	7	**87**	32
tot	55	45	29	94	14	247	67

The total to the right of the table, shows that this activity has the largest number of attempts at redirecting attention compared to the other activities discussed above. This was expected as this is the most complex activity of the three. The children and the parents have to constantly switch between the book as their main focus and each other for signing input. Because of this constant switch in attention, parents have to keep reminding children to switch their attention from the book towards themselves and back.

The total average attempts per minute is between 3 and 4. Per age category the average is over eight attempts at 9 months old and almost 3 attempts a minute at 18 and 30 months of age.

The strategy that was most preferred by the parents is the one involving objects. This is obvious as using a book in itself is using an item to redirect the attention of child. It is therefore rather straightforward that this category would turn out to be the most used one.

There is a gap between the most favourite strategy and the runner-up, but it seems that physical touch is still commonly used throughout the videos. This again is probably due to the close proximity of the parent and the child. In most cases was the child seated on the lap of the parent or right next to them. Being so close to each other and often facing the same direction, makes a physical touch the most obvious choice when parents need their child to pay attention.

The third most common tactic, was the modification of signs during the story. A reason for this might be the creative nature of storytelling. Just like hearing parents might use exaggerated language while reading a story to their children, deaf parents will make the story more interesting by exaggerating the signs.

Sight was used more sporadically throughout the videos. This may be due to the position parents and child were in, where the child is facing away from the parent and both are focussed on the book.

Although there were not a lot of instances where parents used other strategies, the number is higher for this activity than the other activities discussed above. This is probably because storytelling allows for parents to be creative in their signing and communicating. Just as hearing parents may do with hearing children, deaf parents may make noises that mimic the object in the book, or they may make other sounds that draw a child into the story. Story times allows parents to be creative when drawing their children's attention.

Looking at the data from a more general perspective, the results give some sort of preference for each activity. Generally, the data indicates that a physical touch is always a favoured tactic. This strategy was the favourite one to use in one-on-one conversations and during play time. During storytelling time was it only second to using objects. This was probably due to the obvious item within reach, the book, that is the centre of attention during storytelling time and should be referred to regularly. This makes it seem that the use of physical touch is not necessarily affected by the type of activity, or at least not by the type of activity presented in this study.

Objects were also regularly used to redirect the attention of the child. It should come as no surprise that this was mostly done during play time and during storytelling times. During these activities, the parent and child already had obvious items that could be used to draw attention. The parent and child were focussed on the same items, after all. This makes for an obvious choice to use items such as toys and books to attract the attention from their child. This reasoning can also be found in the lack of item-use during conversations. Conversations may refer to objects near the pair, but are not obvious to use to redirect attention. This is why it is much more common to wave a hand or fingers during a conversation, even if it is with a young child. This also mimics adult interaction and teaches the child how to behave in these situations. Modified signs were rarely used during play or conversations. It was used mostly during storytelling time. This may be because the parents use modified signs to make the story more interesting and exciting for the children. By enlarging a sign, or repeating it, the signs get extra information that is also visible in the face. So is a repeated sign with a long face telling the children that this action took a while and was hard. It is also during this activity, that the use of miscellaneous strategies increased. Parents probably tried to make the story more interesting and interactive by making sounds that fitted the story, or by using their whole body to mimic a movement, for example the rocking of a boat. This helps children get immersed in the story and makes it more exciting and interesting

for them. It may also help the children understand the signs that are used, or the story overall.

In conclusion, although there seems to be no strong relation between strategies and activities but there is evidence that some strategies are better suited for particular activities and less well-suited for others. Physical touches are always a possibility as long as both parties are close to each other. Objects are an obvious choice when the child, and sometimes parent, are already focussed on an item like a toy or book. But when no such toy is already the object of attention, parents rather wave their hands or fingers to visually attract attention. Storytime allows parents to be more creative and this allows for the use of exaggerated signs or the use of the entire body. This creates a more immersive experience for the child.

Research question 3: what can be noted about the position of parent and child.

The main focus of this thesis was how deaf parent redirect the attention of their children. Looking at the different strategies parents use, gives insight into how the use of these strategies develops with age. Different activities also may impact what kind of strategies parents use, as they might take advantage of what is around during the activity. As mentioned in the previous sections, it is highly likely that position also plays an important role in deciding what kind of strategy a parent might use. Therefore, this section will briefly discuss some findings from the footage used.

The first thing that was striking while reviewing the nine video clips, is that there was a lot of agreement on how children and parents are positioned. A large part of the clips, were filmed at the table. When at the table, the parents and child were often seated opposite of each other or at ninety degrees from each other.

being seated at the table also had the advantage of the child being at a similar height to the parents. This allowed for better alignment of the faces and made for easier interaction between the parents and the child. In none of the videos were ever more than two people seated next to each other. This probably optimised the line of communication

When the child was not seated on a chair but on the lap of a parent, both of them never fully faced the same way. With that is meant that the child is never facing the mother with their back. They were always positioned in such a way that allowed for the parent to see the face of the child. This shows that they are focussed on the facial expressions of the child but mostly on the eye-gaze. Following the eye-gaze of their child, allowed them to follow their interest and focus on either the object or the sign language input from the parent. This is backed up by previous studies. It seems that deaf parents indeed are more sensitive to the eye-gaze and focus of their child.

At nine months, the infants rarely keep their attention on their parents, so they need to put in extra effort to attract their infant's attention. TO optimise the opportunities, in two of the three clips, the infant was placed on the table. This made it easier for the parent to see the infant as well as being able to sign to a certain extend. In one clip the infant sat on the floor. In this clip, the mother made sure to be on eye level as much as possible too, by sitting down on the floor or even lying down.

Parents at this stage usually used objects or physical touches to attract attention, but they also frequently moved themselves into the field of vision of the infant. They tried to stay as much on eye level as possible and kept track of their infant's focus.

In the second data set of the children around one-and-a-half years old, the children start to walk around more. In one clip especially, was it visible that the parent tried to never turn her back on the child. She moved the chair in such a position that allowed her to always see the child. In the other clips as well, the parents are constantly following where the child goes and always look for an opportunity to see their face as well.

At this age and at nine months, there were instances were a child was manoeuvred into a more suitable position. This did not happen often, but only when necessary. One such instance was with infant Cato, who wriggled herself facing away from her father. He then decided to move her back facing him.

Interestingly, is that as was mentioned in the literature, the children sporadically look back at their parents. This was especially visible in the Cato video. In this video, she walked around the room with a camera following here. She clearly looked back to her mother to either for attention or to see if her mother needed her attention. This was not as visible in the other videos.

At three years of age, the child is used to the rules of sign language interaction and is more attentive to eye-contact with the parent. A nice example is the Keke video. In it she is seated on the couch next to her mother. They talk about different topic and are just enjoying each other's company. In the video it is easy to see that she often looks at her mother and is very conscious of the fact that she needs to keep eye-contact.

Above are just some observations about the positioning of parent and child. It is clear that deaf parents are aware of the necessity of being able to see each other's face and that it helps to be on the same eye-level. When the children are young, they are positioned in such a way that both can see the other's face. In more complex situations, the parent and child are always facing each other to a certain extend. Sometimes they are seated ninety degree from each other, other times they are just lightly facing each other. Deaf parents seem to pay attention to the seating of the child at the earlier stages to ensure good interaction opportunities.

Chapter 7: Discussion

This thesis set out to explore what types of strategies deaf parents use to signal to their children they need to switch their focus to them. Children communicating with sign language, need to learn to divide their attention between objects and signed input. This is because sign language is mostly visual, so when a child is focussed on an item, they need to look away from this object and to the parent to receive signed input.

This is something, that hearing parents of deaf children struggle with. They are not used to relying on only one modality, and there is a language mismatch between them and their deaf child. Previous studies have found that haring parents have difficulties communicating with their child and the type of communication is also not similar to that of hearing parents with hearing children. Deaf parents with deaf children on the other hand, do seem to follow the regular interaction patterns also found with hearing parents.

Previous studies have looked at the different strategies deaf parents use and what was most effective. These studies have skipped looking at how the preferences of deaf parents may be affected by the age of the child or the activity and position involved. There are different types of strategies parents use, some are physical, some are visual and some rely on sound. This makes position and activity an important aspect of choosing what strategy might be used. Age is also an important factor, as infants are just learning to switch focus, but around 3 years of age, a child is expected to react to adult cues and to be able to sign in a similar way as adults do. This lead to the following research questions:

1. What are the most popular strategies per age category, and how does this change
2. What are the preferred strategies for different activities (book reading, play time and conversations)?
3. What can be noted about the positioning of child and parent?

This thesis, looked at a total of nine clips. Three clips of each participant and three different ages. The first results compared the different strategies parents use at different ages. The results showed that there is a lot of individual variation and that the small test group made it hard to get good results. It was possible to conclude some preferences that also seemed to change with age, which could indicate that certain strategies are age restricted. The most used strategies involved physical touches and visual indications that the parent wanted to have the attention of the child. Parents also seemed to often use objects to redirect the attention of the child, but the use of this strategy lessened after 2,5 years. This means that it is highly likely that at younger ages, infants are very interested in objects as they are exploring the world around them, but when they approach the 3 year mark, they do not need the stimuli of other objects to redirect their focus.

The modifying of signs is noted in other studies as a common strategy, but is rarely found in the footage observed for this study. It may be because many other studies have focussed on infants, while this study observed a larger age group with fewer participants.

Visual cues as a strategy was used quite often too, especially at the later ages. This is probably due to the age of the child. The child does not rely on other items any more and has learned to communicate like most adults, as noted by.

It must be kept in mind, that the data pool of this study is very small, and has a lot of individual variation between and within participants. This is probably the main problem with this study. Because of time and material restraints, it was not possible to add more participants to the dataset. Coding and annotating the clips is rather time consuming and the short time span did not allow for a full set of clips to be extracted and annotated. A larger number of clips would give more satisfying results but this study is a first and gives a good look into probable trends.

Overall, there is a slight trend visible in the growing use of visual cues like the ones used in adult signed conversations and a steady use of physical touches to redirect the attention of the child. This might be proof of the idea that around 3 years of age, the child is expected to communicate in a similar way to adults.

The second stage of this study compared different activities. This was to see how the chosen activity affects the strategies parents use and how this may affect results in future studies that want to explore similar situations. The activities were chosen based on the complexity of the

shared focus between parent and child. Reading stories form a book is a much more complex situation than a face-to-face conversation. Story reading has both the child and the parent switch their attention between each other and the book. A conversation, on the other hand, already has both parties invested in the other because this is an important aspect of signed communication. It is therefore understandable, that the strategies parents use will differ, also due to the probable difference in position. Story telling is often done on the lap of the parent, at least in the clips used for this study, while a conversation can have both participants on different sides of a table.

The results indeed show that there is a slight tendency towards the use of different strategies in different situations. Story reading situations had the tendency to be more physical and usually used the book to redirect the attention of the child. During a conversation, the participants were often farther removed from each other which made it logical to use more visual cues to ask for the attention of the child. A side note should be made, that infants are incapable to have a conversation with a parent, and the real conversations are only visible at the later ages. Because the child is already older and more familiar with sign language, it is also possible that this difference in strategy is for a large part due to age as seen in the results of the first part of this study.

In this study, the small number of participants not only caused a lot of individual variation, but the way the clips were chosen, also happened to not all contain the same information. Even though the situations that were chosen are common daily activities, not all activities were found in all clips. This has effected the results found and possible explanations. Because of material and time constraints, it was not possible to analyse the clips beforehand to see if they contained all the necessary information. This is of course a major gap in this study and future studies will profit from increasing the test group and making sure the necessary information can be found in most, if not all, clips. Of course, this study has used clips from an already existing database which made it impossible to influence what is in the clips. Using clips from the database has save a lot of time, but it is regrettable that the clips did not all contain the necessary information.

This study shows how age and activity affects the preferred strategy of deaf parents. This is important for future studies that wish to look into this topic. The results have shown that the age of the child is an important factor when parents choose a strategy to redirect the attention of the child. This means that studies using infants should get different results from studies using toddlers.

Most of all, this study helps hearing parents with deaf children realise the different option that are available to them and how these can be used. A major problem of hearing parents faced, is that they were unfamiliar with the visual way of communicating. This lead to problems asking for attention when they needed their deaf children to switch focus to them. They often miss the window of attention and have difficulties finding the right moment and manner to redirect and keep their child's attention. This study can serve as a basis for advice for parents that are not confident in their parenting or face problems with redirecting their child's attention. If used for this purpose, it should be kept in mind that this study did not look at how effective different strategies are or how long it took for parents to get the child to focus on them. There has been another study that has efficiency as the main topic.

The current study set out to explore what kind of strategies deaf parents use to redirect the attention of their children. Using clips form an existing database, annotations were made at each attempt to redirect the child's attention. The results were analysed per age category and per activity to see how the results are affected. It is clear that not all strategies are

commonly used at every age or with every activity. This is probably due to the complexity of the activity as well as the position the parent and child are in. the age of the child is also an important factor, as not all strategies were commonly used in all clips. Some were mostly used at a later age, and some were used at the earlier stage. There is also a large variation between participants which makes it hard to generalize the results. It does seem that parents prefer different strategies for different activities and that age also affects the types used. As the child grows older, the most common cues adults use in their conversations, are also used when communicating with a child while at an earlier age, objects are often used to interest the child.

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