A case study of aided story telling

Comparing the Step-by-Step™ with the How was School Today Prototype

Jennifer Menjivar Dominguez
Karolina Yläneva

Master Thesis in Speech and Language Pathology – 30 credits
Autumn 2010
No 041

Supervisors:
Niklas Norén
Annalu Waller
Rolf Black
INDEX

1. INTRODUCTION ............................................................................................................. 4

2. BACKGROUND .............................................................................................................. 5
   2.1. COMMUNICATION AND INTERACTION .............................................................. 5
   2.2. A SOCIO-CULTURAL PERSPECTIVE ON COMMUNICATIVE AND LINGUISTIC DEVELOPMENT .............................................................................................................. 5
   2.3. HOW CHILDREN WITH LANGUAGE IMPAIRMENTS DEVELOP COMMUNICATION .............................................................................................................. 6
   2.4. THE IMPORTANCE OF PEER RELATIONS IN PERSONAL DEVELOPMENT .......... 7
   2.5. COMPLEX COMMUNICATION NEEDS ................................................................. 7
   2.6. AUGMENTATIVE AND ALTERNATIVE COMMUNICATION ................................. 8
      2.6.1. Aided and unaided communication ..................................................................... 8
      2.6.2. Dependent and independent communication ...................................................... 8
      2.6.3. The users of AAC .................................................................................................. 9
      2.6.4. Communication aids ............................................................................................ 9
      2.6.5. Switches ............................................................................................................... 9
      2.6.6. High technology aids .......................................................................................... 10
   2.7. FEATURES OF AIDED COMMUNICATION ............................................................. 10
   2.8. STORY TELLING ...................................................................................................... 11
      2.8.1. Story telling as an interaction and participation activity .................................... 11
      2.8.2. Story sharing in typically developed children .................................................... 11
      2.8.3. Children with CCN and their story sharing ....................................................... 12
   2.9. PREVIOUS RESEARCH ON HOW CHILDREN WITH COMMUNICATION AIDS INTERACT .............................................................................................................. 12
   2.10. THE HOW WAS SCHOOL TODAY PROJECT .................................................. 13
      2.10.1. The How was School Today system ................................................................ 13
   2.11. AIM AND RESEARCH QUESTIONS ................................................................... 13

3. METHOD AND DATA .................................................................................................... 15
   3.1. PARTICIPANTS ...................................................................................................... 15
      3.1.1. Focus participant ............................................................................................... 15
      3.1.2. Other participants ............................................................................................. 15
   3.2. COMMUNICATION AIDS USED IN THE STUDY .................................................. 15
      3.2.1. Step-by-Step ..................................................................................................... 15
      3.2.2. The How was School Today prototype and how it operates ............................ 16
   3.3. PREPARATION ...................................................................................................... 18
   3.4. INSTRUCTIONS .................................................................................................... 18
   3.5. COLLECTION OF DATA ....................................................................................... 18
   3.6. ETHICAL CONSIDERATIONS .............................................................................. 18
   3.7. CHANGED METHODOLOGY ................................................................................ 19
   3.8. METHODS OF ANALYSIS .................................................................................... 19
      3.8.1. Quantitative analysis .......................................................................................... 19
3.8.2. Qualitative analysis ................................................................. 19
  3.8.2.1 Conversation analysis ....................................................... 19
  3.8.2.2 Transcription procedures ................................................ 20

4. ANALYSIS .................................................................................. 22

  4.1. OVERVIEW AND CATEGORIES .................................................. 22
  4.2. DESCRIPTIVE QUANTITATIVE ANALYSIS .................................. 23
    4.2.1. Definition of questions and quantitative results .................. 23
    4.2.2. Eye contact and quantitative results .................................. 24
  4.3. QUALITATIVE ANALYSIS ....................................................... 24
      4.3.1. Questions ..................................................................... 24
        4.3.1.1 Elicited and Spontaneous questions ............................... 24
        4.3.1.2 Content oriented and aid oriented questions .................. 29
      4.3.2. Gaze .......................................................................... 33
        4.3.2.1 Eye contact between Kevin and one of his peers ............. 33
        4.3.2.2 Joint orientation towards the screen ......................... 35
        4.3.2.3 Kevin’s gazes at peers ............................................. 36
        4.3.2.4 Kevin’s gazes at researchers ..................................... 39
        4.3.2.5 Peers’ gazes at Kevin ................................................ 41

5. DISCUSSION .................................................................................. 44

  5.1. MAIN RESULTS OF THE STUDY .............................................. 44
    5.1.1. First research question ................................................... 44
    5.1.2. Second research question .............................................. 45
      5.1.2.1 Similarities .................................................................. 45
      5.1.2.2 Differences .................................................................. 46
  5.2. DO THE ANALYSED AIDS SUPPORT NARRATIVE ABILITY? .... 47
  5.3. DOES PARTICIPATION IN STORY TELLING SUPPORT INTERACTION? 48
  5.4. WHICH AID IS BEST SUITED FOR INTERACTION? ...................... 48
  5.5. THE HWST PROTOTYPE COMPARED TO THE HWST SYSTEM ......... 49
  5.6. CLINICAL IMPLICATIONS ..................................................... 49
  5.7. FUTURE RESEARCH ............................................................... 50
  5.8. CONCLUSION ........................................................................ 50

ACKNOWLEDGEMENTS ................................................................. 51

REFERENCES ................................................................................ 52
ABSTRACT

The main purpose of this study was to compare how the Step-by-Step™ (S-b-S) and the newly developed How Was School Today (HWST) prototype can support participation in narrative activities for a 10-year-old boy with complex communication needs (CCN) when he interacts with two typically developed peers. The researchers wanted to find out how the use of the different communication aids affected interaction. The S-b-S is a low technology communication device with a voice recording function. The HWST prototype is a simulation of the HWST system, which is a high technology system that automatically collects information and creates stories about what the user has done in school. The researchers focused on different aspects of gaze and questions as vital communicative practices for the boy’s involvement in the interaction, and hence, the story telling activity. The data was analysed mainly qualitatively with conversation analysis (CA). A descriptive quantitative analysis was also developed. The results indicate that the HWST prototype provides a framework for establishment of joint orientation towards the prototype and questions about it. The S-b-S on the other hand creates a context in which it is easier to establish eye contact. There is an uneven distribution of questions with a much higher frequency in the session where the HWST prototype was used. There are not many studies on narrative ability in children with CCN together with peers. Future research on shared stories in natural environments is suggested.

Keywords: How Was School Today prototype, Step-by-Step™, narrative ability, story telling, conversation analysis, complex communication needs, questions, gaze

SAMMANFATTNING


Nyckelord: How Was School Today-prototypen, Step-by-Step™, narrativ förmåga, berättande, samtalsanalys, komplexa kommunikativa behov, frågor,blickriktning
1. Introduction

This study was carried out in Dundee, Scotland and Uppsala, Sweden during the autumn of 2010 within the scope of a Master thesis project at the Speech and Language Therapy program at Uppsala University. The gathered material is a part of a larger project about augmentative and alternative communication (AAC) aids which is used to support narrative ability. The larger project is carried out by The University of Dundee and Aberdeen University in Scotland.

There are few communication aids that aim to support narrative ability today. Even though peer relations have been noticed to be of great importance for children’s social development (Clarke & Wilkinson, 2008), not many researchers have focused on interaction between children within the field of AAC.

This study will examine two conversations taking place at two different occasions between a boy with complex communication needs and his naturally speaking peers. In the first conversation he uses the Step-by-Step™ (S-b-S) for narrative support and in the second conversation he uses the newly developed prototype version of How Was School Today prototype (HWST) for narrative support.

The aim of the study is to compare how the S-b-S and the HWST prototype can support the user’s ability to participate in narrative activities when used with typically developed peers and how this affects the interaction. The researchers mainly use a qualitative method of analysing the narrative activities in the data, conversation analysis (CA), which puts emphasis on the practices and methods of the participants themselves to co-construct meaning. A quantitative method has also been applied to complement the qualitative one. It gives an account of frequencies of some phenomena that are analysed qualitatively.

The two essential research questions are:

1. How does a 10-year-old boy with complex communication needs (CCN) interact with peers about his school day when using the HWST prototype?
2. What are the similarities and differences between a peer interaction when using the HWST prototype compared to a peer interaction when using the S-b-S?

In order to answer the essential research questions above, the researchers investigated 9 interactional phenomena (listed below). These centred around questions and gaze, which were analysed from 3 for interaction relevant perspectives: what precedes in the immediate interactional context, what follows in the immediate interactional context, and how the aid is used in the analysed interactional sequence. The interaction phenomena which were investigated are: Elicited and Spontaneous questions; Content oriented and Aid oriented questions; Eye contact between Kevin and one of his peers; Joint orientation towards the screen; Kevin’s gazes at the peers; Kevin’s gazes at the researchers; and finally The peers’ gazes at Kevin. These phenomena will be examined below (see 4. Analysis).

Before turning to the analysis, the researchers will give a background for the study, including the field of AAC. The researchers will also introduce the participants in the study, the communication aids used in the data, the data collection procedure and the method of analysis.
2. Background

2.1. Communication and interaction

Communication has been defined in different ways, depending on the focus of the researchers. According to Heister Trygg (2009) the need to communicate is fundamental for humans. Weaver (1949) presented a very broad definition of communication, namely how one mechanism (human or not) can affect another mechanism. His major focus though was on human communication and he described it as a transaction of messages from a sender to a receiver. Weaver illustrated different problems that may occur during this transaction, such as the receiver not understanding the message or him/her not behaving according to the sender’s expectation.

A wider definition is suggested by Heister Trygg (2009) who argues that communication always takes place within an interactional environment. She also sees it as a transaction of messages, but in a situation where the participants can be conscious or unconscious of their actions towards each other.

An even more interactional view is represented by Kraat (1985:6). She defined communication as:

A dynamic process between at least two people which is highly interactive, bi-directional and multi-modal. The behaviours of each person continually affect the behaviours of the other(s) in a constantly and elaborative communication and social process.

Kraat was a forerunner of an interactional approach within research on communicative disabilities and laid the foundation of modern interactional research of communication disorders (e.g. Clarke & Wilkinson, 2007).

According to Sachs, Schegloff and Jeffersson (in Yont, Hewitt & Miccio, 2002) it is within talk-in-interaction (also called talk) that the nature of social interaction is stressed. Talk is a wider dialogical framework for the analysis of communicative activities which includes verbal and non-verbal modalities (Psathas, 1995). Within this process oriented account transactional uses of language can be studied. Meaning making arises through interaction in communicative activities (cf. Linell, 2009:14). The analysis in this Master thesis will be made within this view of language and communication.

2.2. A socio-cultural perspective on communicative and linguistic development

The dialogical view just mentioned partly has its origin in the socio-cultural view on language development. Renner (2003) discusses how the Vygotskian view on development of communication can be applied within the field of AAC. According to Vygotsky the development of communication evolves from a social and cultural environment rather than being an innate ability (ibid.:68). Children learn to communicate in social situations by interacting with more competent members of their culture (adults or older children) and learning from them. The child can only learn to perform a task (e.g. communicative) when being able to perform it with help from a more competent member. This is called “the zone of proximal development” and is essential for development (ibid.:70).Regarding children with atypical development, Vygotsky’s idea is that a physical impairment causes a social impairment in terms of special treatment and segregation. Vygotsky calls the impairment a “normal state of that person” and argues that a child with a physical impairment must be treated as “normal” as possible. According to Vygotsky it is the social environment adjusting to the motor
impairment (rather than the impairment itself) that explains how mental functions such as language develop (ibid.:71).

To overcome impairments Vygotsky suggested the use of “developmental sidetracks” to achieve social functions such as communication. Renner (2003:72) argues that for atypical children AAC could be that “sidetrack” and the goal is still communication, but with an alternative mean. This means that children who cannot learn to communicate in a typical manner may use AAC to do so. To create AAC from this socio-cultural point of view would require an analysis of the culture in which the child lives, so that the AAC can be socially adjusted to fit in to it. Thereafter one would have to look at the different properties necessary to be able to adjust the AAC to the child’s motor skills, cognitive development etc. The development of AAC has provided children with motor impairments with different alternative ways to manoeuvre their AAC, such as switches and scanning (ibid.:73).

2.3. How children with language impairments develop communication

According to von Tetzchner and Martinsen (2000) communication difficulties during the pre-lingual period in life have a great impact on both the child and the caregiver. Parents of children with extensive communication disorders can experience poor interational contact with their child. Some might feel that they cannot interpret the sometimes unclear and inconsistent signals their child is giving them (Burkhart in von Tetzchner and Martinsen, 2000:2). Early important forms of interaction that adults react to are children’s facial expressions, cry, laugh, babble, take hold of and reach out for objects. The crying of children with motor impairments is not always functional in the same way as for typically developed children. Parents cannot always do something about it, e.g. when their child is in muscular pain or has pain in intestinal organs (ibid.:68). It is also easy for the parents to misinterpret their child’s involuntary movements and reflexes. When the child is tense s/he is seen as more alert than when the muscle tone is low (ibid.:68).

When caregivers interpret a non-communicative action of the child as a communicative act they are making an over-interpretation; this may be an important force in the child’s development (Ryan; Lock, in von Tetzchner & Martinsen, 2000:68). Due to the fact that people react less to children with motor impairments than they would to a typically developed child (von Tetzchner & Martinsen, 2000:68) and because people speak less to these children many opportunities to learn in a natural way might get lost for children with motor impairments (ibid.:2). This leads to less language learning (ibid.:69). Instead they learn to do things in a co-constructed manner, i.e. together with someone else. They learn through shared focus, reactions from others and what others explain and tell them about things etc. Training, washing and feeding take up much of the time for children who have motor disorders. The treatment they get, impairments in moving and speaking might make them develop a passive communicative style (ibid.:67). These children can have an intact neurological basis for language acquisition but still have reduced comprehension of spoken language because they do not get as much language stimulation as typically developed children (ibid.:68).

It is important to stress that many persons with speech impairments caused by motor disorder have normal comprehension of spoken language, but have expressive impairments.

The ability to express oneself is linked to feelings of self-sufficiency, self respect and worth; but also to the perception of oneself as an independent individual that is equal to others. Persons with the most severe disabilities may have negative experiences of people underestimating them, or on the contrary overestimating them. This along
with infrequent reactions to their initiations and wants lead to learned passivity, dependency on others, frustration and behavioural problems. Through more communication they would be able to better understand the world and what is going on around them (von Tetzchner & Martinsen, 2000:3).

If persons with no or little functional speech are given an alternative way of communicating they might get a better life quality, get more control of their own lives, get more self-respect and get a better chance of feeling equal to others e.g. by participating in social activities. The ability to communicate for people with extensive motor impairments may be easier to improve than other skills. With an alternative communication system that is adjusted to the individual’s total situation, the person should be able to improve everyday life, because it can be used in all life situations, often together with other interventions that run parallel, e.g. education, training etc. The different kinds of intervention should all be integrated to get better results (von Tetzchner & Martinsen, 2000:3). It seems like persons with motor impairments do not initiate conversations although they have something to say and do master their communication aid. One possible explanation is that they have difficulties learning new ways of using their language after having used mainly answers to question strategies.

2.4. The importance of peer relations in personal development

Interaction with others is crucial for how children see themselves (Beck & Dennis in Clarke & Kirton, 2003:137). Through this children “establish and maintain social relationships” (Brinton & Fujiki in Yont, Hewitt & Miccio, 2002:265). Research has shown that peer relationships are very important for personal development (Clarke & Wilkinson, 2008).

When it comes to children with disabilities Bunch and Valeo (2004) have found that they tend to have friends more often when they attend mainstream schools where they are inclusive in the education in comparison to then when they go to schools with special education structure. One study (Conners & Stalker in Waller & Balandin, in press) reported limited opportunities for children with disabilities to make friends. They found that amongst those children the ones that used wheelchairs had most difficulties regarding visiting friends at home and going out with them. The study also reported that the children with difficulties did have a positive self-image even though they had had some negative experience, e.g. being stared at and talked down to. Waller and Balandin (in press) discuss the negative impact that not having a role model can have on children with disabilities. According to them children may think about themselves as normal if they do not experience narratives about disabilities. This non-exposure can make them develop negative self-confidence later in life.

2.5. Complex communication needs

The group of people (both children and adults) that have complex communication needs (CCN) is heterogeneous. A common aspect is that they do not develop language and speech skills as typically developed persons. They can have motor, sensory perceptual, language and/or cognitive impairments which can be caused by cerebral palsy (CP), Down syndrome, autism spectrum disorders or other developmental disabilities (Light 2007, in Light & Drager, 2007:204). Many children with physical disabilities, without intelligible speech, communicate naturally through eye-pointing, vocalization, gestures, facial expression etc (Clarke & Kirton, 2003). Persons with CCN experience difficulties in access to the environment, few opportunities for communication and restrictions in interaction (Light 2007, according to Light & Drager, 2007:204).
The focus participant in this study has CP which is a neurological damage that occurs before, during or after birth. It is usually diagnosed before the age of 3. As a result the person’s body movement and muscle coordination is affected (Capability Scotland). Many use wheelchairs/crutches (von Tetzchner & Martinsen, 2000:67). The severity of the impairment/s varies, which in combination with other symptoms makes this a heterogeneous group. About half of the persons with CP have a cognitive impairment. The global incidence for CP is about one in one thousand new born children (Heister Trygg, 2009: 37).

2.6. Augmentative and alternative communication

AAC means augmentative and alternative communication and is used by people who cannot communicate fully by using their speech (and might not be helped of training) or people that do not have any speech at all. These persons need a non-speech way of communicating as a supplement to, or substitute for spoken language (von Tetzchner & Martinsen, 2000:7). It can also be helpful for a person with a mild speech disorder to learn an alternative way of communicating while learning to speak, or use an augmentative way of communicating to support his/her current communication and thus make it more understandable (ibid.: 7). “Augmentative communication means supplementary or supportive communication” and has two purposes: “to promote and supplement speech and to guarantee an alternative form of communication if the individual does not begin to speak” (ibid.: 7). Alternative communication is a non-speech mode e.g. writing, manual and graphic signs for individuals that do not speak.

According to Heister Trygg and colleagues (2009) AAC involves the user (the person with communication impairment), the tools (ways of communicating and aids) and the surroundings (people, communication partners and the environment). Functionally it can be used as: (a) a way of expressing oneself, (b) as a support to express and understand and (c) a replacement for both expression and understanding (von Tetzchner & Hygum Jensen in Heister Trygg, 2009:45).

2.6.1. Aided and unaided communication

AAC can be divided into two different technique types. These are aided communication and unaided communication. In aided communication the medium of communication is outside of the user, physically speaking. Some aid examples are pointing boards, synthetic speech machines and computers etc. In unaided communication the communication medium is the person her/himself, no equipment is used. S/he produces signs or gestures. The most typical mode of unaided communication is manual signs. Other examples are blinking with one’s eyes, nodding and shaking head, pointing and other gestures (von Tetzchner & Martinsen 2000: 8).

2.6.2. Dependent and independent communication

Two other used terms when speaking about AAC are dependent and independent communication which refers to the contribution of the conversational partner. Dependent communication is when the user gets support from the communication partner to interpret or join together the meaning of what is being said. Some examples are letter boards and manual or graphic signs. Independent communication is when the utterance is completely formulated by the user. One example is when a synthetic speech machine puts out what the person has “typed in” using symbols (von Tetzchner & Martinsen 2000:8).
2.6.3. The users of AAC

The users of AAC are persons with CCN and persons with acquired impairments. In the group with acquired impairments are many elderly people. Today there are a number of alternative communication systems as a result of an increased interest in language and communication disorders (von Tetzchner & Martinsen 2000:1). One research finding about people with CCN when it comes to AAC is that they rely on multiple modes to meet their needs. The child’s communicative skills as well as other factors such as the communication partner, the context or a task to carry out are important in the choice of mode (Blackstone & Hunt Berg in Light & Drager, 2007:205). A prominent group amongst the persons with motor impairments who are in need of AAC are those who do not use speech to communicate due to anarthria or dysarthria. The reason for incorrect (non-controlled) articulation can be spasms and/or paralysis. It is unusual to have a motor disorder that only affects the speaking ability (von Tetzchner & Martinsen 2000:67). Even though there are benefits of using communication aids for supporting children’s engaging in learning and play, there are studies that show that to supply them with an AAC system does not automatically mean that they will get improved communicative skills, interactive abilities or participation in school (e.g., Ko et al.; Culp et al. in Clarke & Kirton, 2003). Within the field of AAC there has been a strong tradition to work from a transactional view of communication (where communication is a transaction of messages, see 2.1. Communication and interaction). The “messages” which have gotten the largest amount of attention are the expressions of needs and wants (e.g. I am thirsty). These have been the main focus when developing AAC-devices.

2.6.4. Communication aids

According to von Tetzchner & Martinsen (2000:34) a communication aid is an aid that supports users to express themselves. Communication aids can be based on everything from low technology (like non-electronic communication boards/books) to high technology (like monitors with artificial speech). Voice output communication aids (VOCAs, also known as speech generating devices) can be both high and low technology. Some VOCAs have a single switch to activate, while others have several symbols to select from (Mirenda, 2003; Wilkinson & Hennig, 2007). When the high technology aids were new on the market they were not easy to carry around, because they were fairly heavy or bulky (von Tetzchner & Martinsen, 2000:34). Since the 1980s a lot of resources have been put on computer technology to enhance the situation of persons with speech/motor impairments etc (Heister Trygg, 2009). This has led to further development of aids and the way in which they are used (von Tetzchner & Martinsen, 2000).

2.6.5. Switches

A switch is a low technology aid. There are many different kinds of switches. Some are used in order to control an aid. The most common is to use one or two, but some systems require up to eight different switches. Switches can be controlled with the arm, foot, head and eyes etc. They can be activated by pushing, sucking, eye-pointing and blowing. Switches vary from requiring very little pressure to being able to be handled roughly. They also vary from small to large, and can look like a normal light switch or consist of a frame that can be pushed.

Probably the most difficult and time-consuming part of introducing a switch, to individuals with extensive motor disorders, is the adjusting procedure. It is very common to start with the hand, because it seems to be more natural. When it is
uncertain how well the hand functions are it is better to start with the head to activate
the switch. The user may get tired quickly because s/he needs to focus on activating the
switch, which can disturb the concentration on the communication. His/her current state
can affect the ability to use the switch and thus the communication in general (von

2.6.6. High technology aids
Since laptops have become less expensive it is more common to use programs in AAC
deVICES on personal computers (PCs). One technical problem that sometimes appears is
that one program specially designed for one type of PC does not always work on
another system. Not many children with severe motor impairment receive a high
technology aid if they cannot use it independently. When children with severe motor
impairments use communication aids with large vocabularies and with assistance, these
aids tend to be used only a little because they are slow in use. It has been seen that
parents and adults go back to guessing strategies in order to save some time (von

According to von Tetzchner and Martinsen (2000) high technology aids are more
flexible and do not require as much from the conversational partner’s attention. This is
thought to make the communicative situation better because the user and the
communicative partner are less tense. Another positive aspect is that the aid makes it
easier for the conversational partner to see non-verbal behaviour, e.g. facial expression
and posture.

2.7. Features of aided communication
If one compares a conversation between naturally speaking individuals with a
conversation where at least one of the speakers uses a communication aid the duration
of the latter is typically slower. Articulation of speech is faster than producing outputs
on a communication aid. The slow speech rate of the users has an impact on their
amount of utterances. Another difference may be that the naturally speaking
conversational partner has other functions, besides creating his or her own contribution,
e.g. interpreting the non-verbal modes of the speaker who uses a communication aid
(Kraat, 1985:22). These demands are put on the conversational partner and if s/he fails
to fulfil these requirements this may hinder the user from engaging in interactional
situations. Their communication is dependent on their relationship i.e. how well they
know each other rather than depending on the individuals per se.

How well the user expresses her/himself depends a lot on the conversational
partner. It has been said that speakers are not equal when at least one of the persons uses
an aid (von Tetzchner & Martinsen, 2000). The conversational participants can
negotiate the meaning of what is being said but an aided speaker is often dependent on
other persons to do so. Studies have shown that the communication partner, who both
interprets and has a participating role, sometimes does not acknowledge or comment the
utterances produced with the aid but take their own views or make false interpretations
when speaking to the user. If the communication partner’s guess does not accord with
the intended meaning of the conversational partner who uses an aid the utterance can
take longer to say or even lead to communication breakdown (ibid.).

For persons who speak naturally the ability to do so is mostly an automatic process
(but not e.g. when they speak a foreign language). For persons who use a
communication aid this ability is more controlled. The users need to put more cognitive
resources to formulate what they want to say. Mistakes can sometimes be due to their
involuntary movements. This can in the communicative situation lead to misunderstandings, breakdowns and frustration (von Tetzchner & Martinsen, 2000).

Probably the most important difference between natural and aided communication is the time that is spent on producing the utterance, i.e. to express what one wants to say. The amount of words or symbols that are produced per minute is much lower compared with natural speech. In one study with 4 adults who used communication aids, where the number of words per day was examined, it was shown that they had used between 269 and 728 words per day, which is considerably less than natural speakers produce (Beukelman et. al in von Tetzchner & Martinsen, 2000:59). Similar numbers are not available for children, but there are indications that the numbers may be even lower for them (von Tetzchner & Martinsen, 2000:59).

In studies on conversations between aided speakers and naturally speaking persons focus has been on strategies used by the latter mentioned persons in communicative situations. One strategy is the already mentioned: guessing. Guessing may both help the aided speaker (to speed up the turn) but can also hinder him/her to get his/her message across and can on the contrary slow down the communication (von Tetzchner & Martinsen, 2000).

2.8. Story telling

2.8.1. Story telling as an interaction and participation activity

Researchers have seen that participation in narrative activities (or story telling) affect how the child perceives itself (Miller et al, in Eriksson, 1997:21) and further it has been shown that story telling is important for establishing and keeping friendships (Hussain in Waller, 2006).

Labov and Waletzky (1967) have defined narrative as verbally recapitulated experience. They mean that telling a story is to construct narrative units (i.e. the different parts of the story) that match the temporal sequences of an experience. Their structural view focuses mostly on the person who is telling the story and describes story telling in terms of e.g. abstract, orientation and evaluation. However, no consideration is given to the interactional context.

A more interactional view on story telling is represented by Hutchby and Wooffitt (2008:123) and Eriksson, (1997:44). Hutchby and Wooffitt (2008:123) discuss how “stories are not produced in a vacuum”. If a story is to be told the teller and the recipient must first agree on this since story telling talk differs from other types of talk. The story is always told in a context of interaction. This means that a story is never only one long turn told by the story teller, but that the recipient participates by contributing in the telling process. These contributions actually become parts of that very story, which means that the conversational partners are telling it together (ibid.:130). Ryave’s definition (in Eriksson, 1997:44) summarizes it like “the telling of some event in more than one utterance”. Hutchby and Wooffit (2008:130) also talk about how different stories are designed for different recipients; the storyteller tells the same story to different persons in different ways depending on their reactions, to which s/he constantly adapts (Schank in Waller, 2008:7).

2.8.2. Story sharing in typically developed children

According to Bruner the development of narrative competence in typically developing children starts before they become verbal with scaffolding. He limits the meaning of scaffolding as being a mother-child activity (Bruner, 1975:277). Children learn to share stories from a very young age. Waller (in Waller & O’Mara, 2002:257-258) reported
how an 18 month-old told his father a story by using single word utterances, and body language. Sachs (1983) illustrated how a child of 26-months of age can tell narratives about personal experiences. Children of 3-years-old produce organized narratives about past episodes either spontaneously, or in response to researchers’ questions (Umiker-Sebeok, Todd & Perlmuter in Hudson & Nelson, 1986). When they have reached 3-5 years of age children produce longer and more complex narratives (Umiker-Seabeok in Peterson & McCabe, 1991:217). By the age of 6 children tell complete narratives (i.e. they include who, what, where and when) and can build it up to reach a high point (ibid.:218). After this point they develop from telling the story in a monologic manner to adjusting their narrative to the conversational partner’s contributions (Peterson & McCabe in Waller, 2006:222). Orientation to the listener has been described “a hallmark of good narration” (Labov in Peterson & McCabe, 1991:218).

2.8.3. Children with CCN and their story sharing

When it comes to studies of children with CCN and their participation in story telling activities, these have been made with different focus, both structural views (e.g. Soto, Hartmann & Wilkins, 2006) and interactional views (e.g. Clarke & Wilkinson, 2007).

Children who are atypical and use AAC face many challenges when it comes to narrative. Some issues are that they do not get many chances to participate in story telling with their aids, which means that they do not learn from other AAC users that can model how to produce aided narratives. They are also limited by the systems they use (Light & Kelford-Smith in Soto, Hartmann & Wilkins, 2006:232). The creation of narrative requires both interactional skills and language skills. For children with CCN there is also the operational skill of trying to construct what to say (e.g. on a high tech communication aid), which can be a very slow and tiring task (Waller, 2006). It has also been shown that some users of more advanced AAC aids may have story texts saved, but these are often told in a monologic manner with little interaction with the listener (Waller, 2006).

Grove (2009) focuses on how adults can help e.g. children with impairments to tell stories, by telling them together. The approach is called Storysharing™ and was partly developed through observations of stories being told (ibid.:55). One of the central aspects of the approach is to provide the adult with techniques that can support the child when sharing stories (ibid.:28). The adult is “not there as the child’s instructor, but as the child’s friend and partner, and often as their astonished, appalled and delighted audience” (ibid.:1).

2.9. Previous research on how children with communication aids interact

According to Clarke and Kirton (2003) previous studies on children’s use of AAC in interaction has focused on the adult-child dyad (adults being parents and professionals). They conclude that the young AAC users often are described as responsive, non-directive or non-initiating. Adults are described as controlling the conversational topic, directors of the interaction, asking questions to which they already know the answer and asking many yes/no questions, while children mostly produce responses (Harris, Light et al., Udwin and Yule, Basil, Jolleve et al. in Pennington and McConachie, 1999:393). In comparison to children using communication aids naturally speaking adults “produce more contributions in conversation, and more complex utterances in terms of the number of communicative functions within each turn” than the children (e.g., von Tetzchner & Martinsen in Clarke & Wilkinson, 2007:337).

When it comes to studies with children using communication aids in interaction with their peers, programmes of intervention have received most attention (Clarke &
Wilkinson, 2007). McConachie et al. (in Clarke & Kirton, 2003) observed that school-aged children who use AAC make initiations more frequently when interacting with an adult(s) rather than with a peer(s). Clarke and Kirton (2003) on the other hand have seen a more equal distribution of turn taking in interactions between children with physical disabilities using AAC systems and their peers (both aided and naturally speaking). These children speak less in conversations with naturally speaking adults. There is however little research about children who use communication aids in interaction with peers (Clarke and Kirton, 2003).

2.10. The How was School Today project

The How was School Today (HWST) project aims to support personal narrative for children with CCN. A software system called HWST has been developed by the Universities of Dundee and Aberdeen, Scotland, UK, to aid children when sharing stories about their school day. When the aid was first evaluated in a feasibility study with child-adult dyads the results indicated that the children played an active role in e.g. initiating the interactions (Black et al, 2007). The project was initiated by the researchers Annalu Waller and Rolf Black from the University of Dundee, Scotland, Ehud Reiter and Ross Turner from the University of Aberdeen, Scotland and Capability Scotland. The first two researchers are specialists in designing AAC communication systems and the second two researchers are specialists in using natural-language generation technology to generate stories from data.

2.10.1. The How was School Today system

The HWST is a high technology system that was developed for story sharing. It is a software that can be installed to a Windows PC, which can be attached to a wheelchair. The system automatically makes stories out of information that has been captured from sensors and swipe cards that have been placed out around the school. The system registers where the person has been, who s/he has talked to and objects s/he has manipulated. Additional voice recordings that have been made by the school staff are integrated into the right story automatically. The system can store up to 5 stories, each consisting of several parts including additional voice recordings. All the parts can be evaluated by choosing either a sad or happy smiley button. The evaluation differentiates depending on the stored material, e.g. the system adjusts accordingly to whether the story part refers to something animate (e.g. she is nice) or inanimate (e.g. I didn't like that). All story parts (except for voice recordings) are put out via synthetic speech in the order that the child decides. For more detailed information see Black et al. (2007).

2.11. Aim and research questions

The aim of the study is to compare how the S-b-S and the HWST prototype can support the user’s narrative ability when used with typically developed peers and how this affects the interaction. The research questions to investigate this and the main phenomena targeted in the data are repeated from the introduction above:

1. How does a 10-year-old boy with complex communication needs (CCN) interact with peers about his school day when using the HWST prototype?
2. What are the similarities and differences between a peer interaction when using the HWST prototype compared to a peer interaction when using the S-b-S?
In order to answer the essential research questions above, the researchers investigated 9 interactional phenomena (listed below), centred around questions and gaze, which were analysed from 3 for interaction relevant perspectives: what precedes in the immediate interactional context, what follows in the immediate interactional context, and how is the aid used in the analysed interactional sequence? The phenomena are Elicited, Spontaneous, Content oriented, and Aid oriented questions, as well as Eye contact, Joint orientation towards the screen, Kevin’s gazes at the peers, Kevin’s gazes at the researchers, and finally the peer’s gazes at Kevin. These phenomena will be properly examined below (see 4. Analysis).
3. Method and data

3.1. Participants

3.1.1. Focus participant

The focus participant was Kevin (fictional name), a 10-year-old boy with quadriplegic cerebral palsy causing very limited mobility in both arms and legs. He had some hand function. He used a manual wheelchair which he could not manoeuvre himself. He went to a special education school for children with different disabilities. This is where the study was conducted.

At the time of the study, Kevin communicated through vocalization and indicated yes/no by nodding/shaking his head, using body language or vocalization. He had unintelligible speech with a few spoken words. He knew a few manual signs. He was able to make choices through gaze, by looking at the option he wanted.

Kevin used a low tech colour coded communication folder, which was also used for educational purposes. The pages in his folder consisted of squares with photographs of school staff, pupils and class rooms, Boardmaker symbols and other pictures which he accessed by eye pointing to the coloured corners on the inside of the folder. There could be up to 16 symbols/photographs/pictures on one page. There was also an index on the first page, where Kevin could choose what to talk about.

Another low tech system, which he used for story sharing in this particular study, was the Step-by-Step™ (S-b-S). He had only been using it for 4.5 months when the study was initiated and had not had a similar aid previously. For more information about the S-b-S, see 3.2.1. Step-by-Step.

3.1.2. Other participants

The other participants were two naturally speaking 10-year-old peers who will be known as Emma and Ben. They attended a mainstream primary school which at the time had collaboration with Kevin’s school and all the participating children were therefore acquainted. Every other week half of their class visited Kevin’s class, and the other weeks the other half came. Kevin also participated in their class once a week.

All participants were recruited through the School of Computing, University of Dundee, Scotland.

3.2. Communication aids used in the study

The data collected in this study consists of video recordings of 2 sessions which occurred at different occasions with the focus participant using 2 different communication aids in interaction with his peers. In the first session Kevin used the S-b-S and in the second session he used the HWST prototype. Prior to the sessions school staff had to make recordings on the S-b-S which were to be used (partly or completely) in both of the aids. These are described below.

3.2.1. Step-by-Step

The S-b-S is a low technology voice recording communication device that was developed for sharing stories. The recorded stories can be accessed by pushing a switch on the device. Everything is stored manually and the parts are put out in the same fixed order as they were recorded in. The S-b-S that was used in this study has 3 levels, which means that it can store up to 3 stories. To record additional stories one of the existing ones must be overwritten. Every story consists of different parts and can be up to 90
16

seconds long in total. Each time Kevin presses the switch one story part is put out. The last part is usually an evaluation of the story (e.g. *I had so much fun in the gym*).

The Step-by-Step™. Photograph taken by Rolf Black

3.2.2. *The How was School Today prototype and how it operates*

Within this study the time limits were too restricted to set up the entire HWST system in the school that Kevin attended. Instead the researchers created a prototype that simulated the system (see 2.10.1. *The How Was School Today system*). The interface of the prototype was influenced by the appearance and function of Kevin’s communication folder, since this is a familiar way for him to communicate in school. The prototype is a PowerPoint presentation shown on a Windows XP PC tablet with touch screen. The symbols that were used were taken from Boardmaker™ and the photos came from Kevin’s communication folder or were taken by the researchers. The prototype screen was designed to provide access to story phrases (voice recordings and synthesised speech), evaluations and navigation buttons. Information was collected and stored manually by the researchers, simulating the data collection and language processing which would normally be performed by the HWST software. They, one at a time, followed Kevin during his school days and took notes to collect information that later was used to create stories. These were then put into the HWST prototype.

With the prototype the user can decide in which order he wants to tell the stories and each story’s different parts. He can also choose not to tell stories or parts. Additional functions of the prototype are evaluation (*It was awesome*) and navigation (*I don’t want to do this anymore*).

The interface has the same colour coding as the communication folder with yellow to the top left, green to the top right, red to the bottom left and blue to the bottom right. The prototype is accessed by eye pointing and therefore the researcher needs to hold up the tablet computer in front of the user and register where he is looking. When the researcher has understood which symbol/photo the user is aiming for she clicks on it and the utterance is put out via either synthetic speech or a recorded voice.

The main page consists of 4 equally sized squares and can contain up to 3 stories. The blue background always indicates a navigational option. To choose a story or a navigational option the user needs to look at the outer edge of the coloured square where that option is located (see *Figure 1*).
The story pages consist of 16 small squares equally divided onto the 4 backgrounds. Their frames have the same colour coding as the big squares and indicate front colour. The small squares contain symbols and photos. The story parts (including voice recordings) are found on the yellow and green background. Emotional expressions are found on the red background, whereas the navigational options are found on the blue background. It would be too difficult to read where the user is looking if he was to look directly at the symbol/photo in mind. Therefore the user needs to choose that symbol/photo by using a twofold strategy that is described under Figure 2.
To simulate the voice recording function of the HWST system the researchers manually stored voice recordings into Audacity™ from the S-b-S or by recording own messages in the programme. Audacity is a free web-based recording program.

3.3. Preparation

Before the study was conducted the researchers got familiar with the school. They got acquainted with Kevin, pupils, staff and got to know routines and rooms. Before approaching the participants their parents/guardians had received an information sheet about the project (see Appendix 4) and had signed a consent form (see Appendix 6). In addition to that the focus participant signed a symbol supported consent form (see Appendix 7) together with the researchers. The researchers also practiced the functions of the HWST prototype together with Kevin for about 20 minutes, with 1-3 new stories, every day during 2 weeks prior to the session when the prototype was used. Prior to the HWST session Kevin had already told 2 of the stories to the researchers. This means that he was already familiar with these.

3.4. Instructions

The first session (S-b-S) started with the researchers presenting themselves. Thereafter Ben and Emma got some instructions. They were told that they were going to be video recorded with one camera. The children were told that the project was about peer interaction and story sharing and that everyone was to tell at least one story. The researchers encouraged them to ask questions. Information about the S-b-S was provided.

Before the second session (HWST) the children were reminded about the information from the first session and also were given some additional information. This time they were told that 2 cameras were going to record during the session. The researchers explained to them how the prototype worked.

3.5. Collection of data

Both sessions took place in a small room, used for e.g. speech and language therapy. The researchers planned the sessions to be between 5 and 20 minutes long. The S-b-S session is 6.11 minutes long. The HWST session is 18.09 minutes long. One camera (Sony HDR-XR105 E) was used to record the interaction between the focus participant and the peers. During the HWST sessions an additional camera (Sony DCR-TRV330E) was used to capture the screen of the prototype. Both cameras were attached to tripods and had their own incorporated microphone for audio recording. The cameras were placed 1.5 – 4 meters away from the focus participant. Both video recorded sessions were carried out in a similar manner.

The video recordings were transferred and stored in the researchers’ computers, the Scottish supervisors’ computer and on an external hard disk belonging to the Department of Neuroscience, Uppsala University.

3.6. Ethical considerations

The researchers sent out information sheets about the project (see Appendix 4) and letters of consent to the parent(s)/guardian(s) of the children that were invited to participate (see Appendix 6), but also to the principals and staff of the two schools that were invited to participate in this study (see Appendix 2 & 3). The focus participant had an own information meeting with the researchers in connection with the signing of the symbol supported consent form (see Appendix 7). All participants were informed that
they could withdraw from the study at any time without consequences or punishment. The letters of consent were collected by the researchers and read through to sort out which children were allowed to participate and which children were not. All the participants’ personal records are treated confidentially and are kept locked in at the School of computing, University of Dundee, Scotland, UK. Only the research team has access to this information.

The raw material that consists of video recordings will be kept on the laptops of Miss Jennifer Menjivar Dominguez and Miss Karolina Yläneva until this Master thesis is published on the Uppsala University database DiVA. The research team on the Assistive and health care department, School of Computing, University of Dundee in Scotland, UK and the Department of Neuroscience at Uppsala University in Sweden also have copies of the raw material. The video recordings are not marked with personal records. All participants mentioned in the study were given fictional names, except for the researchers who have chosen to use their real names.

When the study is presented transcripts from the sessions will be used, as well as pictures of the HWST prototype and drawings on which the participants can not be identified. Video recorded clips from the sessions will only be used for research (such as conferences and meetings) and in educational purposes with the permission from the participating children’s parent(s)/guardian(s).

3.7. Changed methodology
This study was first designed as a comparative intervention study with an ABA design. During the study a larger amount of data was therefore collected during 4 weeks. Due to the structure of the collaboration between the schools (see 3.1.2. Other participants) it would not be meaningful to use all the data in accordance with the original plan. This lead to that the same pair of naturally speaking peers could not participate in baseline, intervention and follow up baseline (ABA-methodology). The excluded video recordings show Kevin in interaction with another pair of naturally speaking peers. They behaved in a very different way compared to Ben and Emma. The researchers concluded that this would have made it difficult to determine which contributions depended on the communication aids versus the peers’ different personalities and strategies.

3.8. Methods of analysis
Instead of the original plan (see above) a combination of quantitative and qualitative methods will be used in this study. The quantitative analyses will give a brief account of frequencies of phenomena found using the qualitative analysis. The qualitative analysis of the two interactions will be done using conversation analysis (see below).

3.8.1. Quantitative analysis
The quantitative analyses are dependent on the qualitative findings and are used to complement these. They consist of an account of the frequency of different phenomena (see 4.1. Overview and categories)

3.8.2. Qualitative analysis
3.8.2.1 Conversation analysis
Conversation analysis (CA) has its origin in sociology and was developed in the Unites States during the 1960s as an opposition against the experimental research of that time.
A forerunner of this field was Harvey Sacks, who’s *Lectures on Conversation* became famous within the field (Norrby, 2004:32).

In CA it is believed that conversational partners are orienting towards a meaningful communication together (Hutchby & Wooffitt, 2008). CA aims to investigate how conversational interaction (so called talk-in-interaction) between persons is organized. All contributions to the conversation, both verbal and nonverbal (such as laughter and body language) are looked at. Each contribution is called a turn. CA looks at how turn taking works, e.g. how does one get on to starting to say something or what happens when turns overlap? How the interaction is organized on a local level, e.g. from turn to turn is investigated. Many turns couple together naturally, e.g. question – answer. These couples of turns are called adjacency pairs (Norrby, 2004:38-39).

CA is the study of naturally occurring talk (Norrby, 2004:34) and the factors that are available in the interaction are the focus. This means that the researcher cannot look at outer factors to try to understand the conversation. This is why researchers within the field of CA also never have hypotheses before they start to study an interaction. The research is only based on Transcripts of video and/or audio recorded naturally occurring interaction (Hutchby & Wooffitt, 2008). The researcher gets an overview of his/her material, looks for frequently occurring patterns, and bases his/her results on these patterns (Norrby, 2004:34) The Transcript is analysed following the fundamental assumptions below.

1. All interaction is structured.
2. All contributions to the interaction – e.g. an utterance in a conversation – are both context dependent and context renewing.
3. All details in the interaction are potentially of value and nothing can therefore be dismissed as irrelevant, accidental or wrong.
4. The study of social interaction occurs best through the study of natural, “real” interaction.

(Norrby, 2004:34)

Hutchby and Wooffitt (2008) discuss story telling from a CA-perspective which means that they focus on the interactional context in which the story is being told. For more information about their view on narrative activities in talk see 2.8. Story telling.

Interactions between children with CCN who use VOCAs and their naturally speaking peers have been analysed with CA by Clarke and Wilkinson (2008). They found that the naturally speaking peers had difficulties understanding how the VOCA turn by the aided child was sequentially linked to prior turns. The authors noticed that there was an asymmetry in the communication, e.g. the naturally speaking child talked more than the aided child. This is something that traditionally has been seen as a negative thing. For example, in conversations between adults and aided children, the adults have been described as “dominant” (Pennington & McConachie, 1999). On the contrary, Clarke and Wilkinson (2008) argue that the asymmetry might be an advantage for the children. If the naturally speaking child asks many questions and the child who uses an aid answers them, they create a context in which it is easier for the naturally speaking child to understand the child who uses an aid. It is also easier for the child who uses an aid to be understood.

**3.8.2.2 Transcription procedures**
The material is transcribed in detail, showing both verbal and non-verbal actions. The majority of the symbols in the Transcript key (see *Appendix 1*) are generally accepted.
within the field of CA. The researchers have created 3 additional symbols to adjust the key to the focus participant’s contributions. These are “ss:” that means synthetic speech, “vr:” that means voice recording and words written in italics (“Word”) means that they are produced with either the S-b-S or the HWST prototype. In all of the transcripts K stands for Karolina and J stands for Jennifer (the researchers).
4. Analysis

4.1. Overview and categories

After screening the material the researchers chose to focus on gaze and questions. These features were chosen for a number of reasons. For example both gaze and questions appeared as prominent in relation to narrative activities in the data and these phenomena would therefore be interesting to examine them from an interactional point of view. Questions were also chosen because of their uneven distribution in the material and because the researchers thought it would be interesting to see what impact different questions have on the interaction. Gaze was partly chosen because it is a non-verbal activity that can complement the verbal questions. Due to Kevin’s physical disability it is difficult for him to talk. One must therefore see to his non-verbal contributions. Even these are restricted and actions such as gestures become challenging for him. Gaze is one of his non-verbal strengths because he can control it to a large extent. In quantitative terms the analysis demonstrated that there was about the same amount of sequences with eye contact in both sessions. The density of these contributions differs considerably between the sessions since the HWST session is more than twice as long as the S-b-S session. What was prominent for the HWST session is that it contained a much higher proportion of questions, and a specific type of gaze, i.e. joint orientation towards the screen. This means that proportionally there was more eye contact in the S-b-S session compared to the HWST session. Table 3 does not take into account the durations of the sessions, but only accounts for the frequencies. Since it was noticed that there was a lower frequency of questions in the S-b-S session the main focus of it has been on gaze. When all of the data was analysed more closely using qualitative methods the researchers found certain patterns that were later separated and put into categories. These categories were developed by the researchers after screening the data which they were based upon. All of the questions taken in consideration in this study were asked by the naturally speaking peers.

The question categories are (a) Spontaneous, (b) Elicited, (c) Content oriented and (d) aid oriented. The researchers here explain the different categories within the phenomenon questions. Spontaneous questions are initiated by the peers themselves, without being prompted by the researchers. Elicited questions are those that the naturally speaking peers ask after the researchers have encouraged them to do so. With content oriented questions the researchers refer to questions that are asked about the content in a story. Aid oriented questions on the other hand refer to questions that have to do with Kevin’s options on the aid leading the conversation forward, e.g. “do you want the green”.

The gaze categories are (a) Eye contact between Kevin and one of his peers, (b) Joint orientation towards the screen, (c) Kevin’s gazes at peers, (d) Kevin’s gazes at researchers and (e) Peers’ gazes at Kevin. The researchers here give an explanation of the different categories within the phenomenon gaze. Eye contact between Kevin and one of his peers here refers to when Kevin and either Ben or Emma look each other in the eyes at the same time. This act can be initiated either by Kevin or by one of the naturally speaking peers; or occur simultaneously. Joint orientation towards the screen means that Kevin and at least one of his peers are looking at the prototype screen at the same time. The category Kevin’s gazes at peers is defined as Kevin looking at a peer when s/he does not look back at him. Kevin’s gazes at researchers refers to situations where Kevin looks at a researcher. The last category Peers’ gazes at Kevin describes
situations where one or two of the naturally speaking peers is looking at Kevin without him looking back.

The researchers developed 3 questions to answer for each category from the phenomena questions and gaze, which makes a total of 27 CA-influenced questions. These are listed below:

a. **Elicited questions.** What precedes the researchers eliciting a question? What does it lead to in the interaction? How is the aid used in the interaction?

b. **Spontaneous questions.** What precedes a spontaneously asked question? What effects does it have on the interaction? How is the aid used in the interaction?

c. **Content oriented questions.** What precedes a content oriented question? What does it lead to in the interaction? How is the aid used in the interaction?

d. **Aid oriented questions.** What precedes an aid oriented question? What does it lead to in the interaction? How is the aid used in the interaction?

e. **Eye contact.** What precedes eye contact between Kevin and one of his peers? What does it lead to in the interaction? How is the aid used in the interaction?

f. **Joint orientation towards the screen.** What precedes joint orientation towards the screen? What does it lead to in the interaction? How is the aid used in the interaction?

g. **Kevin’s gazes at peers.** What precedes situations where Kevin looks at his peers without getting a response? What does it lead to in the interaction? How is the aid used in the interaction?

h. **Kevin’s gazes at researchers.** What precedes Kevin’s searching for the researchers’ eye contact? What does it lead to in the interaction? How is the aid used in the interaction?

i. **Peers’ gazes at Kevin.** What precedes a situation where the naturally speaking Peers look at Kevin without getting a response? What does it lead to in the interaction? How is the aid used in the interaction?

### 4.2. Descriptive quantitative analysis

#### 4.2.1. Definition of questions and quantitative results

In this study the definition of questions include questions that start with who, when, where and what, utterances that have the raised pitch at the end which is typical for questions and utterances starting with “do”. Multi-unit questions (a type of question that consists of 2 or more question units, see Hofvendahl, 2000) are also included and each of them is regarded as one question, i.e. only counted once. All of the questions have not been transcribed because the time limits within this study were too restricted (e.g. most of the Aid oriented questions).

Now the question results from the S-b-S session will be presented. In the S-b-S session 1 question occurs and this question is elicited (see Transcript 1). No other questions occurred in this session.

Now the question results from the HWST session will be presented. The question categories that were presented and defined above (see 4.1. Overview and categories) have here been divided into two groups, Groups 1 and 2. The questions in Group 1 can be either elicited or spontaneous (as seen in Table 1). The questions in Group 2 can be content oriented, aid oriented or other questions (as seen in Table 2). In the HWST session a total of 55 questions were asked by Ben and Emma. Fifty-two of the questions were aimed for Kevin; the other 3 were not (see e.g. Transcript 2, line 21 and Transcript 3, line 11). Out of all of the questions 7 of them were content oriented, whereas 47
questions were aid oriented. Fifty-three of the questions were spontaneous and 2 were elicited. The results from both sessions are summarized in Tables 1 and 2 below:

<table>
<thead>
<tr>
<th>Questions</th>
<th>S-b-S session</th>
<th>HWST session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicited</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Spontaneous</td>
<td>0</td>
<td>53</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>55</td>
</tr>
</tbody>
</table>

Table 1. Group 1 of question categories is here presented.

<table>
<thead>
<tr>
<th>Questions</th>
<th>S-b-S session</th>
<th>HWST session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content oriented</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Aid oriented</td>
<td>0</td>
<td>47</td>
</tr>
<tr>
<td>Other questions</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>55</td>
</tr>
</tbody>
</table>

Table 2. Group 2 of question categories is here presented.

4.2.2. Eye contact and quantitative results

Eye contact was chosen as an interesting aspect of interaction because it has been noted as not being an accidental phenomenon but systematically aligned by the conversational partners (Goodwin & Goodwin in Gardner & Forrester, 2010:210). When one conversational partner looks at the person who is looking at him/her it indicates that these two persons are giving each other an equal amount of attention (Kendon, 1990:76).

Regarding Kevin initiating eye contact in a context where he is telling a story he does it more frequently when using the S-b-S. When he uses the HWST prototype he is focused on the screen rather than on his peers. In general eye contact between Kevin and one of his peers does not occur frequently in the material and it is seldom initiated by the child that is telling a story. Table 3 below does not account for the categories Joint orientation towards the screen, Kevin’s gazes at peers, Kevin’s gazes at researchers and Peers’ gazes at Kevin. Only eye contact is looked at quantitatively. In the S-b-S session eye contact between Kevin and a peer occurred 8 times whereas it occurred 9 times in the HWST session. However the HWST session was more than twice as long as the S-b-S session, which means that there was a lower density of eye contact in the first mentioned session. The results from both sessions are summarized in Table 3 below:

<table>
<thead>
<tr>
<th>Type of gaze</th>
<th>S-b-S session</th>
<th>HWST session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye contact between Kevin and a peer</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 3. The table shows a quite even distribution of the frequency of eye contact in both sessions. However the HWST session was more than twice as long as the S-b-S session which means that there was a higher density of eye contact in the S-b-S session.

4.3. Qualitative analysis

4.3.1. Questions

4.3.1.1 Elicited and Spontaneous questions

What precedes the researchers eliciting a question? What does it lead to in the interaction? How is the aid used in the interaction? The researchers will answer these questions by analysing Transcripts 1 and 2. Transcript 1 below, which is an extract from
Transcript 4 (drawn from the S-b-S session) demonstrates an example of an elicited question.

**Transcript 1 (S-b-S session)**

In this sequence Kevin has just used his S-b-S to tell a story about when he went to the safari park. Karolina asks if Kevin wants to tell his other story as well. Before Jennifer is about to change levels on the S-b-S Karolina turns to the peers.

1. K: \[
\text{[do you have any } \text{questions?]}\]
2. \[
\text{[(Ben and Emma look at K)]}\]
3. \[
\text{(2.0)}\]
4. Ben: ( ) \text{wha was the other t h e } \text{animal e said the=}
5. Emma: \[
\text{[(looks at Ben)]}\]
6. Ben: =\text{was the thing } \text{=} \text{the} \text{=} \text{giraffe}\[
\text{[(glances at K)]}\]
7. \[
\text{[(looks at Ben)]}\]
8. =\text{giraffe} \text{[t h e]}
9. Emma: \[
\text{[an the elephants]}\]
10. Ben: \text{yeah}
11. J: \[
\text{[(ise  } )}\]
12. K: \[
\text{[(points to switch)}\]
13. \text{[cause we can listen [again}
14. Emma: \[
\text{[((glances at J)]})\]
15. Ben: \text{[aright bison}
16. Emma: \text{bison an [camel}
17. Emma: \[
\text{[((looks at Ben)]})\]
18. Ben: \text{[((glances at Emma, eye contact))}
19. Ben: \text{"yeah"}

**Sequential description.** As seen in line 1 Karolina asks the peers if they have any questions about Kevin’s story. The peers react to the question by looking at Karolina. After 2 seconds Ben asks a question about the story content (lines 4-8) and glances at Karolina during the question (line 7). He finishes with re-counting “the giraffe” (line 8). Emma then fills in with “elephants” to continue Ben’s recounting in overlap (line 9). Karolina responds to this by pointing to the switch and saying that they can listen again (lines 12-13). At the same time as she points to the switch Jennifer says “ise” which is interpreted by Ben as “bison” (line 11). Directly after that Ben says “aright bison” as seen on line 16. The sequence is organized in terms of an adjacency pair where Ben’s question is the first pair part, and where Emma’s and Karolina’s answers are both second pair parts. Ben’s question can also be paired with Jennifer’s (inaudible) response on line 11.

**Findings.** What precedes the elicitation of a question is that Kevin has just finished telling a story and now gets the option to tell another story, which he wants to do. Jennifer is just about to change levels on the S-b-S when Karolina wants to involve the naturally speaking peers in the conversation by saying “do you have any questions?” (line 1). In the interaction the elicitation of a question leads to Ben asking Karolina “wha was the other animal e said” (line 4). Ben’s question was in turn responded to by everybody but Kevin, even though it was about the content of the story just told by Kevin himself. The characteristic of the question, (i.e. the question being about Kevin rather than being directed to him) makes Kevin less involved in the conversation. Karolina’s orientation to the switch on lines 12-13 could be interpreted as an attempt to involve Kevin in the sequence, but Ben and Emma keep on orienting to the researchers (Emma’s gaze on Jennifer on line 14) and each other (eye contact on line 18). In this sequence the S-b-S is not used. Kevin could have provided Ben the answer to his
elicited questions by using a repetition of the story on the S-b-S but never gets the opportunity by the co-participants, who figure out the answer amongst themselves.

In Transcript 2 below (drawn from the HWST session) another elicited question is shown. The same questions as above will be answered.

**Transcript 2 (HWST session)**

In this sequence Kevin uses the HWST prototype to tell a story about his rebound therapy class.

1. Kevin: \[J`\text{'}s \text{VR}: \text{I:: did block bounces with=} \]
2. \[\text{(enlarged photograph of Jennifer appears on screen)}\]
3. Kevin: \[\text{(looks at screen)}\]
4. J: \[\text{((smiles, looks at Kevin)}\]
5. Kevin: \[\text{Jennifer on the trampoline}\]
6. \[\text{(looks at J, smiles, nods, eye contact)}\]
7. J: \[\text{((nods)}\]
8. Kevin: \[\text{((vocalizes)}\]
9. J: \[\text{yeah that was yesterday}\]
10. \[\text{((looks down on screen)}\]
11. Kevin: \[\text{((Kevin looks at screen)}\]
12. \[\text{(1.0)}\]
13. J: \[\text{((clicks to story)}\]
14. \[\text{(2.0)}\]
15. J: \[\text{okay}\]
16. K: \[\text{remember you can ask questions if you want to=} \]
17. Ben: \[\text{((makes hands gestures and turns to peers)}\]
18. \[\text{((turns to K)) `um} \]
19. \[\text{(0.5)}\]
20. K: \[\text{=`bout} \]
21. Ben: \[\text{what was he doing on the trampoline;} \]
22. \[\text{((turns to Jennifer and looks at her)}\]
23. \[\text{(2.4)}\]
24. J: \[\text{it (.) back bounces=} \]
25. Ben: \[\text{((nods)) `uhu} \]
26. J: \[\text{=yeah eh I sat behind Kevin andeh=} \]
27. Kevin: \[\text{((moves arms and body as if fixing his posture)}\]
28. J: \[\text{=one of the teachers} \]
29. \[\text{jumped up soe jumped=} \]
30. J: \[\text{((moves hand in vertical motion)}\]
31. \[\text{=really `high} \]
32. Kevin: \[\text{((s m i l e s)}\]
33. J: \[\text{hehehehe} \]
34. Ben: \[\text{((nods)) `um} \]

**Sequential description.** On line 1-6 Kevin’s voice recording (VR), which is recorded by Jennifer, is put out. During the recorded utterance Kevin and Jennifer look at each other and smile. Jennifer confirms the utterance by saying “yeah that was yesterday” (line 8). A second elapses and she clicks back to the story page. On line 13 Karolina encourages the peers to ask questions. Ben responds by asking “what was he doing on the trampoline?” (line 18) and at the same time turns to look at Jennifer. After 2.4 seconds Jennifer starts to explain what she and Kevin were doing on the trampoline (lines 24-31). Kevin’s question and Jennifer’s answer create an adjacency pair. Kevin responds to the answer by increasing his motor movements (line 27), and at the end of it he smiles (line 32). Ben nods both during (line 25) and after (line 34) the explanation.
Findings. The answer to the first question is that the elicitation of a question is preceded by Kevin telling a voice recorded story part involving him and Jennifer. They both respond to the story part in a positive manner by establishing eye contact and smiling. After a 2 seconds long pause Karolina tries to involve the naturally speaking peers in the conversation by reminding them that they can ask questions. This leads to Ben asking the elicited question “*what was he doing on the trampoline*?“ (line 18). The question was directed to Jennifer (using gaze and body posture) even though it is about the content in Kevin’s story. The characteristic of the question (i.e. it being about Kevin rather than directed to him) makes Kevin less involved in the interaction. Jennifer goes along with the proposed activity and answers the question for Kevin (so to speak), but seems to involve Kevin at the end of the answer where he smiles (line 32) and mutual laughter develops. The HWST prototype is not used in the interaction. Even if the question would have been aimed for Kevin he would not have been able to answer it with the HWST prototype because it does not provide him with the tools to do so. The same phenomenon of directing a question about Kevin’s narrative to someone else other than Kevin also occurred in the S-b-S session, as seen in Transcript 1 above.

The focus will now turn to spontaneous questions. What precedes a spontaneously asked question? What does it lead to in the interaction? How is the aid used in the interaction? The researchers will answer these questions by analysing Transcript 3, because no spontaneously asked questions occurred in the S-b-S session. Transcript 3 below illustrates a question that is asked spontaneously by one of the naturally speaking peers in the HWST session.

Transcript 3 (HWST session)
In this sequence the naturally speaking peers are talking about when their birthdays are.
1. J: ((looks at Kevin during this sequence))
2. Ben: so shou be s ( )
3. Emma: | so yur birthday’s s
4. L((looks at Ben))
5. Ben: ((looks at Emma, eye contact))
6. two d a y s °before°
7. Emma: |two days before=
8. L((holds up two fingers))
9. =“christma”
10. Kevin: L((vocalizes, smiles))
11. Ben: when’s Kevin’s birsdazy
12. Emma: when’s your birthday Kevin
13. L((leans over tray, looks at Kevin))
14. Kevin: ((looks at Emma, eye contact))
15. (1.0)
16. Ben: ( ) somethin about June
17. ((looks at Emma))
18. Emma: ((looks at Ben))
19. Ben: ( ) (. “dono”
20. Ben: L((looks at Kevin))]
21. Emma: L((looks at Kevin))]
22. Ben: L((leans forward against Kevin))
23. is your=
24. Kevin: L((looks to front))
25. Ben: =birthday in June;
26. J: | do you remember Kevin;
27. L((looks at Kevin))
28. Kevin: L((shakes head))
29. Emma: |((looks at Kevin))
30. J: \((\text{is your birthday in } \text{june})\)
31. J: \(\text{n::o it's not in the summer}\)
32. J: \((\text{continues to look at Kevin})\)
33. K: \(\text{not in june}\)
34. K: \(\text{((looks at Kevin)})\)
35. Kevin: \(\text{((looks at J)})\)
36. Kevin: \(.\text{hh ((makes a snoring sound))} \text{[hh}}
37. J: \(\text{of the year}\)
38. Ben: \(\text{[is it in } \text{january?]}\)
39. Emma: \(\text{[J a n u a r y } \text{]}\)
40. Kevin: \(\text{((looks at J, smiles, nods))}\)
41. J: \(\text{[no<}}
42. J: \(\text{((smiles))}\)
43. J: \(\text{[is ↑it}}
44. Kevin: \(\text{((looks at Emma))}\)
45. Kevin: \(\text{((looks at J, smiles, nods))}\)
46. Emma: \(\text{(taps her chest, looks at Kevin)}\)
47. Kevin: \((\text{looks at Emma})\)

**Sequential description.** Ben and Emma talk about Ben’s birthday (lines 2-9). When Kevin hears this he starts to vocalize and smile (line 10). The naturally speaking peers then draw their attention towards him and Ben spontaneously asks “when’s Kevin’s birthday?” as though he is thinking aloud (line 11). Emma turns towards Kevin and leans over the tray that is attached to his wheelchair. She looks at him and asks him when his birthday is (lines 12-13). Ben continues thinking aloud and refers to the date of Kevin’s birthday as something about June (line 16) but expresses that he is unsure (line 19). Ben asks Kevin if his birthday is in June. Simultaneously Jennifer asks Kevin if he remembers when his birthday is (lines 23-26). Kevin shakes his head at the same time as Emma repeats Ben’s question (lines 28-30). Jennifer’s response to Kevin shaking his head is “n::o it’s not in the summer” (line 31). Karolina confirms this by saying “not in june” (line 33). Jennifer then continues by saying that the birthday is in the beginning of the year, thereby giving the children a clue (lines 37-38). The naturally speaking peers then express their belief that the birthday is in January at the same time (lines 39-40). Kevin nods whilst Jennifer says “>no<” (lines 41-43). Jennifer says “is ↑it” and marks the information as new to her with the raised pitch in the word “it” (line 44). Kevin nods again (line 45).

**Findings.** Emma’s spontaneously asked question (“when’s your birthday Kevin?”; line 12) is preceded by Kevin responding positively to Ben and Emma’s topic birthdays by smiling and vocalizing. This positive response draws the peer’s attention to Kevin. Ben starts to think aloud and says “when’s Kevin’s birthday?” (line 11). When Kevin initially vocalizes and smiles he gets the peers’ attention and Ben responds to it by asking the question “when’s Kevin’s birthday?” (line 11). Emma’s spontaneously asked question leads to Kevin looking back at her silently. Ben then reformulates the question into a yes/no question (“is your birthday in january?”; lines 23-25). The children get further help from the researchers, who provide them with clues and comments. Within this contextual framework Kevin is able to participate in the sequence. In this sequence the HWST prototype is not used because the focus is the naturally speaking peers’ stories, not Kevin’s story. It could have been used earlier in the sequence to complement Kevin’s non-verbal actions (vocalizations and smiles) by an emotional expression (voice recording) that is pre-stored on the HWST prototype e.g. “that was
really good and fun”. Even though Kevin is provided with this opportunity he does not orient towards the screen as an attempt to indicate that he wants to say something. When comparing the findings of elicited and spontaneous questions from both sessions the results indicate that elicited questions are not directed to Kevin, and hence not optimal for involving Kevin in the conversation. On the contrary spontaneous questions help Kevin to easier participate in the conversation. One of the elicited questions could have been answered by Kevin with help of the S-b-S; the other questions could not have been answered with the help of an aid.

4.3.1.2 Content oriented and aid oriented questions
The analysis will now shift to content oriented questions from both sessions. What precedes a content oriented question? What does it lead to in the interaction? How is the aid used in the interaction? The researchers will answer these questions by analysing Transcripts 4 and 5. Transcript 4 below (drawn from the S-b-S session) demonstrates a content oriented question on line 25.

Transcript 4 (S-b-S session)
In this sequence Kevin uses his S-b-S to tell a story about when he went to the safari park.

1. Kevin: ((clicks switch)) VR: Yesterday we wen to the safari
2. park
3. ((glances at Emma)
4. Emma: ((glances at Kevin, mutual eye contact))
5. K: [eah tha was Wednesday=
6. J: [((sits down))
7. =wasen it [but we sesi ( ]
8. [((nods, makes a clicking gesture with the
9. hand))
10. K: [((looks at Ben and Emma))
11. Kevin: [((clicks switch)) VR: We wen in a big bus:;
12. [((looks at Emma))
13. Emma: [((looks at Jennifer))
14. Kevin: [((clicks switch)) VR: we saw some elephants an a g↑iraffe
15. [((vocalizes, looks at Emma))
16. Emma: [((looks at Kevin, eye contact, smiles))
17. Kevin: [((clicks switch)) VR: we saw=
18. =camel an [b↑ison
19. Emma: [((looks at Kevin))
20. Kevin: [((continues to look at Emma, eye
21. contact))

..............................................................................................................
22. K: [do you have any ⁙que⁙stions¿]
23. [((Ben and Emma look at K)) ]
24. (2.0)
25. Ben: ( ) wha was the other [animal e said the=
26. Emma: [((looks at Ben))
27. Ben: =was the thing [ t h e ]=
28. [((glances at K))]
29. =giraffe [ t h e ]
30. Emma: [an the elephants]
31. Ben: yeah
32. J: [ise ]
33. K: [((points to switch))}
Sequential description. The sequence starts with Kevin telling a story about when he visited a safari park, with the S-b-S voice recordings on lines 1-2, 11, 14 and 17-18. Karolina makes a comment after Kevin’s first output to clarify that the message was not about yesterday (“yeah that was Wednesday”, line 5). Kevin also makes an additional vocalization (line 15) before he clicks the switch to put out the last recorded story part (lines 17-18). A while after Kevin has finished his story Karolina asks the peers if they have questions (line 22). This leads Ben to asking the content oriented question “wha was the other animal e said” (line 25). He starts counting up the animals that he can remember from the story (lines 25-29). Emma responds to this by counting up one of the animals that she remembers (line 30). Jennifer says “ise” on line 32, which is interpreted by Ben as “bison”. Simultaneously Karolina tries to involve Kevin in the interaction by pointing to the S-b-S switch and saying “cause we can listen again” (lines 33-34). Ben responds to Jennifer’s comment by saying “aright bison” (line 36). Thereafter Emma repeats the animal that Ben was aiming for and adds a new one by saying “bison an camel” (line 37).

Findings. The content oriented question in preceded by Kevin finishing a story about when he went to a safari park. Immediately after that he gets to choose to tell another story. But before Jennifer is about to change levels on the S-b-S Karolina wants to engage the peers by asking them if they have any questions. The content oriented question “wha was the other animal e said” (line 25) which is directed to Karolina, leads to her trying to engage Kevin in answering the question about his story. The peers figure out the answer amongst themselves and with help from Jennifer’s comment “ise” (line 32) before Kevin has the time to make a move, i.e. start orienting towards the switch. The S-b-S is not used in this sequence, only as an aid for Kevin to tell a story initially. He could have answered Ben’s content oriented question by repeating the story, because the question was related to something that Kevin had told.

Now the same questions category (Content oriented questions) will be analysed in Transcript 5 below (drawn from the HWST session) which is an extract from Transcript 3 above.

Transcript 5 (HWST session)
The naturally speaking peers are talking about when Ben’s birthday is.
1. Ben: so shou be s¿
2. Emma: so yur birthday’s ¿
3. ((looks at Ben))
4. Ben: ((looks at Emma, eye contact))
5. two d a y s °before°
6. Emma: two days before=
7. ((holds up two fingers))
8. =°christma°
9. Kevin: ((vocalizes, smiles))
10. Ben: when’s Kevin’s birsday¿
11. Emma: when’s your birthday Kevin¿
12. ((leans over tray, looks at Kevin))
Kevin: ((looks at Emma, eye contact))
14. (1.0)
15. Ben: ( ) somethin about june=
16. (looks at Emma)
17. Emma: (looks at Ben)
18. Ben: = ( ) (. ) °dono°
20. Emma: [((looks at Kevin))]
21. Ben: [(leans forward against Kevin)]
22. is your=
23. Kevin: [(looks to front)]
24. Ben: =birthday in june;°

..............................
38. Ben: [is it in january?]
39. Emma: [ J a n u a r y ]

..............................
45. Emma: is en my birthday ( ) aswell

Sequential description. The naturally speaking peers are talking about that Ben’s birthday is two days before Christmas (lines 1-8). Kevin responds to this by smiling and vocalizing (line 9). In Ben’s next turn he asks the content oriented question “when’s Kevin’s birthday?” (line 10). Emma then directs the question to Kevin (“when’s your birthday Kevin?” line 11). After a while the peers get an answer to the question from Kevin with assistance from the researchers (see Transcript 3, lines 29-40). Emma tells Kevin that her birthday also is in January (line 45).

Findings. The content oriented question is preceded by Ben and Emma talking about the topic birthdays which is something that Kevin can be engaged in. Kevin responds positively (both smiles and vocalizes, line 9) after the peers have talked about when Ben’s birthday is. This draws Ben’s and Emma’s attention to Kevin and they therefore try to involve him. Eventually this leads to Emma asking Kevin the content oriented question. The content oriented question leads to Kevin answering the question in an engaged manner with assistance from the researchers. The children stay within the topic for a while. Emma even finds the context adequate for making a personal comment on Kevin’s response (“is en my birthday ( ) aswell”, line 45). Kevin did not use the HWST prototype in this sequence. Even if he would have used the prototyped it would in this case not have provided him with the answer to Ben’s question, because none of the pre-stored stories were about the topic birthdays. Kevin could have used the HWST prototype in the beginning of the sequence to put out an emotional utterance (e.g. “It was awesome”) in addition to his non-verbal actions (vocalization and smiles, line 9).

The focus will now be aid oriented questions, which are demonstrated in the following transcript. The following questions will be asked when analysing Transcript 6 below: What precedes an aid oriented question? What does it lead to in the interaction? How is the aid used in the interaction? No aid oriented questions occurred in the S-b-S session.

Transcript 6 (HWST session)
In the following Transcript Kevin is telling a story about when he went shopping. He has told half of the story parts that are stored in it. The naturally speaking peers have been engaged by asking questions about where Kevin is looking (aid oriented questions).
1. Ben:  what do you want=
2. Ben:  ((looks at Kevin))
3. Ben:  now? d'you want the=
4. Ben:  ((looks at screen, looks at Kevin))
5. Ben:  green;
6. Ben:  ((points to green background))
7. Ben:  ((looks at Kevin))
8. Emma:  ((looks at Kevin))
9. Kevin:  ((nods, looks at screen))
10. Ben:  °uhu°
11. Ben:  ((looks at screen))
12. Ben:  d’you want=
13. Emma:  ((points to screen, looks at Kevin))
14. Ben:  =yellow;
15. Emma:  e::h
16. Emma:  ((looks at Kevin))
17. Kevin:  ((looks at screen, nods))
18. Ben:  so he wants [green yellow
20. Emma:  yello one
21. J:  ((clicks at story part))
22. Kevin:  SS: Jennifer, [Karolina=
23. Ben:  ((looks at Kevin))
24. Kevin:  and Grace were with me
25. Ben:  ((looks at J, then Kevin, then screen))
26. (1.0)
27. Kevin:  ((looks at J, vocalizes, smiles))

Sequential description. On lines 1-5 Ben asks Kevin a multi-unit question (see 4.2.1. Definitions of questions and quantitative results). Ben’s question is segmented in two parts, and is about which background colour on the HWST screen Kevin wants Jennifer to click on. After the second part of the question (“d’you want the green¿”, lines 3-5) Kevin nods and looks at the screen (line 9). Ben confirms that he has understood Kevin’s non-verbal contribution with an “uhu” (line 10). At that point Emma points to the yellow background of the screen, which has story parts on it (line 14). Ben sees this and he proceeds by asking if yellow is the front colour (line 12-14). Ben summarizes both Kevin’s choices (“green yellow”) on line 18. Emma then repeats the front colour only (“yellow” line 19). Jennifer clicks on the symbol for people (that is on the green background) and the synthetic voice speaks out a new part of the ongoing story (lines 22-24). A second after the story part has been put out Kevin looks at Jennifer, vocalizes and smiles (line 27).

Findings. The aid oriented question on lines 1-5 is preceded by Kevin telling a story about when he went to the Supermarket. He had been telling it in a co-constructed manner together with his peers. When the peers ask aid oriented questions it leads to the narrative moving forward, as seen in the above sequence. It seems as if these kinds of questions are placed in sequential environments where a topic glide or topic shift might be relevant and therefore provide Kevin with the possibility to initiate topic shift. This makes it easier for the peers to get involved into the development of Kevin’s story and it makes them more interested in exploring what is stored in the prototype together with Kevin. The HWST prototype is used frequently when Kevin tells his story about when he went to the Supermarket. It is made into a relevant next action and becomes incorporated into the conversation.
When comparing the findings of content oriented and aid oriented questions the results indicate that aid oriented questions help moving the conversation and narrative progression forward. The spontaneously asked content oriented question in the HWST session led to Kevin being able to participate with help of the researchers, whereas the elicited content oriented question in the S-b-S session led to Kevin being isolated from the conversation. Whether a question is spontaneous or elicited thus seems to matter more than if the question is content oriented or not.

4.3.2. Gaze

4.3.2.1 Eye contact between Kevin and one of his peers

The analysis will now deal with gaze, starting with the category Eye contact between Kevin and a peer. The following questions will be answered by looking at Transcripts 7 and 8: What precedes eye contact between Kevin and one of his peers? What does it lead to in the interaction? How is the aid used in the interaction? Transcript 7 below (drawn from the S-b-S session) illustrates this category.

Transcript 7 (S-b-S session)

Kevin is telling the last part of his second story which is about what he had been doing on the previous day.

1. Emma: ((glances at K, smiles, fixes her hair))
2. Ben: ((glances at K))
3. Ben: ((head turned towards Kevin, glances at Kevin, seems to look out in air))
4. K: ((looks at Kevin, smiles))
5. J: ((looks at Kevin))
6. Kevin: ((looks at K, eye contact, orients hand towards the switch))
7. ((clicks, holds hand on switch, continues to look at K))
8. VR: then I=
9. Emma: ((looks down on table))
10. Kevin: went to music and I had to learn
11. a new song=
12. Emma: ((looks at Kevin))
13. Kevin: ((continues to look at Emma))
14. K: ((looks at Emma, eye contact))
15. Emma: for harvest
16. Kevin: ((removes hand from switch))
17. ((continues to look at Emma))
18. Emma: ((leans back with hands behind head, looks at K))
19. K: oohahoo
20. Ben: ((glances at K))

Sequential description. Initially in the sequence the naturally speaking peers glance at Karolina (lines 1-2). Thereafter Ben glances at Kevin (line 3) before he starts to look out in the air. Both of the researchers look at Kevin. Simultaneously Kevin looks at Karolina and they establish eye contact (lines 5-7). Kevin tells his last story part on the S-b-S (lines 9-17). Emma looks at him before the very end of it (line 15). After this at the end of his story Kevin looks back at her, and they establish eye contact (line 16). Then Emma leans back and looks at Karolina (line 20).

Findings. The eye contact between Kevin and Emma is preceded by that both of them have looked at Karolina. Kevin has also started to tell his last story part and at the end Emma looks at Kevin. He then responds by looking back at her. The establishment
of eye contact leads to the focus of their attention being on each other – not on the S-b-S, even though the story output comes from the aid. Emma’s gaze at Kevin indicates that she is listening to the story. After the last story part has been put out Kevin marks that he is finished by removing his hand from the S-b-S switch. Emma responds to this by directing her gaze to Karolina, marking that she is not giving him as much attention as before, because Kevin has finished his story. Kevin uses the S-b-S to tell his story in this sequence. Kevin telling a story (in this case with the S-b-S) creates an interactional framework for Emma to look at him.

In Transcript 8 below the same category as above (Eye contact between Kevin and one of his peers) will be illustrated. The same questions as above will be answered, but this time about HWST session.

Transcript 8 (HWST session)
The naturally speaking peers are finishing talking about when their birthdays are.

1. Kevin: ((looks at Emma))
2. Ben: eht what "elle°
3. Emma: >my birthday’s justhe first o january<
4. Ben: l((leans forward, looks at screen, then at
5. [Emma])
6. Ben: is it¿
7. Emma: ((nods several times))
8. (2.0)
9. Ben: ((looks at screen))d’y wanto=
10. Kevin: 3((looks at screen))
11. Ben: =te::il thi s::tory¿
12. ((points at screen))
13. ((looks at Kevin))
14. Kevin: ((shakes head))
15. Emma: ("heà") (points at blue background on main menu))
16. Kevin: ((nods, continues to looks at screen))
17. Ben: ( )
18. K: are you finished 3telling stories¿
19. d((glances at Kevin))
20. Kevin: 3((nods))
21. J: ((click, looks at Kevin))
22. Kevin: SS: I don’t want to do this 3anymore
23. 3((smiles))
24. Emma: [((giggles))
25. K: ehhhehehehehe
26. Ben: 3think he jus likes listening to tha
27. Kevin: (((shakes head, looks up at J))
28. J: 3((continues looking at Kevin))
29. you don wan to tell the third story¿
30. Kevin 3((shakes head))
31. K: *no
32. (0.5)
33. J: ((shakes head)) *okay
34. K: (((looks at Kevin))you don have to=
35. J: 3you don have "to")
36. (1.0)
37. K: =you decide your
38. 3own stories what you wan to talk about
39. J: 3((nods)) yeas
40. Kevin: 3((looks at screen))
41. K: [is there anyone else=  
42. Kevin: ([looks at J))  
43. Ben: ([looks at K))  
44. Emma: ([starts leaning to get in front of and face Kevin))  
45. K: [who has a story¿  
46. Emma: ([looks at Ben and Emma))  
47. Emma: ([looks at Kevin, smiles))  
48. Kevin: ([looks at Emma, eye contact))  
49. Ben: [thap really think of any  
50. Emma: ([looks at Ben))

**Sequential description.** Kevin has stated that he does not want to tell his story by choosing the blue background on the main menu which indicates the navigational option “I don’t want to do this anymore” (lines 14-22). Jennifer confirms that this is what Kevin wants (“you don want to tell the third story¿”, line 29). The researchers tell Kevin that he does not have to tell his last story if he does not want to (lines 34-38). At this point in the sequence Karolina asks the peers if they want to tell another story (line 41-45) and simultaneously Emma leans over the tray that is attached to Kevin’s wheelchair and interferes between Kevin and the screen, facing Kevin and looks at him (lines 44 and 47). Kevin looks at her, Emma smiles and they establish eye contact (lines 47-48). When Ben starts to answer Karolina’s question Emma looks at him instead (lines 49-50).

**Findings.** The eye contact between Emma and Kevin is preceded by Kevin marking that he does not want to tell his third story. Karolina then asks the naturally speaking peers if they have another story. Simultaneously Emma starts leaning to get in front of Kevin to face him and they establish eye contact. This is an unusual move for achieving eye contact. Emma’s effort shows Kevin that she is giving him her full attention. Emma’s smiling facial expression enhances what she wants to express to Kevin. Kevin gazing back at her shows that he is giving her his full attention as well. The eye contact is held until Ben starts to answer Karolina’s question. In this interactional context Emma is the first one to abort the eye contact by looking at Ben. This marks that her attention is drawn to Ben instead of Kevin. The HWST prototype is not used for the establishment of eye contact in this sequence.

**4.3.2.2 Joint orientation towards the screen**

The analysis will now turn to the next category, Joint orientation towards the screen. As stated before, this category only occurs in the HWST session. Therefore there is no corresponding extract from the S-b-S session. The questions that the researchers will answer are: What precedes joint orientation towards the screen? What does it lead to in the interaction? How is the aid used in the interaction? In Transcript 9 below an example of Joint orientation towards the screen is presented.

**Transcript 9 (HWST)**

The naturally speaking peers are finishing a story about what they had been doing in music class.

1. Emma: [can we also got golntime today=  
2. ([looks at no one in particular))  
3. Kevin: ([looks at Emma))  
4. Emma: [after lunch  
5. ([glances at K))  
6. Kevin: ([looks at screen))

35
7. Ben: |*yeah
8. Emma: |((looks at Emma))
9. Ben: |((looks at Ben))
10. Ben: |((leans forward,))
11. Ben: |((glances at screen, then Kevin, then screen))
12. Ben: |((looks at screen, then Kevin, then screen))
13. Ben: |((looks at screen, then Kevin, then screen))
14. Emma: |((looks at screen))
15. Ben: |((then Kevin, then screen, then Kevin, then screen))
16. Emma |((looks at Kevin, then screen, then Kevin))
17. Kevin: |((continues to look at screen, }}
18. joint orientation towards the screen
19. Kevin: |((nods))
20. Emma: |((looks at screen)
21. Kevin: |((continues to look at screen))
22. J: |((looks at screen))
23. Emma: |((points to screen))
24. J: |((points to screen)) the |red one¿
25. Kevin: |((nods))
26. (1.2) (clicks to story page)}

Sequential description. In this case Kevin looks mostly at the screen (e.g. line 6). When the peers perceive that Kevin is looking at the screen they start orienting towards it (lines 12-14). Lines 15-18 demonstrate that there is joint orientation towards the screen between Kevin and Ben. Kevin and Emma and partly all 3 children. Emma and Jennifer point to the screen simultaneously (lines 23-24) whereupon Jennifer asks “the red one¿” (end of line 24). Kevin nods and everybody’s gathered contributions lead to the revealing of Kevin’s next part in the on-going story (line 27).

Findings. The joint orientation towards the screen is preceded by that the peers have finished telling a story together. Immediately after that Kevin starts looking at the screen. Whenever at least one of his peers also looks at it, joint orientation towards the screen is established. When Ben perceives where Kevin is looking he asks Kevin “so what story d’you want to tell us¿” (lines 11-13). During this he looks at the screen alternately (joint orientation towards the screen). Joint orientation towards the screen leads to Ben and Emma locating Kevin’s gaze, i.e. trying to find out what Kevin wants to say and Emma pointing to the screen as a suggested alternative in the on-going story. This means that Ben and Emma are assistants but also recipients in this interactional context. Joint orientation towards the screen also leads to Jennifer asking an aid oriented question (“the red one¿”, line 24). In this context it is adequate for Kevin to respond by choosing the next part. After Kevin’s choice has been confirmed by him Jennifer clicks to the story page. All actions mentioned together lead to the story moving forward. The HWST prototype is used in the sequence above by Kevin and his peers to tell the story in a co-constructed manner. Without the aid no joint orientation towards the screen would occur.

4.3.2.3 Kevin’s gazes at peers
The category Kevin’s gazes at peers will now be presented. The researchers will answer the following questions: What precedes a situation where Kevin looks at his peers without getting a response? What does it lead to in the interaction? How is the aid used in the interaction? Approximately in the middle of Transcript 10 (below) a situation where Kevin looks at Ben but he does not look back at him occurs.
The researchers ask the children who would like to tell the first story.

1. J: yes (.) who would like to start¿
2. Emma: [((looks at Kevin))]
3. J: [((looks at Ben))]
4. Ben: [((looks at J))]
5. Emma: [((looks at Ben))]
6. Kevin: [((looks at Emma))]
7. K: [anyone¿]
8. [((looks at Ben and Emma))]
9. Ben: okay [I’ll do it ((says it resolute, smiles))]
10. [((raises hand))]
11. K: [((laughs))]
12. J: [((laughs))]
13. Emma: [giggles]
14. Ben: [eh (.) well (.) eh=]
15. [((looks in front of himself))]
16. "wha whas >i<" [((looks in front of himself))]
17. Kevin: [starts looking at Ben])
18. K: an you can tell=
19. [((hand gesture towards Emma and Kevin)
20. ]= (1.0) the other ones,=
21. K: =we’re just here if you have any qhuestions *or
22. Ben: [well last (.) tuesday when >we were< having gym=
23. [((head towards Kevin, looks out in the air))]
24. Ben: =there >was a< man called mr Smith
25. [((head towards Kevin, looks out in the air))]
26. Emma: [hihihihihi
27. Ben: =phuppet things that=
28. Emma: [((covers face shortly, laughs))]
29. Kevin: [((smiles, vocalizes, continues looking at Ben))]
30. (0.8)
31. Ben: =watchs:: [you
32. Emma: [shashapoopoo
33. [((smiles, [giggles, looks at Ben))
34. Ben: [yeah
35. [((smiles, continues to
36. look out in the air))]
37. Kevin: [((glances at J, vocalizes))
38. Emma: [shashaphapha
39. [((continues smiling, giggling))
40. Kevin: [((looks at Ben))]

**Sequential description.** Jennifer asks who would like to start (line 1). Emma glances at Kevin in the beginning of the sequence (line 2). When Kevin then turns to look at Emma she looks at Ben instead (line 5). Kevin looks at her for a while until he diverts his gaze to Ben (line 17) because Ben is about to starts telling his story. Ben gazes to the front (line 14). The fact that Ben does not look much at others whilst telling his story is interpreted by the researchers as him planning or trying to remember the story at the same time as he is telling it, which is indicated by the hesitation of his utterance “eh (.) well (.) eh” (line 14) and the questioning utterance ““wha whas >i<” (line16). Karolina reminds Ben to look at the other children when telling the story (lines 17-20)
by saying “you can tell (1.0) the other ones” (lines 18-19). Ben then turns towards Kevin but does not look at him (line 22). Emma makes contributions to the story and both she and Ben are smiling simultaneously (lines 32-38). After a while Kevin glances at Jennifer instead (line 35). On line 38, at the end of the sequence, he looks at Ben one more time.

**Findings.** A sequence of Kevin looking at his peers (in this case Ben) without getting a response is preceded by Jennifer asking “who would like to start?” (line 1). Emma looks at Kevin for a short while and then Emma and the researchers look at Ben. Simultaneously Kevin starts to look at Emma. In this interactional context Ben responds to the question and starts talking. Almost simultaneously Kevin starts to look at him. The sequence of Kevin looking at Ben without getting a response leads to him continuing to try to engage in Ben’s story by smiling, vocalizing and looking at Ben, but Ben keeps looking in front of himself during the story. When Kevin does not get any attention from Ben he orients his gaze to Jennifer for a short while instead. Since Kevin is not included by the others this makes him isolated from the interaction. The S-b-S is not used in this sequence because Ben was telling a story at that moment.

Transcript 11 below is another example of when Kevin’s gazes at peers, but this time from the HWST session. The same questions as above will be answered.

**Transcript 11 (HWST session)**

In the beginning of the HWST session one of the researchers asks about who would like to start telling a story.

1. J: okay Kevin; ((leans forward, looks at Kevin))
2. Kevin: ((laughs))
3. Ben: ((looks at screen))
4. Emma: ((looks at screen))
5. Kevin: ((continues laughing, vocalizes, looks at screen))
6. K: let's so who would like to=
7. ((walks to chair))
8. K: =start=
9. Ben: ((glances at Emma))
10. Emma: ((looks at Ben, eye contact))
11. K: =(. to tell a [story bout=
12. Kevin: | ((looks at Emma))
13. K: =(sits down on chair))
15. Ben: ((looks down on floor))
16. Emma: ((continues to look at Ben))
17. Kevin: ((continues to look at Emma, starts to move in chair))
18. (1.0)
19. Kevin: ((makes a quiet snore sound))
20. Emma: ((continues [to look at Ben))
21. Ben: ((glances at Emma, eye contact
22. then looks out in air))
23. K: "who would like to start"
24. ((moves head at peers direction, then looks at Kevin))

**Sequential description.** Karolina asks the children who would like to start (lines 6-14). During this the naturally speaking peers have eye contact (line 10). Before the question has been completed Kevin looks at Emma (line 12) but she does not respond by looking back at him (line 16). Kevin keeps looking at Emma and starts moving around in his wheelchair and even makes a little snoring sound after 1 second (17-19). When Ben
starts to tell a story Kevin looks at him instead (lines 25-26), but Ben does not look back at Kevin. Kevin’s arms hit the tray that is attached to his wheelchair, which makes the researcher look at him for a short while (lines 31-32). Ben does not look at Kevin but pauses for 0.2 seconds before he continues his story (lines 33-34). After a while Kevin starts to look at Emma (line 35).

Findings. The sequence where Kevin looks at a peer (in this case Emma) without getting a response is preceded by Karolina beginning to ask who would like to start. Before the question is completed Kevin looks at Emma, thereby making relevant for her to start. At the same time Emma looks at Ben. Kevin looking at Emma without getting a response leads to Kevin starting to move around in his chair and making a quiet snore sound. This is interpreted by the researchers as an orientation by Kevin to the fact that the peers do not seem to explicitly involve him as a conversational partner. Since Kevin is not gaze responded by anyone this leads to him becoming isolated from the conversation. The HWST prototype is not used in this sequence because Kevin does not give any indication of wanting to tell a story.

4.3.2.4 Kevin’s gazes at researchers

Now the category Kevin’s gazes at researchers will be looked at. The following questions will be answered by the researchers by analysing Transcripts 12 and 13: What precedes Kevin’s searching for the researchers’ eye contact? What does it lead to in the interaction? How is the aid used in the interaction? Transcript 12 below which is taken from Transcript 7, demonstrates a sequence from the S-b-S session where Kevin is looking at a researcher.

Transcript 12 (S-b-S session)

Kevin is telling his story about the previous day.

---

5. K: ((looks at Kevin, smiles))
6. J: ((looks at Kevin))
7. Kevin: L((looks at K, eye contact, orients hand towards the switch))
8. ((clicks, holds hand on switch, continues to look at K))
9. VR: then I=
10. Emma: L((looks down on table))
11. Kevin: I went to music and I had to learn
12. K: a new song=
13. Emma: I((looks at Kevin))
14. K: ((nods, continues to look at Kevin))
15. Emma: L((looks at Kevin))
16. Kevin: I((looks at Emma, eye contact))
17. for harvest
18. Kevin: ((removes hand from switch))
19. ((continues to look at Emma))
20. Emma: L((leans back with hands behind head, looks at K))
22. Ben: ((glances at K))

Sequential description. Kevin is about to tell his last story part. Karolina looks at Kevin and smiles (line 5). On line 7 Kevin reacts to this by looking at Karolina whilst he is orienting towards his switch (lines 7-8). Karolina’s smile and gaze are non-verbal actions which create a context that makes it suitable for Kevin to orient towards the S-b-S switch and press it to tell the next story part. They get a long eye contact. Kevin tells
his last part (lines 10-17). During this Emma looks at him (line 15). At the end of this he looks back at her (line 16), whilst Karolina continues to look at him (line 14).

**Findings.** Kevin looking at a researcher (in this case Karolina) is preceded by Karolina giving him a gaze and a smile. When Kevin notices Karolina’s smile and gaze at him he responds by looking back at Karolina and eye contact is established. Kevin looking at Karolina leads to him understanding that he has Karolina’s attention. Eventually it also leads to the naturally speaking peers looking at Karolina. In this sequence the S-b-S is used to tell a story. Since Karolina knows that the end of the story is approaching, she looks at Kevin. The S-b-S therefore creates a contextual framework where it is natural from Kevin and Karolina to establish eye contact.

In Transcript 13 below drawn from Transcript 2 the same category (Kevin’s gazes at researchers) will be looked at, but this time from the HWST session. The same questions as above will be answered.

**Transcript 13 (HWST session)**

Kevin is telling a story about his rebound therapy class.

1. Kevin: \[J's\; VR: \textit{I:: do} \textit{black bounces with=}
2. \]
3. Kevin: \[\text{((enlarged photograph of Jennifer appears on screen))}
4. J: \[\text{((smiles, looks at Kevin))}
5. Kevin: \[=\text{Jennifer on the trampoline}
6. \]
7. J: \[\text{((looks at J, smiles, nods, eye contact))}
8. Kevin: \[\text{((nods))}
9. J: \[\text{((vocalizes))}
10. J: \[\text{yeah tha was} \textit{yesterday}
11. Kevin: \[\text{((looks down on screen))}
12. (1.0)
13. J: \[\text{((clicks to story)}\]

**Sequential description.** When the message is put out Jennifer looks at Kevin and smiles (line 4). The voice recording was recorded by Jennifer and describes an activity that she and Kevin have done together (lines 1-5). An enlarged photograph of Jennifer also appears on the screen. In this case Jennifer is both assistant and recipient which can be seen in her non-verbal actions of smiling (line 4) and nodding (line 7). Kevin looks up at her before the message has ended (line 6). She comments the output by saying “\textit{yeah tha was yesterday}” (line 9) and looks down on the screen when she says the last word (lines 9-10). Immediately after that Kevin also looks at the screen (line 10). Jennifer clicks back to the story page, i.e. the enlarged photograph disappears (line 13)

**Findings.** The sequence where Kevin looks at a researcher (in this case Jennifer) is preceded by him telling a story part that is about something they had done together. The voice recording had been made by Jennifer and an enlarged photograph of her turns up on the screen. Before the complete story part has been put out Jennifer smiles and looks at Kevin. At the end of the story part Kevin looks at Jennifer, nods and smiles. Kevin looking at Jennifer leads to him understanding that he has her full attention. It also leads to them sharing a positive experience, which is demonstrated by mutual smiles and nods. Further it leads to Kevin vocalizing and Jennifer saying “\textit{yeah tha was yesterday}” (line 9). The HWST prototype is used by Kevin to tell his story about rebound therapy. In this sequence it also motivates Kevin and Jennifer to look at each other.
4.3.2.5 Peers’ gazes at Kevin

The last category, Peers’ gazes at Kevin, will now be looked at. The following questions will be answered by the researchers by analysing Transcripts 14 and 15: What precedes a situation where the naturally speaking peers look at Kevin without getting a response? What does it lead to in the interaction? How is the aid used in the interaction? Transcript 14 below (drawn from the S-b-S session) illustrates the naturally speaking peers looking at Kevin, when he is not looking at them.

Transcript 14 (S-b-S session).
In this sequence Kevin tells a story about what he did during the previous day.

1. Kevin: [VR: the::r after=
2. \((\text{recording has loud background noise})\)
3. Kevin: =lunch (.I=
4. |((looks at K))
5. Emma: |((looks at Kevin))
6. Ben: |((looks beside Kevin))
7. Kevin: =gotto make=
8. K: |((looks at Ben and Emma))
9. Kevin: =\text{fl}iapjacks
10. |((starts orienting towards switch))
11. Emma: |((glances at Kevin))
12. (6.4)
13. Kevin: |(clicks) [VR: I gotto try a::pricots to put >into< the=
14. |((looks at switch))
15. Ben: |((looks beside Kevin))
16. Kevin: =\text{flapjacks} (. but I didn
17. |like them
18. Kevin: |((looks at K))
19. K: |((looks at Kevin, eye contact))
20. K: |((shakes head, smiles))
21. Emma: |((looks at K, smiles))
22. Ben: |((glances at K, smiles))
23. K: |((continues looking at Kevin, smiles))

Sequential description. Kevin is telling a story part which has a loud background noise (lines 1-2). During the output he looks at Karolina and not at his peers (line 4). Karolina then looks at Ben and Emma on line 8. Emma both looks (line 5) and glances (line 11) at Kevin during his story but she does not get any response from him. Kevin continues to look at Karolina (line 18). At the end of the last story part Kevin and Karolina develop eye contact and she confirms his utterance “but I didn’t like them” (lines 16-17) by shaking her head (line 20). After a while the naturally speaking peers start to look at Karolina as well (lines 21-2). The naturally speaking peers give their evaluation on Kevin’s story to Karolina instead of to Kevin (indicated by smiles, lines 21-22).

Findings. The situation where a naturally speaking peer (in this case Emma) looks at Kevin without getting a response is preceded by Kevin starting to tell a story part about what he did the previous day. In the middle of the story part Kevin looks at Karolina and simultaneously Emma looks at Kevin. At the end of the same part when Kevin starts orienting towards the switch Emma gives him a glance. When Emma looks at Kevin without getting a response this leads to Emma locating Kevin’s gaze, which is directed at Karolina. In this contextual framework both Emma and Ben direct their gazes to Karolina. The S-b-S is used by Kevin to tell a story part. It provides the opportunity to establish eye contact, in this case with one of the researchers.
Furthermore Kevin’s gaze at Karolina could be explained by him including her in his audience even though he is aware of that the story is supposed to be told to the peers. Karolina’s gaze at the peers (line 8) is interpreted as an indication for Kevin to also direct his focus to them. She here enacts the role of a moderator that leads the talk forward.

In Transcript 15 below the same gaze category (Peers’ gazes at Kevin) as above will be analysed, but from the HWST session instead. The researchers will answer the same questions as above.

Transcript 15 (HWST session)
Kevin is telling a story about when he went to the supermarket with his class. He has just made a voice recorded utterance.

1. J: ((clicks back to story))
2. Kevin: ((continues to look at screen, vocalizes))
3. Ben: (((leans forward, looks at screen))
4. Emma: (((glances at Kevin))
5. Ben: (((looks at Kevin))
6. Emma: (((points to yellow part of screen, looks at Kevin))
7. Ben: ((looks at screen))
8. Ben: (((looks at Kevin))
9. Ben: ((nods, vocalizes))
10. Kevin: (((looks at the screen, continues to nod))
11. J: and front colour is,
12. Ben: (((looks at screen then at Kevin))
13. Kevin: (((looks at screen, then at Kevin))
14. J: )))
15. Ben: (((looks at Kevin))
16. Kevin: SS: I had the trolley
17. J: ((clicks to story part))
18. Ben: (((looks at Kevin))
19. Emma: (((looks at Kevin))
20. (0.8)
21. J: ((looks at Kevin, smiles, nods))
22. Kevin: (((looks at J, eye contact))
23. Ben: (((looks at J))

Sequential description. The sequence above starts right after Kevin has told a voice recorded story part. He does not look up from the screen after that (line 2). Kevin mostly directs his gaze at the screen. The naturally speaking peers Ben and Emma alternate between looking at the screen and Kevin (e.g. on lines 12-18 and 23-25) and ask him which background colour (“yellow,” line 11, has stories on it) and front colour (“re::d,” line 16, story part) he wants. Because Kevin only looks at the screen he does not get eye contact with his peers when they gaze at him. After Kevin has told his story part (line 24) Ben and Emma look at him (lines 25-26). On line 27 Jennifer looks and smiles at Kevin and he responds to this by gazing back at her (line 28). Ben gazes at Jennifer simultaneously (line 29).
Findings. Since Kevin has told his story part the peers are attentive to Kevin’s actions, and this is what precedes them looking at him. When the peers look at Kevin without him looking back at them this leads to Kevin being the focus of this sequence and getting the peers’ full attention. The fact that Kevin is not looking at his peers also makes them interested in what he is looking at, so they start looking at the screen. This leads to the peers asking aid oriented questions that lead the conversation moving forward. The children are contributing to the story together and are thereby co-constructing the story. The HWST aid is here used by all the children to tell Kevin’s story in a co-constructed manner.
5. Discussion

5.1. Main results of the study

This study aims to investigate how the focus participant Kevin can interact with his naturally speaking peers when using 2 different communication aids in different sessions. The aids are the S-b-S and the HWST prototype. The analysis demonstrates how these aids provide different conditions for sharing stories, and how these conditions in turn can support the interaction. The researchers have focused on questions and gaze as communicative actions, which are aspects of the mechanisms of how the children organize participation in the analysed story telling activities.

5.1.1. First research question

The question was: *How does a 10-year-old boy with complex communication needs (CCN) interact with his peers about his school day when using the HWST prototype?* This question will be answered by summarizing and discussing the results from the analysis of the phenomena questions and gaze from the HWST session only.

A very prominent finding that was made by the researchers is that 3 of the categories almost always co-exist. These are the question category *Aid oriented questions*, and the gaze categories *Joint orientation towards the screen* and *Peers’ gazes at Kevin*. Together they form a contextual framework that makes them tell Kevin’s stories together in a co-constructed and explorative manner. This leads to the story moving forward. An advantage of aid oriented questions is that the children are not getting stuck in the story development, but can move on to the telling of the next story or story part easily. A disadvantage would be that the peers seldom stop for reflection around these questions, and the talk about the narrative content as such becomes shallow. As stated by Clarke and Wilkinson (see 3.8.2.1. Conversation analysis) questions asked by the naturally speaking children also create a context in which the child who uses an aid and the naturally speaking children can understand each other. The researchers’ conclusion is that the aid oriented questions can be good for creating and maintaining peer relations. As stated before children with CCN often have difficulties to establish these (see 2.4. The importance of peer relations for personal development). In those cases the HWST prototype can be a good help. This type of story sharing activity is also an important experience for children with CCN because they typically do not have much of this experience. From a socio-cultural point of view this can be compared to the zone of proximal development where a less experienced child learns from a more experienced child (see 2.2. A socio-cultural perspective on communicative and linguistic development).

However, when an *elicited question* is asked it leads to Kevin being less involved in the interaction. Jennifer tries to compensate this by trying to involve Kevin in the answering of the question at the end of it. A spontaneously asked question on the other hand leads to Kevin being able to participate in the conversation with help from the researchers. When a question is content oriented it leads to Kevin answering it in an engaged manner with help from the researchers, but not from the aid. Whether a question is spontaneous or elicited thus seems to affect the interaction more than if the question is content oriented or not. The researcher reason that the interaction benefits from all spontaneously asked questions.

Turning to the use of gaze orientation in the data, one of the results of the analysis is that eye contact between Kevin and Emma leads to that they devote each other an
equal amount of attention. When Kevin looks at Emma without getting a response it leads to him trying to draw her/others attention by getting physically active or by searching someone else’s gaze. When Kevin looks at Jennifer this leads to him getting aware of that he has her full attention and it also leads to them sharing a positive experience.

When analysing how the HWST prototype was used in the interaction, one of the main results was that this occurred in the following contexts: Aid oriented questions, Joint orientation towards the screen, Kevin’s gazes at researchers and Peers’ gazes at Kevin. The HWST prototype was not used in the other contexts: Elicited questions, Spontaneous questions, Content oriented questions, Eye contact between Kevin and one of his peers and Kevin’s gazes at peers. When the HWST prototype is not used this is because it could not provide Kevin with the answer to a question, he did not choose to use it as an addition to his non-verbal actions (e.g. vocalizations and smiles). The HWST prototype was not needed for establishment of eye contact, but rather an obstacle for this establishment. The results show that it takes great effort to establish eye contact with Kevin when he is using the aid, since Emma needs to get in between him and the screen to do so. Since Kevin needs to focus on the screen to be able to tell his stories this might make it difficult for him to spontaneously look up and gaze at his peers to see their reactions.

5.1.2. Second research question

The question was: What are the similarities and differences between a peer interaction when using the HWST prototype compared to a peer interaction when using the S-b-S? This question will be answered by summarizing and discussing the results from the analysis of the phenomena questions and gaze in both sessions.

5.1.2.1 Similarities

In both of the sessions when the naturally speaking peers ask questions that are elicited by the researchers it results in the naturally speaking peers directing the elicited question to the researchers instead of Kevin, which makes him less involved in the talk about his story. The researchers then try to compensate for this by trying to engage Kevin in the conversation. The researchers noticed that in both sessions when Ben tells a story he does not often search for eye contact. The fact that Ben did not look at Kevin whilst telling his stories could be due to him not having prepared the stories in advance. It seems as though he is thinking about what to say when telling it. This might be the reason for him looking elsewhere. Eye contact is only established between Kevin and Emma, but never between Kevin and Ben. Emma is usually the one who initiates the eye contact. When Emma establishes eye contact with Kevin she shows him that she is giving him her full attention. Emma is also the first one to abort the eye contact. In both sessions, the category Kevin’s gazes at peers leads to Kevin trying to get his peers’ attention (e.g. by moving around in his chair, vocalizing, smiling). Kevin looking at a peer without getting a response leads to him getting less involved in the conversation. When Kevin does not succeed to get his peers attention he instead searches for a researcher’s gaze. Kevin did not get the opportunity to answer any question with either of the aids. Both aids provide limited opportunities to answer questions. The content which would provide an answer to a question has to be pre-stored into the devices. Another aspect is that both the HWST prototype and the S-b-S were developed to support narrative ability. This makes them limited communication aids in contexts where Kevin is not telling a story.
5.1.2.2 Differences

To begin with questions were more common in the HWST session than in the S-b-S session, with spontaneous questions only occurring in the HWST session. Most of these spontaneous questions were aid oriented. The spontaneous questions were shown to enhance Kevin’s involvement in the conversation. The results also show that there is a higher density of eye contact in the S-b-S session compared to the HWST session. The lower frequency of eye contact in the HWST session does not necessarily mean something negative, the question is rather what is used instead or what happens instead. Joint orientation towards the screen was more typical in the HWST session, a phenomenon that was not corresponded to in the S-b-S session. The HWST prototype is a tool that increases the opportunities for peers’ to direct their gazes and aid oriented questions to Kevin. Kevin on the other hand does not use his gaze on his peers as freely as he can in the S-b-S session because he cannot make a synthetic speech or voice recording output without having to look at the screen. Kevin can, on the other hand, generate a story part with the S-b-S without the same focus required. This could be an explanation for why the naturally speaking peers are not as active when listening to a story produced with the S-b-S as when it is produced with the HWST prototype, their assistance is simply not as required as in the HWST session. The category Peers’ gazes at Kevin has different characteristics in the 2 sessions. In the S-b-S session the category often appears because Kevin is looking at a researcher to make her a part of his audience when he is telling a story. This is why his peers do not get a gaze response from him. In these cases his peers get less involved in the interaction and orient their gaze towards the researcher that Kevin is looking at. In the HWST session the same category (Peers’ gazes at Kevin) often appears because Kevin has a fixed gaze on the screen when he is telling a story.

Another difference between the sessions is the positioning of the participants in the room. The HWST prototype requires that Kevin sits in front of the screen for him to be able to access it without having to strain himself and to be able to see it clearly (see Figure 3 below). This is also more optimal for the researcher to see where he is looking. The peers were placed separated on each side of the screen because the researchers’ opinion was that this was more advantageous than having them both on the same side. If the peers were to sit on the same side, Kevin would have to make an even larger effort to be able to face the peer that sits the furthest away.

Regarding the S-b-S session the peers were placed next to Kevin, which turned out not to be optimal for the interaction, since they were then almost facing the researchers and often directed their gaze to them instead of to Kevin (see Figure 4 below). The peers sitting right opposite each other would have been optimal and also possible with the S-b-S, but this is not how the researchers positioned the children.

![Figure 3](image-url)
Another difference regarding the aids is that Kevin can tell his stories in different manners. With the S-b-S he tells the story in a sequential fixed order, i.e. the same order that it was recorded in. The researchers believe that this could affect the amount of questions asked by the naturally speaking peers, since Kevin is often quick when he presses his switch again after a story part. With the HWST prototype Kevin instead can choose in what order to tell the parts of his story.

### 5.2. Do the analysed aids support narrative ability?

Both aids were developed with the purpose to support narrative ability for the individual user. However, this study does not provide evidence that the HWST prototype supports narrative ability as such, partly because the researchers had only practiced the use of it with Kevin for about 2 weeks prior to the session. He was not familiar with all the symbols that were used in the stories. When Kevin chose the story parts it sometimes seemed as if he did it in a systematic order, i.e. by first choosing all story parts on the yellow background and then moving on to the story parts on the blue background. Kevin mostly did not tell the story parts in a chronological order. Therefore the HWST session appeared more as a learning opportunity for Kevin to use the aid as such, rather than displaying a narrative ability that he had from the beginning, and then getting support from the aid to demonstrate this. If Kevin would have been using the HWST prototype for a longer period of time it might have been able to support his narrative ability more specifically.

On the other hand, when it comes to the S-b-S, which Kevin had been using for 4.5 months, the study provides evidence that it supports Kevin’s narrative ability. Kevin tells the story in a normative manner, i.e. in a chronological and logical order. Kevin tells the stories “correctly” since they have been recorded by adults that are familiar with the norm of telling a story. At the same time the S-b-S limits Kevin by not giving him the opportunity to choose in which order to tell his story, and thereby not giving him an opportunity to practice how to tell a story according to e.g. Labov’s and Waletzky’s definition of narrative (see 2.8. Story telling). The researchers would like to suggest that future users of aids that are designed to support narrative ability can use the HWST prototype (or a similar aid) for educational purposes on how to tell a story.
5.3. Does participation in story telling support interaction?

The researchers have focused on participation in story telling rather than narrative ability because of the characteristics of the data where Kevin on the one hand used the S-b-S with a normative story telling structure but where he on the other hand used the HWST prototype and displayed a more explorative structure in the story telling. In this case the more general interactional tools questions and gaze become essential to answer the question in the above heading. The analysis in this study demonstrates that the interaction is much supported by the actions achieved by questions and gaze orientation rather than by the individual abilities to narrate alone. Telling stories is an activity achieved in and through interaction between all participants, rather than building on the individual competences of Kevin or the peers. This study brought together children during 2 sessions at 2 different occasions. They were informed that their task was to tell stories to each other and within this contextual framework interaction thrived, especially in the HWST session.

5.4. Which aid is best suited for interaction?

Theoretically, if the same story would be stored on both aids and a conversational partner poses a question about the content of the story, the HWST prototype would help to provide a faster answer to it, since the story part providing the answer can be chosen directly and the person using the aid does not have to go through the whole story in a fixed sequential order. In this sense the HWST prototype is better for a more dynamic, context sensitive, and co-constructed interaction than the S-b-S. On the other hand it is unlikely that a question that is not about the content of a story can be answered with any of the aids, since only a limited kind of questions about the content in a story can be answered (by using the pre-stored information). With the HWST prototype most questions beginning with who, where, when and what and are related to the story can be answered because this information is always pre-stored in the aid. Additionally Kevin could use the HWST prototype to evaluate his own stories or a peer’s story whereas the S-b-S only consists of pre-stored voice recorded story parts. The HWST prototype is therefore better because it provides the user with the material to answer more questions than the S-b-S does, which prevents the activity from turning into a more static and monologically organised interaction.

An advantage of the S-b-S can be manoeuvred without any help once the user has learned to do so, but the HWST prototype always requires someone to assist the user in directing their gaze and clicking the different options on the screen. In this sense the S-b-S is better for supporting interaction. The researchers believe that there could be an advantage of being assisted with the use of the HWST prototype, because this leads to communicative actions such as questions and gaze, which are 2 manners of supporting interaction. Another advantage of the S-b-S compared with the HWST prototype is that it allows the positioning of the conversational partners to sit right opposite each other. This positioning is optimal for establishing eye contact and for interaction in general. This was not possible with the HWST prototype, therefore the S-b-S can be said to be better in this sense.

In conclusion the researchers state that the aid that best supports a dynamically organized interaction is probably the HWST prototype, since it engages the conversational partners in the telling of Kevin’s story. It must be stated that both aids have too many limitations to be used as general communication aids since they only support narrative ability for situations where the user is telling a story and do not support communication in other contexts.
5.5. The HWST prototype compared to the HWST system

The HWST prototype has many limitations, the most obvious being that the user needs to get assistance from someone who can interpret where his gaze is located so that that person can click the intended symbol. Another obvious limitation is that all the content in the stories has to be gathered by someone on a daily basis and then be stored manually in the HWST prototype. This is a time consuming task for the person in charge of creating the stories. The researchers also noticed that the HWST prototype was slow in use. The duration from the moment when Kevin decided which story part to tell and fixed his gaze on it to the moment where the story part was put out was long. Another issue with the HWST prototype was different technical problems such as the wrong photograph or symbol often coming up or the battery running low. The researcher’s suggestion for minimising this problem is to adapt the sensitivity of the screen to the person that is in charge of this “task”.

The researchers also noticed that Kevin would benefit from having phatic phrases stored on the device for the following situations: A) When he wants to indicate that he is about to start to tell a story it would be appropriate with an expression such as “Guess what”. This is to give the peers an opportunity to agree on him telling a story (according to Hutchby and Wooffitt, see 2.8. Story telling). B) When Kevin wants to indicate that he wants the conversational partners’ attention an expression such as “Hello” or “Hi” would be appropriate. C) Kevin should get the opportunity to ask questions independently, e.g. “What have you done in school this week?” and “Do you have a story to tell me?”. Many of the problems that were seen when Kevin used the HWST prototype are more general problems that many users of high technology AAC face (e.g. see 2.6.6. High technology aids above).

The fully developed HWST system on the other hand will not struggle with all problems described above. It can e.g. be used independent of assistance from anyone and story parts are therefore generated quicker. Since all story parts (except for the voice recordings) are automatically put into the aid the stories are updated on a regular basis without much effort. The HWST system has many advantages against the HWST prototype, but can still be further developed to better support communication in general. The researchers suggest that the HWST system is incorporated into a high technology software where it can be a part of the more general communication toolbox for the person who uses it.

5.6. Clinical implications

Story telling as an interactional process should get more attention within the field of AAC because the ability to tell stories is linked to feelings of self-sufficiency, self-respect and worth; but also to the perception of oneself as an independent individual that is equal to others. Story telling is a social act, something that we do with others. Children with CCN typically do not have much of this experience. The researchers suggest that clinicians and other professions working with children with CCN start story groups where children of different ages tell each other personal narratives with support from their communication aids. It would also be good to include naturally speaking peers in these groups so that all the children can learn from each other. This means that narration is not just a sequential account of something that has happened. Intervention on children with CCN should combine the adjustment of AAC devices to the user with teaching them to use other modes of communication (such as gaze) in specific ways that are crucial for establishing and maintaining participation in everyday communication.
5.7. Future research

The researchers suggest for future research to investigate children with CCN and their opportunities and abilities to participate in narrative activities, using a more extensive study with a higher number of children and looking at how they tell stories in a natural environment together with peers. Since evidence based practice is crucial in speech and language therapy intervention, more research on the topic children with CCN and their story telling is desirable.

5.8. Conclusion

The researchers created the HWST prototype that aimed to support narrative ability and it was compared to the S-b-S which also aims to support narrative ability. With these aids Kevin, a boy with CCN, could get support in interaction with 2 naturally speaking peers during 2 sessions. The researchers focused on different aspects of gaze and questions as vital communicative practices for Kevin’s involvement in the interaction, and hence, the story telling activity. The data was analysed mainly qualitatively with CA, but also quantitatively. The quantitative analysis showed an uneven distribution of questions with a much higher frequency in the session where the HWST prototype was used. The researchers conclude that the HWST prototype in this case probably did not support narrative ability since Kevin had only been using it for a short period of time. On the other hand the HWST prototype does support the interaction between Kevin and his naturally speaking peers since it provides a framework for establishment of joint orientation towards the prototype and questions about it. The S-b-S creates a context in which it is easier to establish eye contact which also supports the interaction to some extent. None of the aids can be used as general communication aids since they do not support communication in contexts other than story telling activities. The researchers suggest that the real HWST software is incorporated as a complement into a more general high technology communication aid.
Acknowledgements

The researchers want to take this opportunity to thank:

All the children who agreed to participate in this study and their parents.

The principals and teachers on the participating schools for their cooperation and great hospitality.

Niklas Norén for all the valuable time he has given us, comments, advice and help.

Annual Waller and Rolf Black for giving us the opportunity to participate in the How Was School Today Project, for all the support, guidance, encouragement and practical help.

the friendly research team and other staff on the Assistive and health care department in Scotland that introduced us to the researcher life and helped us with various practical matters.

Last but not least we would like to thank our friends and families for all their support.

Without all of you this study would not have been possible to carry through.

Jennifer and Karolina
References


communication aids. *Language, speech and hearing services in school*. 34, 203-216.


Appendix

Appendix 1: Transcription key
Appendix 2: Information letter to school principal
Appendix 3: Information letter to school staff
Appendix 4: Information letter to parent(s)/guardian(s)
Appendix 5: Fly leaf to parent(s)/guardian(s)
Appendix 6: Consent letter to parent(s)/guardian(s)
Appendix 7: Consent letter to focus participant
Transcription key

All transcripts are written using Courier New (character size 10). The symbols used are described below:

(0.4) The numbers in parentheses indicate silence represented in tenths of a second.

(.) A dot in parentheses indicates a silence that is shorter than 2 tenths of a second.

= The equal sign is put at the end of a row and at the beginning of another row. It indicates that there is no pause between them.

[] Square brackets indicate that more than one thing is happening at the same time.

.hh A dot before “h” means that there is an audible inhalation.

.hh Without the dot it means that there is an audible exhalation.

(( )) The researchers’ own explanations are placed within double parentheses.

:: Multiple colons indicate that the speaker has prolonged the previous sound.

( ) Empty parentheses mean that the researchers cannot hear what is said.

, A dot indicates finishing intonation, though not necessarily the end of a sentence.

? A question mark indicates raising intonation, not necessarily a question.

¿ An inverted question mark indicates a rise that is stronger than the comma but weaker than the question mark.

_ : If the letter(s) are underlined it marks a falling intonation.

_ : If the colon is underlined it indicates rising intonation.

* An asterisk indicates a croaky vocal cord sound.

↑↓ The arrows are placed where the intonation changes and becomes either rising or falling. This marking is sharper than an underlined colon.

< > Symbols for “smaller than” and “larger than” are combined to illustrate that the talk between them is slower.
Symbols for “larger than” and “smaller than” are combined to indicate that the talk between them is faster.

Degree marks are used to indicate that the talk between them is more quiet.

**Additional symbols developed by the researchers:**

**VR:** Voice recording. Symbol is placed in front of a voice recorded utterance.

**SS:** Synthetic speech. Symbol is placed in front of a utterance said by a synthetic voice.

**Word** HWST prototype or S-b-S generated utterances are written in italics.
Appendix 2

“How was School today…? – in the Wild”
Supporting personal narrative for children with communication impairments

Dear Mr./Mrs. X

Thank you for allowing researchers from the peer study as a part of the “How was School today…? – in the Wild” project to carry out experimental work at XXX school.

The HWST aid is the result of the “How was School Today…? – in the Wild” project, and has been developed through a collaboration between Annalu Waller and Rolf Black from the University of Dundee, specialists in designing augmentative and alternative communication systems; Ehud Reiter and Ross Turner from the University of Aberdeen, specialists in using natural-language generation technology to generate stories from data; and Capability Scotland. The purpose with the aid is to support children with communications impairments to tell about their school day. The unique aspect of the device is that the content is updated continuously on a daily basis. For example every time a child meets a person, enters a room or is presented to an object in class at school this information will be stored in the HWST aid. The device has sensors (eg. a card reader) that register the information.

Previous research has shown that the ability to tell stories is important for several reasons like developing self image, relating and sharing experiences, expressing personality and being able to entertain.

Not many studies have investigated how aided children share and talk about stories with other children of about the same age. We want to find out how children with communication disorders can share stories with their peers using the HWST device. The goal is that the results will provide us with more information to develop the HWST device further and make it more custom made using a user centred design. Even if a similar device will not be made for commercial purposes the information gathered will give us valuable insight into how communication systems can be improved in the future.

This study is carried out by Ms. Jennifer Menjivar Dominguez and Ms. Karolina Yläneva, two final year speech language pathology students at the University of Uppsala, Sweden, who are making this study as their Master’s thesis under supervision of Annalu Waller and Rolf Black from the School of Computing, University of Dundee and Niklas Norén, University of Uppsala, specialist in conversation analysis. During September and October 2010 we will video record the children when using the HWST aid in interaction with a peer. The recording will take place in the school environment. Thereafter the material will be analysed.

To guarantee anonymity in this study all names occurring in the video recordings will be changed in the report. The children’s parent(s)/guardian(s) will sign a letter of consent and the children will fill in an assent form saying that they are willing to participate in the study. We ensure you that our main focus is to record an aided child in conversations with a peer, which will give us valuable information about how to adjust the aid and make it more easy to use. If there are any video recordings where staff accidentally happen to appear they will be offered to watch that sequence, and choose to
have their faces blurred. If any of the video recordings are suitable for educational or research purposes they will only be used with the permission from parent(s)/guardian(s), and staff if they appear on the recorded sequence. The participation in this study is voluntary and the participants can withdraw at any time without giving a reason and without any consequences. No economical compensation will be given. We do not envisage any medical, physical or psychological risks with the study. The study has ethical approval from Dundee University’s Research Ethics Committee.

Please visit http://HowWasSchoolToday.computing.dundee.ac.uk for more information.

Do you have any further questions? Please contact us or one of our supervisors.

Please fill out the consent form on the next page to confirm that you understand and agree to the conditions of the study.

Best regards

Ms. Jennifer Menjivar Dominguez
Ms. Karolina Yläneva

Academic supervisors:

Dr. Annalu Waller
Senior Lecturer
School of Computing
University of Dundee
Dundee DD1 4HN
Scotland, UK
Phone number: (01382) 388223
E-mail: awaller@computing.dundee.ac.uk
rolfblack@computing.dundee.ac.uk

Mr. Rolf Black
Research fellow
School of Computing
University of Dundee
Dundee DD1 4HN
Scotland, UK
Phone number: (01382) 386530
E-mail:

Dr. Niklas Norén
Post doctoral research fellow
Department of Neuroscience
Speech and Language Pathology
University of Uppsala
Box 593
751 24 Uppsala
Sweden
Phone number: +46 18 471 4744
E-mail: niklas.noren@neuro.uu.se
“How was School today…? – in the Wild”
Supporting personal narrative for children with communication impairments

Information for School Staff

When it comes to building stories there are not many AAC systems that support this for children with communication impairments. In particular graphical communication aids have restrictions such as the information having to be stored into the aid manually. One can assume that spontaneous utterances can be limited if the information is not updated on a regular basis due to the responsibility that is put on the adults involved.

The HWST aid is the result of the “How was School Today…? – in the Wild” project, and has been developed through a collaboration between Annalu Waller and Rolf Black from the University of Dundee, specialists in designing augmentative and alternative communication systems; Ehud Reiter and Ross Turner from the University of Aberdeen, specialists in using natural-language generation technology to generate stories from data; and Capability Scotland. The purpose with the aid is to support children with communications impairments to tell about their school day. The unique aspect of the device is that the content is updated continuously on a daily basis. For example every time a child meets a person, enters a room or is presented to an object in class at school this information will be stored in the HWST aid. The device has sensors (eg. a card reader) that register the information.

Not many studies have investigated how aided children share and talk about stories with other children of about the same age. We want to find out how children with communication disorders can share stories with their peers using the HWST device. The goal is that the results will provide us with more information to develop the HWST aid further and make it more custom made using a user centred design. Even if a similar device will not be made for commercial purposes the information gathered will give us valuable insight into how communication systems can be improved in the future.

This study is carried out by Ms. Jennifer Menjivar Dominguez and Ms. Karolina Yläneva, two final year speech language pathology students at the University of Uppsala, Sweden, who are making this study as their Master’s thesis under supervision of Annalu Waller and Rolf Black from the School of Computing, University of Dundee and Niklas Norén, University of Uppsala, specialist in conversation analysis. During autumn 2010 we will video record the children when they are using the HWST aid in interaction with a peer. The recording will take place in the school environment. Thereafter the material will be analysed.

To guarantee anonymity in this study all names occurring in the video recordings will be changed in the report. This study will be conducted according to the ethical approval obtained. We ensure you that our main focus is to record an aided child in conversations with a peer, which will give us valuable information about how to adjust the aid and make it more easy to use. If there are any video recordings where staff accidentally happen to appear they will be offered to watch that sequence, and choose to have their faces blurred. If any of the video recordings are suitable for educational or research purposes they will only be used with the permission from parent(s)/guardian(s), and
staff if they appear on the recorded sequence. The participation in this study is voluntary and the participants can withdraw at any time without giving a reason and without any consequences. No economical compensation will be given. We do not envisage any medical, physical or psychological risks with the study.

Previous research has shown that the ability to tell stories is important for several reasons like developing self image, relating and sharing experiences, expressing personality and being able to entertain.

For more information please visit http://HowWasSchoolToday.computing.dundee.ac.uk

Do you have any further questions? Please contact us or one of our supervisors.

Best regards

Ms. Jennifer Menjivar Dominguez
Student in speech language pathology
0046(0)70-2503425
jennifer.menjivar.5598@student.uu.se

Ms. Karolina Yläneva
Student in speech language pathology
0046(0)70-8628195
karolina.ylaneva.7334@student.uu.se

Academic supervisors:

Dr. Annalu Waller
Senior Lecturer
School of Computing
University of Dundee
Dundee DD1 4HN
Scotland, UK
Phone number: (01382) 388223
E-mail: awaller@computing.dundee.ac.uk
rolfblack@computing.dundee.ac.uk

Mr. Rolf Black
Research fellow
School of Computing
University of Dundee
Dundee DD1 4HN
Scotland, UK
Phone number: (01382) 386530
E-mail:

Dr. Niklas Norén
Post doctoral research fellow
Department of Neuroscience
Speech and Language Pathology
University of Uppsala
Box 593
75 1 24 Uppsala
Sweden
Phone number: +46 18 471 4744
E-mail: niklas.noren@neuro.uu.se
"How was School Today…? – in the Wild"
Supporting narrative for Children with Complex Communication Needs (CCN)

Information for Parents and Guardians

"How was School today…? – in the Wild" is a collaborative research project between Dundee and Aberdeen Universities, Capability Scotland and Perth & Kinross Council. Our aim is to support children with communication impairments when talking to their parents and friends about their day at school. The project is designing a new communication system that allows non-speaking children to talk about their day at school. We have been working closely with disabled children, their parents, school staff and therapists to ensure that the system meets the needs of its users. In a previous project we showed that our system can support personal storytelling with an adult – now we want to see how it can work when non-speaking children communicate with their non-disabled friends and peers.

Not many studies have investigated how non-speaking children share and talk about stories with other children of about the same age. We want to find out how children with communication impairments can share stories with their peers using our system. The results will provide us with more information to develop the system further so the user can share their stories with a wider group.

Sharing stories with non-disabled friends and peers
We would like to invite your child to participate in this part of our research. Your child regularly visits a class at XXX School. One of the pupils in that class will be using our story telling system and we want to investigate how the system can support the communication when chatting to their non-disabled friends and peers.
Computer Screen of the system used by the non-speaking child

At the top of the screen up to five events of the school day are displayed using symbols. Each event consists of a number of messages to support interactive story telling.

The event at occupational therapy (OT) is being highlighted. The messages are accessed with the forward and backward button. The smiley buttons at the bottom of the screen enable the user to easily express their feelings about the event.

This part of the study is carried out by Ms Jennifer Menjivar Dominguez and Ms Karolina Yläneva, two final year speech language pathology students at the University of Uppsala, Sweden, who are conduction this research as their Master’s thesis. During the autumn of 2010 we want to video record your child while s/he is visiting the class at XXX School, talking to the child using our system. The researchers will encourage the pupils to talk about their experiences at school, e.g. interesting things that happen during break or class. Thereafter the data will be analysed.

We want to reassure you that this study is for collecting information about how children interact with a peer about their school day when using the system, which will give us valuable information about how to adjust the system and make it easier to use. We will not evaluate your child’s performance in any way. There are therefore no right or wrong answers or behaviours.

To ensure anonymity, all participants will be given fictional names in the report; personal records will be treated confidentially and only be available to the research team. They will not be kept together with the video recordings and transcriptions or be presented in the report. Parent(s)/guardian(s) will be given the opportunity to watch the video recordings. If any of the video recordings are suitable for educational or research purposes they will only be used with the permission from parent(s)/guardian(s).

What is important to know?
- This research is approved by the relevant ethics committees.
- All researchers have Enhanced Disclosure Scotland or equivalent clearance.
- We do not envisage any medical, physical or psychological risks with the study.
- We will look after any data we collect during this study.
- We are not researching the school's or children’s performance.
- Your participation in this study is voluntary and you can withdraw your help at any stage of the project without any consequences if you change your mind. You don’t have to give a reason for your withdrawal.

If your child would like to participate in our study, please sign and return the enclosed consent form. Before we start the project we will speak to your child to explain what the project is about and confirm that s/he would like to participate by signing an assent form.

Do you have any questions after reading this information sheet? Please contact us or one of our supervisors for more information.

Please take a look at our research project website: http://howwasschooltoday.computing.dundee.ac.uk/
How to contact us
Ms. Jennifer Menjivar Dominguez  Ms. Karolina Yläneva
Student in speech language pathology Student in speech language pathology
Phone (Sweden): 0046 70 2503425 Phone (Sweden): 0046 70 8628195
jennifer.menjivar.5598@student.uu.se karolina.ylaneva.7334@student.uu.se

Supervisor at the School
Dipl.-Ing. Rolf Black, Research Assistant
School of Computing, University of Dundee
Phone: 01382 386530, Mobile: 07958807545, Skype: rolfblack
rolfblack@computing.dundee.ac.uk

Academic Supervisors
Principal Investigator of the Research: Supervisor in Sweden:
Dr. Annalu Waller, Senior Lecturer Dr. Niklas Norén, Research Fellow
School of Computing Department of Neuroscience, SLP
University of Dundee University of Uppsala, Box 593
Dundee DD1 4HN 751 24 Uppsala, Sweden
Phone: 01382 388223 Phone (Sweden): 0046 18 4714744
awaller@computing.dundee.ac.uk niklas.noren@neuro.uu.se
01 februari 2011

Dear parent/guardian,

Research project of the Universities of Dundee and Aberdeen

We would like to invite your child to participate in a study called “How was School Today? – in the Wild”.

Your child’s class currently visits XXX school on a weekly basis. As speech and language therapy students, we will be looking at how children with and without disabilities communicate with each other about their experiences at school.

For more information about the study kindly read through the information sheet we have enclosed with this letter. If your child is interested to take part in our study, please fill in the consent form and send it back to your child’s class teacher in the enclosed envelope by

Monday, 13th of September 2010.

Your child’s participation would be of great value for this study.

Kind regards,

Ms Jennifer Menjivar Dominguez  Ms Karolina Yläneva
“How was School today…? – in the Wild”
Supporting personal narrative for children with communication impairments

Consent to participating in the peer study about story telling ability when using the How was School today (HwSt) aid.

Please note that you have received two copies of this letter of consent. Please keep one for your own records. Regarding the video recordings of your child and the participation in this study please tick the following boxes as appropriate:

1) I have read the information sheet and understand what the study is about and that my child will be video recorded in the school environment. I have considered the information and have had the opportunity to ask questions.

2) I am aware of the fact that my child’s participation is voluntary and that withdrawal from the study can be made at any time without giving any reason and always without consequences.

3) I understand and give permission to that personal records will be treated confidentially and can be looked at by individuals in the research team.

4) I agree that video recordings of my child can be used for research (such as conferences and meetings) and educational purposes.

5) I do not agree that video recordings of my child can be used for research (such as conferences and meetings) and educational purposes.

By dating and signing the next page you indicate that you understand and accept the conditions of this study.

Thank you for contributing and making this study possible!

Name of participating child:
_________________________________________________

Your Name
__________________________________________________________

Your Relationship to the participating child:
________________________________________

Date:       /       / 2010,    Signature: ___________________________
The Researchers Undertaking the Study

Ms. Jennifer Menjivar Dominguez
Date:    /   / 2010,   Signature: ________________

Ms. Karolina Yläneva
Date:    /   / 2010,   Signature: __________________________
"How was School Today...?"
Assent Form

Thank you for your interest in the project!

We want to build a computer that could help you to tell others about your day at school.

I would like to join you at school and record what you do each day.

I will ask you about your ideas and show you some prototypes to see if you like them.
Do you want to help me?

Tick for "Yes"

Do you agree that I video you?

Tick for "Yes"

Your name

Your Signature

My name

My Signature

Thank you