Influence of Caregiver's Sign Quality on Successful Interaction with a Deafblind Child

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Abstract

This study aimed to analyse the quality of the signs offered by one of the communication partners of an individual with CDB and the effect of this quality on their interaction success. The research questions of the study were: 'What is the quality of the sign input offered by the selected caregiver during communication with this client with CDB?' and 'How does this sign quality affect their interaction success? These questions were answered after analysing four videos of the communication between a client with CDB and her caregiver in ELAN with a newly developed codebook. The codebook was developed to assess phonological and semantic errors, discrepancies between spoken and signed utterances, and the success of the interaction between the communication partners. It was found that even though the caregiver made some phonological and semantical errors and even though there were some discrepancies in her communication, this did not strongly affect the interaction success. It was also found that the discrepancies had a more negative influence on the interaction success than the phonological and semantic errors.

Keywords

Introduction

Worldwide, it is seen that individuals with congenital deafblindness (CDB) face challenges and risks that others typically do not. They are often granted fewer opportunities for learning, social contact, and participation in society, as well as less autonomy (Boers, 2015; Damen, 2015; Correa Torres, 2008; Prain et al., 2010; Jensen et al., 2018). Only 60% of these individuals reach verbal communication, and often with a delay (Dammeyer & Larsen, 2016). Especially when CDB comorbides with an intellectual disability, individuals are at risk of myriad behavioral and communicative problems, sometimes not developing any effective conventional communication at all (Preisler, 2006).

This is striking, since individuals with CDB are believed go through the same developmental stages and display the same innate motivation for learning as others with a typical development (Bruce, 2005; 2010). An explanation for the communicative challenges they face, is the deprivation (deficits in sensory information) they experience from birth (Van Dijk & Janssen, 1993), and the limited input of interaction and language they often receive (Janssen, 2003; Damen & Worm, 2013). The communicational problems can thwart them in connecting to other people and further developing their social competence (Dammeyer & Larsen, 2016).

Research has shown that to successfully communicate with these individuals, there must be a fitting and shared linguistic communication system that both parties have access to (Van den Bogaerde, 2000; Bruce, 2003). Systems with made-up signals that are not conventional languages have proven unfit for successful interaction, so it is important to offer individuals with CDB a conventional communication form, for example an official (tactile) sign language (Dammeyer & Larsen, 2016).

Accuracy and consistency of the offered (tactile) signs are important to stimulate the intake and later output of the language by individuals with CDB. If individuals use a more idiosyncratic language, this often leads to lower readability by others, especially those who are not used to the specific signs this individual uses. This can make communication with others more difficult and can lead to miscommunication and frustration. Offering an official language is not only important for their linguistic development, but ultimately for their cognitive and psychosocial development as well. Several researchers have described linguistic deprivation in children with CDB and link this deprivation to cognitive problems. In addition, psychosocial problems are described, such as feelings of isolation and frustration as a result of the inability to fully understand others and freely express oneself. A continuous offer of an accessible language system is therefore recommended by several authors, to provide people with CDB with more opportunities for self-determination and influence in their interactions with others, and

to allow them to develop higher cognitive abilities and reach their full communicative potential. Furthermore, it is considered more ethical to offer every child, with or without CDB, the same linguistic opportunities. (Worm et al., 2020; Damen et al., 2020; Larsen & Dammeyer, 2020; Van den Bogaerde, 2000; Dammeyer & Larsen, 2016; Bruce & Vargas, 2007; Dammeyer, 2014; Humphries et al., 2012; Souriau et al., 2009).

If a particular individual with CDB has enough residual sight and prefers a visual method of communication, there still are some additional conditions that need to be met for successful language acquisition and interaction. First, the visual attention skills of the individual have to be stimulated, like encouraging them to look up when a potential communication partner enters their visual sign field, and giving them enough time to gaze-switch between their interaction partner and a third person or object that they are communicating about. Additionally, a form of addressee-adjusted signing should be used, by adapting the signs to be larger and slower and the sentences shorter, compared to the standard version of the signs, and by creating a more repetitive syntactic structure. This repetition also plays a crucial role in the scaffolding process; by being offered acknowledgment, replication and expansion in a set context of routines and rituals, individuals with CDB learn how to match the signs to the referents and underlying concepts, gradually expanding their vocabulary and embedding the linguistic labels in their brain (Baker et al., 2016; Pizer et al., 2011; Damen et al., 2017; Souriau et al., 2009).

Since being offered correct and conventional sign and/or spoken language input is proven to be of high importance for language acquisition, this study aimed to analyse the quality of the sign input offered by one of the communication partners of an individual with CDB and the effect of this quality on their interaction success. Because sign fluency on the part of the communication partner reduces misunderstandings, it was expected that a higher sign quality would lead to successful interactions and a relatively lower sign quality to unsuccessful interactions and misunderstandings. The research questions were formulated as follows: What is the sign quality of the selected caregiver during communication with this client with CDB? And how does this sign quality affect their interaction success?

Method

This study was conducted as part of the master's program Deafblindness at the University of Groningen (RUG) and this article focuses on the qualitative part of this study. The participating individual with CDB, Emma (pseudonym) and her caregiver, Anne (pseudonym), were already recruited by researcher Rorije for her PhD study 'Tell it' (2017).

Emma was born in 2000 and diagnosed with Pierre Robin Sequence and attachment disorder. Auditory and visual testing was last done in, respectively, 2015 and 2016. She then showed responses to auditory input from 100 dB and a vision of 0.08 (8% clarity). At the most recent testing through VABS in 2011, her developmental age in the domain of communication was estimated at 1.5 years of age. She lives in a group home with other adolescents with CDB and communicates with her caregivers through visual Sign Language of the Netherlands, because she does not respond well to tactile sign language. Anne (born in 1991) is a social worker specialised in pedagogy. She has been working as a caregiver for individuals with CDB for eight years, seven of which with Emma, among others.

The research data were collected by Rorije through video recordings of twelve moments of interaction between the clients with CDB and their communication partners. The recurring interaction moment that Anne chose to film for this study was going through Emma's diary with her.

To measure caregiver Anne's sign quality and the success of her interaction with Emma, the author of this article developed an annotation instrument that was applied to four of the video recordings, chosen from the four phases of Rorije's intervention research (baseline and phase 1-3). This instrument, 'Codebook for Sign Quality of Caregiver and Interaction Success', consists of eight categories, which were coded on distinct tiers in ELAN (Crasborn & Sloetjes, 2008). An abbreviated version of the codebook is presented in Table 1.

Semantics is the linguistic field that focuses on meaning. This can be the meaning of individual words/signs, or their combined meaning in sentences or larger utterances. Human brains map all the words/signs a person knows in networks, so they can make use of meaning-associations and anticipation, based on linguistic and life experience. Sometimes when two words/signs are semantically related, a semantic substitution can take place, where a wrong word/sign is selected in a particular sentence. These are semantic errors. (Schermer & Pfau, 2008). Because the utterances directed at Emma are often short and simple, (complex) sentences or larger units of language were not present, and therefore the focus in semantic errors was on semantic substitutions on the lexical level.

Phonology is the linguistic field that focuses on the smallest 'building blocks' of words/signs, called parameters in sign linguistics. Each sign consists of five parameters: handshape, location, movement, orientation and non-manual part. If even one of these parameters is expressed differently than in the conventional sign, the meaning of the sign can change or it can render the sign incorrect. These are phonological errors (Schermer & Pfau, 2008). Since Emma's eye sight is not good enough to distinguish non-manual aspects of signs, these were not considered during annotation.

When caregiver Anne communicates with Emma, she uses not only signs, but often also speaks aloud in Dutch at the same time. This is called Sign Supported Dutch (SSD) and is considered a sign *system* rather than an actual sign *language* (Schermer, 1991). In addition to semantic and phonological errors, sign quality in SSD is also influenced by the number of discrepancies between the spoken and the signed utterances. Because Emma cannot hear spoken words, everything that is not supported by a sign (or gesture) is not accessible to her (no intake). However, not every word that was unsupported by a sign was considered a relevant discrepancy in this context. In the analysis of the results, it was important to distinguish between words that were not, but should have been supported by a sign (e.g. all content words like (pro)nouns, adjectives and verbs and also question words), and those that did not need to be signed, since they are not a part of sign language grammar`` (e.g. articles, 'and' and conjugations of 'to be') (Schermer, 1991).

Interaction is defined as a "mutual or reciprocal action or influence" (Merriam-Webster, n.d.), implying a logical connection between the utterances and actions of communication partners. In order to determine whether or not successful interaction is attained at a certain moment in a conversation, one measurement is the presence or absence of a logical connection between distinctive utterances of both partners. This means that first, all utterances have to be categorised into different types. For this study, the author used a simplified version of the verbal communicative acts classification for mother-infant interaction by Ninio and Wheeler (1987). All declarative opening utterances can stand alone without any reaction by the other. These are considered neutral utterances, as long as the communication partner has attention for the utterance. If not, the interaction is considered unsuccessful. All declarative utterances can be followed by a fitting response (i.e. confirmation/acknowledgment, correction/negation or continuation/addition/expansion). If this happens, the interaction can be considered successful. Interrogative and directive/imperative utterances cannot stand alone; these always require some sort of response from the communication partner. If a fitting response is given, the interaction is considered successful. If an ill-fitting response or no response at all is given, the interaction is considered unsuccessful.

Once the videos were coded in ELAN using the codebook and exported into Excel to be analysed, the edited dataset was compiled and several observations were made by visual inspection and processed in Tables 2-4: an overview of all semantic errors, an overview of all phonological errors, and an overview of all discrepancies between Anne's spoken and signed utterances.

Table 1

Codebook for Sign Quality of Caregiver and Interaction Success

Category	Content of Code
Speech Anne	Literal transcript of everything Anne says
	Transcript of every meaningful sound Anne makes
Discrepancies GLOSS-speech	Literal transcript of everything Anne says that is <u>not</u> supported visually
GLOSS Anne	Literal transcript of everything Anne signs
	Transcript of everything Anne gesticulates
Semantic errors	Transcript of spoken words by Anne that are supported by an incorrect, but existing sign
Phonological errors	All parameters of a sign that are articulated incorrectly
Interaction type Anne	Categorisation of every utterance by Anne
Interaction type Emma	Categorisation of every utterance by Emma
Interaction succes	Are Anne's and Emma's utterances logically connected? Yes = successful. No = neutral/insuccessful.

Results

The language used by caregiver Anne in the analysed videos contained some semantic and phonological errors (see Table 2 and Table 3, respectively). The semantic errors occurred in verbs, nouns and some other word types. Consistent substitutions were used for the words 'to plan', 'to lie down', 'mother', 'father' and 'house/home'. The wrongly chosen signs were semantically related to the one that Anne meant, in all cases but one (what instead of no). One neologism was found for the word 'pregnant'.

The phonological errors were mostly on the movement parameter and sometimes on the handshape and/or orientation parameter. Signs that were consistently executed with one or more phonological errors were TO-WALK/STROLL, TO-TAKE/GRAB, THEN, TO-DRAW, and THURSDAY. The location parameter was only wrongly executed once (DOESN'T- HAVE-TO) and this seemed like sloppiness rather than a structural mistake, since Anne was seen making the same sign in the correct location in other recordings.

Table 2

Overview of Semantic Errors

Meaning	Chosen sign	Baseline	Phase 1	Phase 2	Phase 3
To plan	PROGRAM	x	xx	xx	
Done	PAST	x			
To lie down	TO-SLEEP	xx			
Mum/dad	MOTHER/FATHER		xx	xx	
House/home	TENT/ROOF		xx	xx	
To come (here)	TO-GO-WITH		x		
Toy(s)	TO-PLAY		x		
No	WHAT		x		
Together	THEY/THEM (2ppl)			x	
Marker(s)	TO-DRAW			x	
Pregnant	*Neologism*				xx

Table 3

Overview of Phonological Errors

Sign	Incorrect parameters	Baseline	Phase 1	Phase 2	Phase 3
TO-WALK/STROLL	hs, mov, or	x		x	
TO-TAKE/GRAB	hs, mov, or	xx			
THEN	Hs	xx	x		xx
TO-DRAW	Or	xx		x	
ILL	Mov	x			
TO-SEARCH	Mov		x		
THURSDAY	Mov			xx	
DOESN'T-HAVE-TO	Loc			x	
AGAIN	Mov				x

Sometimes Anne vocally said something which she supported with a sign or gesture or in another visual way that made the utterance accessible to Emma. After filtering out the words that are not expected to be supported by a sign in a free sign system like SSD, several types of relevant discrepancies were found (see Table 4). Anne often left out the subject of the sentence in her signing and she sometimes left out the signals for

suggestions or requests such as "Let's" and "Please". She also sometimes seemed to vocalize her thoughts, which did not seem to be directed at Emma and probably were not meant for her to take in. Examples of these were "The toys are getting more and more extensive" and "What have I got on me?! Crumbs… Seems like powdered sugar…". It also happened that she left out a negation, apology or conditional conjunction, but these seemed to be more incidental than consistent drops. The same goes for specific words that she left out in some utterances. There did not seem to be a pattern to those, so this seems to be a random selection of words she just happened to forget to sign at these specific moments.

Table 4

Discrepancies

| General types of discrepancies	Baseline	Phase 1	Phase 2	Phase 3
Suggestion	xx	x		
Negation	x			
Request			x	xx
Apology				xx
Subject of the sentence left out	x	xx	xx	xx
Conditional conjunction left out	x			
Own thoughts spoken aloud (not meant for Emma)		x	x	
Specific words that were left out	**Baseline**	**Phase 1**	**Phase 2**	**Phase 3**
Yes	x			
Finished/done/ready	x		x	x
To-sign	x			
To-get/to-receive	x			
To (as in: go to…)		x	x	x
Then			xx	
To-finish				x

When the found sign problems (both semantic and phonological errors and discrepancies) were cross-referenced with the success of the interactions, it could be deduced from the data that sign errors and discrepancies more often than not (70% versus 30%) still led to successful interactions between Anne and Emma, that 40% of the successful interactions still contained one or more sign errors or discrepancies, and that unsuccessful interactions had sign differences in less than half the cases (44%). When the

sign problems in (un)successful interactions were broken down by type (see Figure 1), it was found that whenever semantic or phonological errors occurred, in the large majority of cases (respectively 88% and 86%), this did not lead to unsuccessful interaction. The discrepancies however, paint a much more nuanced picture, with only 60% of those utterances still leading to successful interaction. In both absolute and relative terms, the proportion of discrepancies leading to unsuccessful interaction is larger than that of errors leading to unsuccessful interaction.

Figure 1

Number of Sign Problems per Type in (Un)Successful Interactions
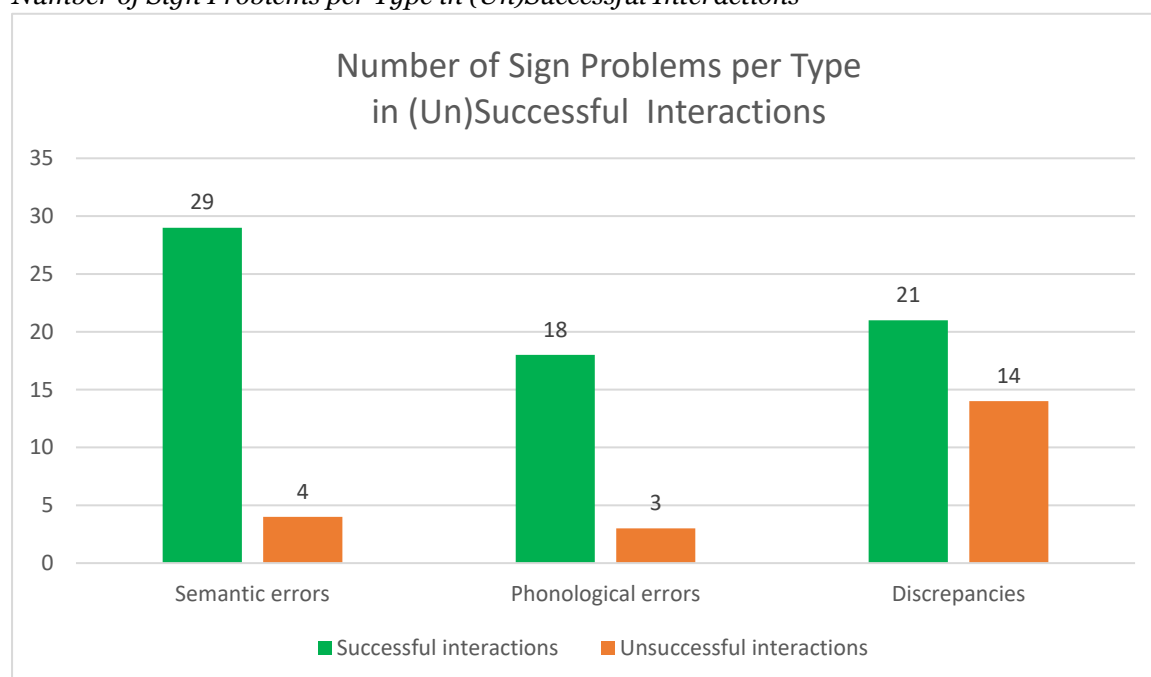
Discussion

The aim of the presented study was to analyse the quality of the sign input offered by caregiver Anne during communication with client Emma, and the effect of this quality on their interaction. It was expected that high sign quality would lead to successful interactions and a relatively lower sign quality to less successful interactions and more misunderstandings. This hypothesis was not supported. Both semantic and phonological errors were found in some of Anne's utterances, as well as some discrepancies between her spoken and signed utterances. But when removing the neutral utterances from the equation, still almost three quarters of all analysed interactions were successful, regardless of whether they contained any of these sign problems. Of all interactions with one or multiple problems, 70% was still successful. Conversely, when offsetting the successful interactions to the unsuccessful ones, comparable rates of problems were

found: 40% of the successful interactions and 44% of the unsuccessful interactions contained problems. Based on these data, no relationship is found between the occurrence of sign problems and the interaction success.

However, it is salient that discrepancies played a much larger role in problem-containing unsuccessful interactions compared to semantic and phonological errors than in problem-containing successful interactions. This means that leaving out signs altogether had a larger negative impact on Anne's interaction with Emma than the errors she made in her sign choice and articulation. This is easily explained by the fact that when Anne leaves out a sign or gesture and only speaks it vocally, it is not accessible to Emma, who then receives an incomplete message. When Anne makes a semantic or phonological error, the impact is much smaller since there is still accessible information. Because Anne and Emma know each other well and communicate often, and because Anne's errors are mostly consistent, Emma is probably used to Anne signing to her that way and understands these 'problem' signs regardless. Or it is even possible that it is Emma who created these versions of conventional signs and Anne who copied them from her. It would be interesting to find out in a follow-up study who initiated these sign variations.

Limitations of this study, because it was conducted within the context of a master's program, were mainly related to the fact that only a relatively short amount of time was available and choices had to be made on what to include and, similarly important, what not to. Elements that were excluded for lack of time were also analysing Emma's sign quality (in addition to Anne's) and linking the results of the research question presented in this article to those of the qualitative part that was also conducted for Rorije's *Tell it!* Research. Also due to time restrictions, only four videos were coded and analysed for the qualitative part of the study, instead of all 12 available recordings that were used for the quantitative part, and these codings were done by the author alone, without any interrater reliability (IRR) checks by another coder/researcher.

Based on this study, the author has a recommendation for the organisation governing the facility that Emma lives in (and other organisations working with individuals with (congenital) deafblindness): to closely involve sign language teachers to support the communication partners in keeping their signing up to par, i.e. to consistently adhere to the conventional signs of (in this case) Sign Language of the Netherlands and, as was seen in this study even more importantly, to not leave out important signs. That way, the same correct signs are offered to all clients by all caregivers, in such a manner that intake and uptake is possible for the clients, opening up myriad possibilities for linguistic and communicative/interactive development, strengthening the basis for their cognitive and psychosocial development.

For future research, many recommendations can be made, since this study was small, as was already mentioned above. An obvious direction is to perform an IRR check

on the four videos that were coded for the second research question, in order to check the reliability of the developed instrument. Based on the results of the IRR check, the instrument could (and should) be edited. Options that would then be interesting to explore in the near future in the case of Emma, are (i) expanding the qualitative part of this study by also coding and analysing the other nine recordings of the interactions between her and Anne, (ii) also analysing Emma's utterances on sign quality and (iii) additionally analysing interactions between Emma and other caregivers. The latter two suggestions are relevant to find out whether Emma uses the same signs and articulations as Anne and which signs and articulations the other communication partners use. This could be combined with interviews with all caregivers to address the question where the sign problems found in this study originated: with Anne, with Emma (and if so, who taught her these signs) or with another caregiver? Or even with a sign language teacher or communication coach who taught all of them these non-conventional signs, maybe even leading to the development of a distinct culture with its own sign system, specific to this organisation?

Conclusion

The analysis of the quality of the signs of a caregiver that were offered to a child with deafblindness in this study revealed that this quality differed per recorded moment. The caregiver's signs were sometimes free of problems and sometimes contained semantic or phonological errors, and there were some discrepancies between her spoken and signed utterances. No effect of these sign problems on the success of their interactions was found, although the discrepancies seemed to play a bigger role in creating unsuccessful interactions than the semantic and phonological errors.

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