



## Visual check back in children with Specific Language Impairment

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### ABSTRACT

Sensitivity to eye gaze is suggested to be an important prerequisite for intersubjectivity and for normal language development. The present study investigated visual check back in two age groups of typically developed children and one group of children with Specific Language Impairment (SLI,  $n = 10$ ). The control children were matched to the SLI children with regard to language level (LMC,  $n = 10$ ) and to age (AMC,  $n = 10$ ). Play setting situations, including child and teacher, were designed to elicit the children's use of visual check back. The children with lower language level (SLI children aged 5;0 and LMC children aged 2;1) gave visual check back significantly more seldom than the higher language level children (aged 5;1) and they also needed more time for giving check back, i.e. there is a relation between visual check back and language level. The results indicate that children with SLI have a deviant visual communication that further worsens their already limited communicative ability.

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### 1. Introduction

The relation between language, intersubjectivity and social cognition is often discussed and examined in clinical populations, for example, in autism (Mundy et al., 1990). The present study concerns visual referencing in children with Specific Language Impairment (SLI) which is sometimes suggested to be a developmental disorder within the autism spectrum (Karmiloff-Smith, 1998). We found this interesting because visual referencing is said to be important both for language learning, intersubjectivity and social cognition. If SLI-children have an aberrant visual referencing this would support the idea that the development of language ability depend on intersubjectivity and vice versa. A reduced and slow visual referencing could be a sign of a developmental disorder and consequently an important sign for clinicians. Visual check back is a form of visual referencing and means in the following that a subject, by alternating his eye gaze between an addressee and a focused object, establishes a joint attention (Smith and Fluck, 2000). The subject focuses an object by eye gaze and then redirects focus back to the addressee which makes a confirmation from the addressee possible. Visual check back conveys meta-linguistic information of how a message is received, understood or approved and establishes intersubjectivity. If there is a relation between language ability and visual referencing this could possibly be discovered in a study on visual referencing in groups of children with SLI and normally developed control children.

The SLI diagnosis is based on both inclusion and exclusion criteria and different combinations of the criteria have been used in research concerning children with language disorders (Leonard, 1981). Usually, the exclusion criteria involve other neuro-developmental disorders, cognitive impairment, hearing impairment and emotional disorder but results from research indicate that children with SLI also have other impairments, for example, lowered speed of visual processing and motor responses (Schul et al., 2004). Another requirement for the SLI diagnosis, is a clear discrepancy between verbal and non-verbal intelligence, i.e.

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the non-verbal functioning should be within age-appropriate limits. A lower limit for non-verbal intelligence usually is IQ 85 (Leonard, 1998). The term SLI is used for studies on well-defined samples of children with language disorders, while the same children in a clinical context are diagnosed with various diagnoses concerning speech and language ability. In this specific study, SLI as defined above, concerns children with general language disorder. We also preferred to choose a group of children with SLI instead of a group of Language Learning Disabled (LLD) children. Children with SLI have many characteristics in common but their developmental profiles differ inter-individually as well as intra-individually over time. The aetiology of SLI is seen as multi-factorial. Environmental influences, hereditary factors, and interaction between the two have been discussed. Hereditary factors are often emphasised for the development of SLI. A male dominance, with the ratio of 1:4 is documented for children with language disorder and this male dominance could support a hereditary origin. Environmental aspects, like the communicative patterns in the close environment and the language input that the parents give the child, are considered as contributing factors, even when the pre-supposition is that certain children might be genetically predisposed for SLI.

Several studies have reported that social cognition and development of theory of mind abilities are normal in children with SLI (Ziats et al., 1998; Farmer, 2000). Farmer (2000) studied language and social cognition in groups of SLI children attending either special schools or integrated educational placements. The children in the segregated schools turned out to differ significantly with respect to measures of social competence and cognition when compared to the normally developed children. The SLI children from the integrated educational placements did however not differ. Ziats et al. (1998) compared the performance on theory of mind tasks in language-matched groups of typically developed children and in groups with SLI, autism and Asperger syndrome. The result showed that the SLI children performed at comparable levels to typically developed controls on the theory of mind tasks. The results of these two studies can be interpreted as a support of the idea that problems with social cognition do not cause language impairment.

On the other hand there are theories claiming for other explanations, for example, the neuro-constructivist approach that suggests that the language impairment is part of a general developmental disorder and that SLI lies on the same continuum as autism and Asperger syndrome (Karmiloff-Smith, 1998). The reason for the emergence of deviances is to be found at low developmental levels and impairments become domain specific in confrontation with the environment (for example, within the language area). If SLI is part of a general developmental disorder signs of poor social cognition could be expected, subtle or not.

In the present paper the use of referential eye gaze in SLI is focused. Results from many studies point at the importance of the referential eye gaze for the development of language, intersubjectivity and social cognition. Bloom (2000) suggested that eye gaze ability is a reflection of the development of theory of mind (ToM), or in other words the understanding of the minds of others. Bloom (2000) proposed that referential gaze is a cue for word learning and for the development of language in early childhood. In a study on 4-year-old children it was found that in following eye gaze the children considered the linguistic and pragmatic context when learning new words (Nurmsoo and Bloom, 2008). Sensitivity to eye gaze has been shown from early age (see, for example, Farroni et al., 2004). Senju et al. (2006) showed that at the age of nine months, infants are sensitive to the relations between eye gaze and objects. Falck-Ytter et al. (2006) reported that the infants' gaze-movements reflect the capacity of predicting other people's actions as early as during the second half of their first year. Morales et al. (1998) found a positive correlation between six-month-old infants' ability to follow their mother's eye gaze and their receptive vocabulary. The sensitivity to eye gaze seems to be an important prerequisite for normal language development. In a review article Brenner et al. (2007) discussed how deviant language acquisition in autism depends on undeveloped joint attention and aberrant eye gaze. The authors suggested that a potential role of a defective functional brain organization for eye movement and visual search must be accounted for in explanations of the socio-communicative impairment in autism. The impaired development of joint attention skill is said to be a cardinal feature in autism (Mundy et al., 2009).

Stern (1985) described how referential eye gaze is involved in the emergence of so-called preverbal key skills in the development of intersubjectivity. The preverbal key skills were suggested to have impact on the child's ability to understand other person's intentions, wishes and thoughts. Skills like (1) ability to joint attention, (2) ability to share an intention and (3) ability to share an emotional state with another person have been suggested to be such key skills (McArthur and Adamsson, 1996; Smith, 1998; Stern, 1985). One of the key skills, joint attention, implies the ability to establish a two-way co-ordination of an activity in relation to an object, and in relation to another person (Smith and Fluck, 2000). From eight months of age, children are able to establish joint attention (Smith and Fluck, 2000). The primary means of expression for the triadic communicative structure seems to be the gaze alternation and declarative gestures (Carpenter et al., 1998, 2002). Gaze alternation between an addressee and a focused object in joint attention can be considered as a type of visual check back.

The second key skill is so-called shared intention. An example where shared intention is expressed is when the child needs help with something, for example, to get something out of reach. Eye gaze, together with words or unaccompanied, is used for asking for help and the check back concerns if the need for help is received and understood by the addressee or not. Then asking for help, implies that the child understands that others can be means for achievement of his goals and that other's actions can be directed towards his own needs. When successful, the intention is shared between the child and the adult. This type of intentional communication develops gradually from the age of six months and reflects the developmental phase of growing awareness of oneself in relation to others (Bates et al., 1975; Tomasello et al., 2005). Intentional communicative acts, for example, when the child is trying to reach a preferred item, involve vocalisations and gestures as well as gaze alternation between the desired object and the care-giver. The relationship between aspects of intentional communication and lexical acquisition in typical children is suggested in several studies (Tomasello and Todd, 1983; Smith et al., 1988; Mundy et al., 1990; Markus et al., 2000).

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