

Comparing native signing, late-signing and orally trained deaf children's 'theory of mind' abilities

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I argue that language skills and social interaction, specifically quality social discourse (reciprocal interaction) concerning mental states are pivotal in the development of social understanding and 'theory of mind' development. Thus, this research is grounded and positioned within the theories of social constructivism. 'Theory of mind' development in relation to language acquisition, social interaction and the assessment of 'false-belief' is presented. In addition, the advantage that Sign Language offers in the early years of a deaf child's life is clearly demonstrated, by comparing the performance of native signing deaf children with deaf parents and late-signing and orally trained deaf children of hearing parents on different 'false-belief' tasks. In contrast to deaf children of hearing parents, deaf children who have deaf parents, are provided with natural access and exposure to Sign Language. As a result, native signing deaf children demonstrate developmental benchmarks in 'theory of mind' acquisition similar to typical developing hearing children.

Keywords: 'false-belief' tasks; language acquisition; social interaction; 'theory of mind' development

Children's understanding of persons' mental states — their 'theory of mind' (TOM) — is a crucial stage in cognitive development and has been a lively area of research in developmental psychology for the past 25 years (Milligan, Astington, & Dack, 2007; Wellman & Liu, 2004). Researchers concur that the majority of 'normally developing children', during their preschool years (at approximately four years of age), come to understand that people, including themselves, "possess minds, conceived of as sets of mental states such as knowing, believing, wanting and feeling, and that these various states are related to one another, to events in the physical world and to human action" (Russell *et al.*, 1998, p. 903). The processes underlying the development of TOM have been and still are the subject of considerable theoretical debate (Meristo, 2007; Russell *et al.*, 1998). Initially, researchers used a single 'false-belief' paradigm (e.g. the 'change of location task', also known as the 'Sally-Anne test') as a criterion to assess the acquisition of TOM skills (Peterson, Wellman, & Liu, 2005; Rieffe & Terwogt, 2000). Children who passed this 'false-belief' test were regarded as having reached the developmental milestones of TOM acquisition. In contrast, other researchers proposed that developing a TOM includes understanding multiple concepts acquired in an extended series of developmental accomplishments (Wellman & Liu, 2004; Marschark, Green, Hindmarsh, & Walker, 2000). As a result, they questioned the utilisation of a single 'false-belief' paradigm to assess TOM abilities and included other 'false-belief' paradigm tasks, such as the 'unexpected content or identity' task, originally developed by Wimmer and Perner (1983), as well as 'deception' and 'belief-emotion' tasks (Jackson, 2001). Practically, having a well developed TOM, provides the child with a powerful social tool for the explanation, prediction and manipulation of other people's behaviour — an understanding of how others' actions are motivated by internal mental states, such as beliefs, desires and intentions. Thus, researchers view TOM development as a foundational skill which is closely linked to social-cognitive functioning, language development, fantasy and pretend play, as well as pro-social and emotion understanding (Dunn, 1999; Sabbagh & Baldwin, 2005; Sabbagh & Seamans, 2008; Taylor & Carson, 1997). Consequently, the broader definitions of TOM focus on a wide range of mental states from "perception to understandings of intention, cognition, emotions, desires and knowledge" (Wellman & Liu, 2004, p. 523).

Despite a remarkable consensus regarding the main features and developmental milestones within children's acquisition of TOM, there is considerable controversy about how these empirical

findings should be interpreted theoretically. In particular, different theoretical perspectives provide contrasting views on the nature and extent of social environmental influences upon its development. Nativist theorists view the emergence of mental understanding as “being dependent on biological maturation of cognitive structures (modules) in the brain, with children’s social environments having no more than a triggering role” (Moeller, 2002, p. 4). Another prominent view which has long been held is that the development of TOM is in some way ‘theory-like’. Children’s conceptual development is compared to the refining and reformulation of scientific theories, meaning that theories can be changed and revised in the face of sufficient disconfirming evidence. According to ‘theory-theory’ the child undergoes a ‘paradigm shift’ around the age of four, when he/she passes the ‘false-belief’ test (Meristo, 2007; Moeller, 2002). A third prominent account of TOM development is ‘simulation theory’, in which children’s social cognition is believed to come about through a process of simulating other people’s circumstances (imagining others’ mental states) or pretending to be the other person (role-taking process) (Hughes & Leekman, 2004).

The nativist (‘modularity’), ‘theory-theory’ and ‘simulation’ theories have been criticised for not taking into account the role of social interaction in developing TOM in children (Meristo, 2007). In contrast, Vygotsky’s social-constructivist theory (Vygotsky, 1978) proposes that children’s thinking and meaning making is socially constructed and emerges out of their social interactions with their environment. Moreover, social constructivist theorists view social understanding as occurring in “triadic interactions in which children’s knowledge builds upon communication, together with other people, about the world” (Meristo, 2007, p. 9). According to Moeller (2002), discourse about thoughts, desires and feelings of self is fundamental to children’s social understanding (social cognition) and pivotal to their TOM development (Moeller, 2002). Given that TOM abilities normally emerge during preschool years, everyday interactions with family, especially parents and siblings, friends and educators, can provide opportunities for learning about mental states and about the relationships of these states to behaviour (Russell *et al.*, 1998; Peterson & Siegal, 1995). Drawing from Vygotsky’s social-constructivist theory (1978), the author aims to demonstrate how language (especially narrative), together with social and cultural contexts, plays a major role in TOM acquisition by comparing the TOM development of native signing deaf children with deaf parents and late-signing and orally trained deaf children of hearing parents.

SOCIAL INTERACTION AND ‘THEORY OF MIND’ DEVELOPMENT

Debate concerning how children come to understand the social and psychological world (i.e. ‘theories of mind’) has become increasingly concerned with the influence of social interaction (Carpendale & Lewis, 2004). During the past decade TOM studies have focused specifically on how early social experiences and social interactions, such as parent-child discourse about mental states and the quality of the parent-child-relationship (in naturalistic settings), contribute to TOM development in hearing and deaf children (Ontai & Thompson, 2008). Data obtained from longitudinal studies, particular in older children, have further demonstrated that early maternal input, e.g. mother talk about mental states including desires, thoughts, knowledge and emotions, is related to later child mental state understanding, mostly notably in passing ‘false-belief’ tasks (Taumoepeau & Ruffman, 2008). In addition, research findings from a South African study conducted in the Durban region of KwaZulu-Natal explored the signing experience of hearing mothers ($N = 45$) of deaf children in the Junior Primary Phase (Joseph & Alant, 2000). Results from the Joseph and Alant study (2000) indicated that the signing ability of 85% of the hearing mothers in their investigation was below that of their signing deaf children (i.e. they exhibited Sign Language vocabularies between 0 and 50 words).

As the socialisation process begins at a very early age, with parents communicating their moral values, norms and expectations to their children, babies born deaf who are not exposed to a natural language, e.g. Sign Language, have serious deficits with regard to language acquisition, academic achievement, verbal intelligence, social skills knowledge and psychological adjustment (Dyck & Denver, 2003). Ross, Storbeck, and Wemmer (2004) postulate that many deaf children and hearing

parents, as a direct result of mutual communication problems, struggle to establish satisfactory parent-child relationship patterns. Their emotional development, socialisation and TOM development may, as a result of this isolation, as well as a lack of stimulation and interaction between the baby and his/her parents, be negatively affected. This lack of important initial contact between hearing parents and their deaf child may potentially affect the child's development of relationships in the context of the broader social milieu. Many deaf children, as a result of this isolation, encounter problems related to the expression and understanding of emotions. Socially inadequate expression or impoverished understanding of other people's emotions may easily create a climate of interpersonal misunderstanding (Peterson & Siegal, as cited in Rieffe & Terwogt, 2000). In contrast, the research findings of Powers (2003) and Bat-Chava (1993) demonstrated the benefits of positive family interactions in deaf families on the self-concept development, socialisation and TOM development of deaf children.

One has to acknowledge the efforts of many hearing parents who develop their Sign Language skills along with their deaf children and, as a result, not all late-signing deaf children lack access to conversation (Moeller, 2002). However, despite these efforts, access to and participation in conversations about the mind may be restricted, because many hearing parents are not fluent in Sign Language. Consequently, the complexity of topics they discuss with their deaf children is limited (Moeller, 2002). It is, however, important to note that research findings in the Suárez study (2000) demonstrated that the social problem-solving skills, interpersonal relations and assertive behaviour of late-signing deaf children could improve significantly after the application of a social skills intervention programme.

THE ROLE OF LANGUAGE IN 'THEORY OF MIND' DEVELOPMENT

Social constructivist theorists such as Vygotsky (1978), Baktin (1981), Bruner (1986), Egan (1988) and Ariel (2002) maintain that the origins of cognitive development in individuals are found in the social nature of the construction of reality (Nourat, 2006). Thus, from a social constructivist viewpoint, language has a mediating role to both "enable and empower intelligence" (Akamatsu, Musselman, & Zwiebel, 1999, p.256). Furthermore, researchers postulate that there is a close relationship between the child's language environment and his/her own language development and TOM acquisition (Courtin, 2000; Peterson & Siegal, 1999; Ruffman, Slade, Rowlandson, Rumsey & Garnham, 2003; Schick, de Villiers, de Villiers & Hoffmeister, 2007; Woolfe, Want & Siegal, 2002).

According to Schick, de Villiers, de Villiers, and Hoffmeister (2001), the majority of deaf children, namely those with hearing parents, have language deficits with regard to Sign Language or spoken language. In addition, research results have demonstrated that deaf children who have hearing parents are delayed in the development of TOM understanding (Moeller & Schick, 2006). Compared to their hearing peers aged 4 to 5 years, who are able to predict the actions of a person whose belief is in contrast with reality, deaf children with hearing parents are able to do so only when they are much older; in some cases not until adolescence (Courtin, 2000; Moeller & Schick, 2006; Schick *et al.*, 2007).

There are strong theoretical claims about why language might be facilitative or even necessary for reasoning about 'false-beliefs'. Some researchers postulate that domain-general cognitive operations, for example, executive function skills or working memory that underlies 'false-belief' understanding, require language for their implementation (Bloom & German, 2000; Schick *et al.*, 2007). In contrast, other researchers view language development as an important pre-requisite for 'false-belief' understanding (de Villiers, 2005; Nelson, 2005). According to Schick *et al.* (2007, p. 377) reciprocal conversations about mental states facilitate the representations of the self and others as mental beings and introduce children to "a vocabulary of terms for unseen and abstract concepts such as thoughts, feelings and memories that are inaccessible to direct observation". Hence, from a Vygotskian perspective (1978) the inter-psychological activity of a child ultimately becomes his/her intra-psychological activity (Symons, Fossum, & Collins, 2006). Moreover, because language is a complex, multifaceted system, an important question is whether all or only particular aspects of the

linguistic system are involved in relation to ‘false-belief’ understanding. Of interest is that studies on the role of syntax (Astington & Jenkins, 1999) and semantics (Ruffman *et al.*, 2003) have produced inconsistent findings. The Astington and Jenkins’ study (1999) demonstrated that syntax predicted a unique variance in ‘false-belief’ test scores. In contrast, the findings of Ruffman *et al.* (2003) supported the predictive role of semantics in ‘false-belief’ scores. A recent meta-analysis by Milligan *et al.* (2007), which analysed results from 104 studies (with a total sample size of almost 9,000 hearing children), showed that there is a significant relationship between language ability and ‘false-belief’ for each of the following language aspects: general language, semantics, receptive vocabulary, syntax and memory for compliments. In addition, these findings suggest a stronger direction of the effect from language to ‘false-belief’ (unidirectional) than the reverse, implying that language is an important pre-requisite for ‘false-belief’ understanding, but that ‘false-belief’ understanding does not improve language abilities in children (Milligan *et al.*, 2007).

Courtin (2000) proposed a fundamentally different linguistic hypothesis, arguing that the ability to attribute ‘false-beliefs’ is rooted primarily in the “mastery of visual perspectives” (p. 267). This suggests that deaf signing children might benefit from the unique linguistic features of Sign Language. Their experience with Sign Language and perspective taking, leads to a change at the representational level that allows signing deaf children to form representations earlier and more easily than hearing children. This linguistic hypothesis of Courtin (2000) was demonstrated when native signing deaf children ($N = 37$) in his investigation, outperformed both the late-signing group ($N = 54$), the orally trained deaf group ($N = 45$), as well as the hearing children ($N = 39$).

COMPARING ‘THEORY OF MIND’ ACQUISITION OF NATIVE SIGNING, LATE SIGNING AND ORALLY TRAINED DEAF CHILDREN

Initial research conducted in the field of TOM development in the 1980s and 1990s focused mainly on hearing children and children with autism spectrum disorder (Woolfe, Want, & Siegal, 2003). Proponents of the ‘modularity theory,’ such as Baron-Cohen, Leslie, and Frith (1985) and Happé (1993), postulated that specific neurological problems contributed to the TOM deficits in children with autism spectrum disorder. Prompted by Frith’s theory (1992) on ‘abnormal neurological development’ as a cause for TOM deficits, as well as results derived from Baron-Cohen *et al.*’s study (1985), Peterson & Siegal (1995, 1997, 1998, 1999) conducted a series of studies on the TOM development of deaf children. Based on research findings obtained through these studies, they challenged the ‘modularity theory’ and hypothesised that TOM deficits in deaf children are not caused by a specific cognitive failing but, instead, are the direct result of a lack of communication about mental states and emotions (Rhys-Jones & Ellis, 2000). Compared to research results which involved hearing preschool children and children with intellectual impairment between the ages of 4 and 5 years, who easily passed the ‘Sally-Anne false-belief’ test, 65% of the deaf children (aged 8 to 13 years) in the Peterson and Siegal (1995) investigation failed this ‘false-belief’ test. Moreover, the deaf children’s performance was similar to that of children with autism spectrum disorder (Russell *et al.* 1998). Peterson and Siegal (1995) reported that the majority of deaf children in their sample had grown up in hearing families and that no family member was proficient in Sign Language. Thus, opportunities for learning about mental states through play, conversation and other types of social interaction are likely to have been limited. These findings lend further support to a social-constructivist theory of TOM development. The fundamental point is that through communicative interaction children construct knowledge about the physical world and discover that other people sometimes have different beliefs about the world (Carpendale & Lewis, 2004). On both theoretical grounds (nature versus nurture) and on the basis of Peterson and Siegal’s (1995) findings, researchers started to compare the TOM abilities of native signing deaf children with deaf parents to that of late-signing and orally trained deaf children (hearing parents), as well as ‘normally developing’ hearing children.

The research results of Dyck and Denver (2003) and Rhys-Jones and Ellis (2000) illustrated the

important role language skills play in the acquisition of TOM by deaf children. Rhys-Jones and Ellis (2000) compared the results of native and late-signing, prelingually profoundly deaf children ($N = 34$) and hearing children ($N = 40$) between the ages of 6 and 16 years on a picture-sequencing and social judgement task. Twenty-eight of the deaf participants had no family history of deafness and the remaining six (one younger child, aged 6 years, and five adolescents, aged 11 to 16 years) were from families with a history of deafness. The dual aim of the Rhys-Jones and Ellis investigation (2000) was firstly to determine whether TOM deficits exist in younger profoundly prelingually deaf children ($N = 14$; aged 6 to 10 years). Secondly, they investigated the social awareness of deaf adolescents ($N = 20$; aged 11 to 16 years) by applying a self-designed test which provides deaf children with the opportunity to give their opinions on the behaviour of individuals in certain social contexts. Research findings indicated that there were no significant differences in the performances of younger deaf and hearing children on the sequencing task. However, younger deaf children performed much worse than older deaf adolescents in the intentional condition task — thus indicating younger deaf children’s “poor understanding of how people interact and react socially, using mental state expressions” (Rhys-Jones & Ellis, 2000, p. 260). Compared to their hearing peers, deaf adolescents performed similarly in the picture-sequencing stories, as well as on the social judgement tests. What is interesting and important for this research is that older deaf children with a superior Sign Language proficiency and better communication abilities were able to freely share information and thoughts on mental states (Rhys-Jones & Ellis, 2000). It is also important to mention that the experimenter in the Rhys-Jones study was profoundly deaf; thus, deaf adolescents were uninhibited and felt freer to express themselves. In contrast, the hearing pupils had not met a deaf person prior to this investigation and it was a “new and unsettling experience to communicate to a deaf person through an interpreter” (Rhys-Jones & Ellis, 2000, p. 259). Moreover, the performances of late-signing deaf adolescents in Rhys-Jones’ study (2000) can be strengthened by adding the social constructivist approach on language mastery which claims that it is through the use of language by more capable others (i.e. parents, family members, teachers and peers) that the individual creates his/her internal symbolic system to be used in thinking (Akamatsu *et al.*, 1999). In addition, Lederberg and Spencer (2005) maintain that even when hearing parents learn Sign Language, the language environment of late-signing deaf children with hearing parents is not as rich as that provided to most hearing children. It is only when they enter school that they begin to develop proficiency in Sign Language and experience increased opportunities for social interaction (with deaf peers and deaf teachers) and finally gain access to the world of mental states of sharing thoughts and emotions (Rhys-Jones & Ellis, 2000; Russell *et al.* 1998). An alternative explanation, not discussed in the Rhys-Jones study, is that the majority of native signing deaf children were in the adolescent group and this could have had an effect on the weaker TOM results reported for the younger deaf children (most of whom were late-signing).

In support of the Rhys-Jones and Ellis (2000) findings, Marschark *et al.* (2000) postulate that ‘false-belief’ tasks may underestimate deaf children’s TOM abilities and that many deaf adolescents do possess the ability to ascribe mental states to themselves and others, and recognise themselves as being causal with regard to behaviour. In the Marschark *et al.* (2000) study, TOMs were explored by examining the narrative abilities of 15 hearing children, aged 10.6 to 15.5 years and 15 late-signing deaf children, aged 9.7 to 15.10 years. Both groups produced mental state and desire attributes and the results indicated no age or group effects. Of further interest is that the deaf children produced more mental state and desire attributes than the hearing students (Marschark *et al.*, 2000). In a more recent investigation, Peterson and Slaughter (2006) examined the TOM abilities of late-signing deaf children and hearing children by using standardised tests and measures of spontaneous talk about inner states of perception, affect and cognition during story telling. In contrast to the results of Marschark *et al.* (2000), the results of Peterson and Slaughter (2006) revealed that despite the fact that all the late-signing deaf children made at least one narrative mention, only 33% scored perfectly on the standard ‘false-belief’ tests, compared to the 85% of hearing children who completed the

'false-belief' tests successfully. However, the most important findings from the Peterson and Slaughter study (2006) revealed significant correlations between late-signing deaf children's TOM test scores and their spontaneous narrative talk about imaginative cognition.

Furthermore, it is the author's intent to highlight an important limitation in TOM assessment of deaf children. In many of the existing TOM studies on deaf children, only verbal tasks were used to assess TOM skills, thus complicating the assessment of deaf children even further (Moeller, 2002). Since verbal 'false-belief' tasks entail language that is grammatically complex, researchers postulate that the failure of late-signing deaf children and orally trained deaf children on these verbal 'false-belief' tasks may be attributed to problems related to language comprehension and not necessarily to their understanding of 'theory of mind' (Schick *et al.*, 2007). Other researchers attempted to reduce the influence of grammatically difficult 'false-belief' tasks on already language delayed deaf children by utilising TOM tasks that contain minimal language demands (Call & Tomasello, 1999; de Villiers & de Villiers, 2000; Figueras-Costa & Harris, 2001; Moeller, 2002). The use of such tasks is warranted when determining if deaf children have an understanding of the mind, but are not demonstrating it because of the complexity of the verbal 'false-belief' tasks (Moeller, 2002). In addition, Ross *et al.* (2004) argue that the inability of examiners to effectively communicate with deaf children is a variable that is a cause of concern, and one that is not taken into account in most research carried out on deaf children. Certain aspects of 'false-belief' assessment tasks, for example 'the change in location' task, are distracting for deaf children and result in divided attention, even when the examiner or interpreter signs the instructions to deaf children (Moeller, 2002). In an attempt to separate language and TOM development, researchers have either adapted existing verbal 'false-belief' tasks by creating simple illustrated stories to accompany these tasks, or have developed additional nonverbal tests for 'false-belief' (de Villiers & de Villiers, 2000; Figueras-Costa & Harris, 2001; Moeller, 2002; Schick *et al.*, 2007).

Figueras-Costa and Harris (2001) adapted the 'false-belief' procedure, developed originally by Call and Tomasello (1999), and administered it to a group of 24 prelingually orally trained deaf children. The sample group ($N = 24$) was divided into two age groups (younger group: $N = 11$; 7 boys and 4 girls; mean age = 5.6 years and the older group: $N = 10$; 6 boys and 4 girls; mean age = 9.7 years). Research findings demonstrated that even if test linguistic demands are minimised, deaf children continue to experience difficulties with 'false-belief' understanding until they are 8 to 9 years old. A significant relationship was reported between age and TOM development for the older group of deaf children. The mean age for successfully passing TOM tasks was 8.10 years (approximately 4 years behind typically developing hearing children). However, the most important methodological issue raised in the Figueras-Costa and Harris study (2001) was the lack of a control group of hearing children of the same age range as the orally trained deaf children. In a replicated study carried out by Schick *et al.* (2007), TOM abilities were assessed in 176 deaf children and 42 hearing children who ranged in age between 4.0 years and 8.3 years. The mean age was similar for each group (native signing deaf children = 6.7 years; late-signing deaf children = 6.11 years; orally trained deaf children = 6.6 years). A battery of tasks was administered, including 'false-belief' tasks (three unseen 'changed in location' narratives presented in picture format and two 'unexpected content' tasks), cognitive tasks (verbal and low-verbal) and language skills (Sign Language or English). Late-signing and orally trained deaf children demonstrated significant delays with regard to TOM and language abilities. In contrast, there were no significant differences between the native signing deaf children and age-matched hearing children on language acquisition and in any of the TOM tasks, either verbal or non-verbal (Schick *et al.*, 2007). Other studies of non-verbal 'false-belief' tests (de Villiers & de Villiers, 2000; Woolf *et al.*, 2002) reported similar results as Figueras-Costa and Harris (2001) and Schick *et al.* (2007), suggesting that late-signing and orally trained deaf children's delayed performance on tests of 'false-belief' reasoning in their studies cannot be attributed to the language demands of the verbal 'false-belief' tasks, but rather to their significant delay in reasoning about cognitive states.

In an empirical study conducted in the Free State, South Africa (Van Staden, 2005), a self-concept scale was administered to a group of late-signing deaf children ($N = 80$) in the intermediary phase. The study was carried out at a School for the Deaf and the sample consisted of Grade 4 ($N = 32$; 16 boys and 15 girls), Grade 5 ($N = 23$; 12 boys and 11 girls) and Grade 6 children ($N = 26$; 12 boys and 14 girls). Their ages ranged between 12 and 16 years. During the administration of the self-concept scales, deaf children had to reflect on their inner states (feelings) and beliefs before completing each question of the self-concept scales. Younger children in Grade 4 were able to recognise the different emotions, but experienced problems when they had to relate their emotional experiences to those of the different pictures (facial expressions of emotions) on the self-concept scale. Van Staden (2005) hypothesised that Grade 4 deaf children in this investigation probably did not understand that human behaviour or responses guided by thoughts, feelings and desires can differ from one individual to the next. This reaction by younger deaf children in the investigation could possibly be attributed to deficits in TOM understanding. In contrast, Grade 5 and Grade 6 children who were fluent in South African Sign Language did not experience problems during the administering of the self-concept scales, which in turn, could probably be attributed to more advanced TOM development in older late-signing deaf children who had had a longer exposure to Sign Language instruction and more opportunities to engage in discussions about mental states with deaf peers and teachers who were fluent in SASL. Moreover, the research findings of Van Staden (2005) validate the research results of Dyck and Denver (2003), Rhys-Jones and Ellis (2000) and Peterson and Siegal (1995), and demonstrate the relationship between language skills, social interaction and TOM acquisition.

CONCLUSION

The contribution of social constructivist perspectives to research on the role of language and social interaction in TOM development is indisputable. Vygotsky's theory of social constructivism especially focuses on the interdependence of language and social interaction in facilitating social understanding and 'theory of mind' development in deaf and hearing children.

Empirical studies, reviewed in this article, show a significant relationship between 'false-belief' understanding and language ability, which holds across a variety of language ability measures (general language, semantics, receptive vocabulary, syntax and memory for compliments) and 'false-belief' task types in different investigations. The results suggest the possibility that the effect of language might be unidirectional. Clarity was also provided on issues related to the language demands of verbal 'false-belief' tasks and the effect these might have on deaf children's 'theory of mind' understanding. Research findings presented in this article demonstrate that regardless of the language demands of the 'false-belief' tasks, deaf children from hearing families (late-signing or orally trained) are delayed in reasoning about cognitive states and 'theory of mind' development. In contrast, the language development of deaf children of deaf parents who are typically exposed to Sign Language from birth is remarkably similar to the spoken language development of hearing children.

Moreover, it appears that the choice of Sign Language as a communication medium is advantageous to many deaf children, because most researchers concur that native signing deaf children outperform late-signing and orally trained deaf children on numerous 'false-belief' tasks and exhibit a better 'theory of mind' understanding. In conclusion, this paper highlights the pivotal role of language skills and social interaction, especially social discourse, in gaining full access to the world of social awareness, understanding and the sharing of emotions that lead to a healthy and natural development of 'theory of mind' in deaf and hearing children.

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