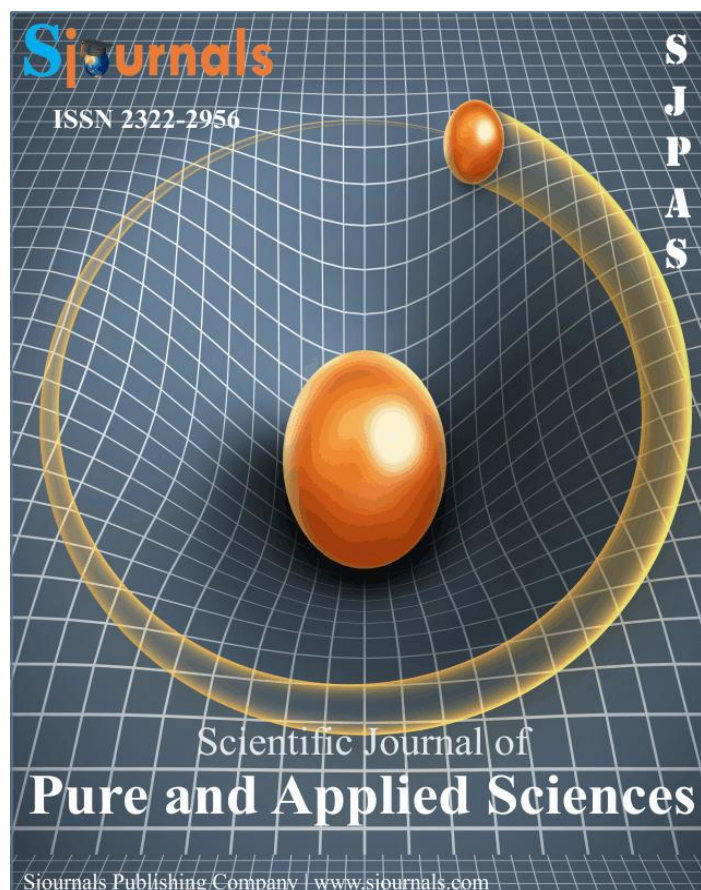


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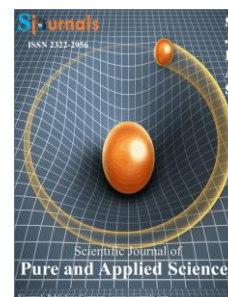
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Review article

The impact of deafness; theory of mind and child development

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ABSTRACT

This paper adopts a wider conception of language which goes beyond viewing language as being limited to speech. The concept of language in this paper includes all forms of socially agreed systems of exchanging and communicating ideas and information which include sign language as a formal language of interaction for the deaf. Thus the paper is premised on the cultural model of deafness which designates sign language as the primary medium of communication for the deaf while at the same time the paper is cognizant of the impact of deafness on child development with regards to aural-oral environments. In these regards, the paper links the impact of deafness to the concept of theory of mind development in order to seduce parents, educators and other stakeholders to strongly consider the need for deaf children to be fully exposed to sign language and deaf culture as a way of promoting their overall development. The paper concludes that; while deafness does impact on child development, quality exposure to and fluency in sign language can facilitate theory of mind development hence mitigate the impact. In the same vein, the impact of deafness becomes an even more critical phenomenon with regards to theory of mind development discourses.

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1. Introduction

Deafness as contextualized in this paper is not primarily located in the medical view, but encapsulates cultural deafness which designates sign language as the primary medium of communication for the deaf. In other words, speech which is simply the ability to make sounds through the articulatory organs (Enns and Price, 2013) is not the easiest of ways of communication for the deaf. Humphries et al. (2014) note that, in medical literature, there is often a confused belief that speech is equivalent to language. This cannot be so since language is far more complex than speech. It involves convergence of words, signs, structures, thoughts and concepts (Deaf Children Australia, 2012) via speech, signs, writing, manual symbols and reading. While deafness does impact on speech and spoken language development, it is not an inhibitive factor to sign language development. In any case, sign language development is central to the perpetuation of deafness as a cultural imperative. Thus the impact of deafness articulated in this paper relates to aural-oral contexts and environments. The linkage of the impact of deafness to perceived lack of theory of mind development in deaf children serves to generate seriousness among parents, teachers and other stakeholders to reconsider the need for exposing deaf children to sign language which is their native language and to deaf culture as a way of promoting their overall development. From this point of view, deafness does significantly impact on speech, communication, social cognitive development hence theory of mind development and educational achievement and ultimately on overall child development, but only in the contexts of speech environments.

2. Situational analysis

It is critical to appreciate that in the hearing dominated world, deafness will obviously have considerable negative impact especially on the social development of the child. This is particularly true for deaf children of hearing parents. Many such children are not exposed to sign language because either their deafness is diagnosed late or their parents decide to have them educated using aural-oral methods. At times the children have no natural sign language models because no one in their environment ever uses sign language which is their natural medium of communication. For many of them, sign language acquisition would start when they eventually start school (For those who are lucky to do so). These issues explain why deaf children of hearing parents have a high propensity for language deprivation. This background reflects on the potential impact deafness has on speech, communication, early cognitive development, social interaction with the hearing hence on theory of mind development and ultimately on educational achievement and mental health.

3. Impact of deafness on speech and communication

Although speech is not a critical factor in the development of deaf children, it becomes a significant in communication within spoken language environments. According to Sandler and Lillo-Martin (2001), early studies show that despite amplification and speech training, the speech of deaf individuals is at best only 20% intelligible. This is because the typical audiological configuration of deafness impacts significantly on the perception and production of speech. Consonants are affected more than vowels yet consonants make language understandable (Wallhagen, 2014). Errors in speech due to deafness include omission of word-final consonants, fronting or backing errors and voicing errors. Meanwhile, fricatives are realised as plosives. Reductions of consonant clusters and deletion of unstressed syllables have also been reported (Bernhardt et al., 2005). Some of these errors are similar to those exhibited by hearing children save for those where consonants are less visible on the lips such as the glottal stops (Herman and Morgan, 2011).

The supra-segmental aspects of speech are also affected by deafness. For instance, the voice quality of a deaf child may be comprised by excessive laryngeal tension (Wirz, 2001); resonance maybe hyper or hypo nasal, mixed or *cud-de-sac* (Boone and McFarlane, 2000). In addition, Gilbert and Campbell (1980) report higher fundamental frequency while Bernhardt et al. (2005) identify difficulty in intonation, including use of extended syllables, longer pauses between words and shortened voice segments as some of the distortions that characterise the supra-segmental aspects of speech among deaf children.

The advent of cochlear implants (CIs) has had a significant impact on the potential for intelligible speech in deaf children, but not all the children are equally successful yet others are simply not eligible. Humphries, Kushalnagar, Mathur, Jo Napoli, Padden and Rathmann (2014) argue that cochlear implants have a variable rate of

success and that, therefore, cochlear implantation does not guarantee speech or spoken language acquisition. In addition to cochlear implantation, visual feedback in which systems that use hand signals to provide information about the phonological features of speech that include cued speech and cued articulation has also been used (Herman and Morgan, 2011). Further, computer-based visual displays such as electropalatography (EPG) have been used to provide phoneme specific information of those phonemes that are difficult to perceive both auditorily and visually. An experimental study by Parsloe (1998) demonstrated that use of EPG to teach profoundly deaf children improved speech perception skills quite significantly. In a hearing environment, speech disorders may significantly impact on communication yet language in general requires a vast amount of social interaction for it to develop efficiently. For the deaf therefore, sign language would offer a solution over and above the auditory oriented efforts reported above.

4. Impact of deafness on social cognitive development

Wallhagen (2014) posits that, in addition to speech and communication, deafness does impact on quality of life and social relationships as well as on social cognition. Because language has both cognitive and social functions, parental interaction is critical in striking the balance between the two functions. Good parent-child interaction allows deaf children to gain social knowledge, information about self and others and sense of being part of the environment (Herman and Morgan, 2011). This also leads to the development of cognitive and problem solving skills in the child. Several studies (Schick et al., 2007; Kegl, 2006) demonstrate that deaf children of hearing parents have persistent delays on theory of mind tasks while deaf children of deaf parents score age-appropriately on the same tasks. This is due to missed interactions as a function of the hearing parents' failure to adapt to the deaf child's communication needs (Herman and Morgan, 2011). Thus the deaf child needs more time engaged in abstract conversational topics with parents in order to achieve successful and connected communication. This is more effective when done right from early communication encounters and when sign language is used. There is also a growing body of knowledge today about how early communication actually fosters later theory of mind development (Taumoepeau and Ruffman, 2008; Want and Gattis, 2005; Wellman and Slaughter, 2012).

According to Astington and Edward (2010) the concept of theory of mind (ToM) refers to the understanding of humans as mental beings, each with his/her own unique mental states such as beliefs, desires, knowledge and pretence. ToM can also be defined as the ability to attribute mental states to one's self and the understanding that others may have beliefs, desires and intentions that differ from one's own (Want and Gattis, 2005). It is the most important development in early childhood social cognition and is used to explain one's on behaviour to others (Astington and Edwards, 2010). This is achieved by expressing one's own thoughts and needs and by interpreting other people's behaviours, thoughts and wants. This is clearly a daunting task for the deaf if they are to use speech which is like a foreign language to them.

By the age of two years, children already show awareness of the difference between thought in the mind and objects and subjects in their environment (Gweon and Saxe, 2013). At about the same age, the children can also distinguish between theirs and other people's wants (Somerville, 2010). According to Astington and Edwards (2010) this developing awareness is evident in children's development of language too. Thus, at two years children are able to talk or sign about what they want and about what others want, like and feel. They also talk or sign about what other people think and know (Wellman and Banerjee, 1991; Metzoff et al., 1991; Bartsch and Wellman, 1995). At the age of four, children then develop a crucial realization that thought in the mind may not be true after all (Ashington and Edwards, 2010). This is also the time children begin to demonstrate a full command of language. All this serves to demonstrate how language and experience play major roles in children's development of ToM

As expected, most deaf children have delayed ToM development compared to their hearing peers (Peterson et al., 2005; Peterson and Wellman, 2009; Wellman and Slaughter, 2012) with the exception of deaf children of deaf parents (Wolfe et al., 2002). In other words, deaf children can only meaningfully develop theory of mind if well disposed to a fluent language, often in the form of sign language. Studies (Gonzalez et al., 2007; Pyers and Senghas, 2009; Van Staden, 2010; Tomasuolo et al., 2013) have consistently demonstrated that language ability and frequent access to fluent language models are significant predictors of ToM among deaf and hard of hearing children. Unfortunately, as earlier indicated, deaf children of hearing parents lack these models leaving them at the risk of profound language deprivation.

5. Impact of deafness on social interaction and communication in hearing environments

Literature is replete with evidence that deaf children experience much discrimination due to negative attitudes portrayed by society towards deafness. These negative attitudes are mostly manifestations of society's lack of knowledge about Deafness and Deafhood. As such, deaf students have reported that mainstream teachers lack deaf awareness (NDCS, 2001). Deaf people use sign language which is their natural mode of communication, but many hearing people do not understand sign language and have no experience with it. Segregation of deaf children in mainstream settings can therefore be attributable to low communicative competences (Nunes et al., 2001); limited ToM and lack of understanding of sign language by hearing people. This is exacerbated by lack of understanding of oral language by the deaf. As a result, deaf people have considerable difficulty communicating in hearing environments. Cocker and Edwards (2004) confirm that, prelingually deaf children typically display poor mastery of spoken language and find learning the rules of social communication particularly challenging. Inversely, most hearing people cannot sign. This scenario leads to the emergence of what Bouvet (1990) terms 'a shared handicap of communication' between hearing and deaf partners. In a mainstream classroom this creates several barriers to participation by deaf students.

6. Impact of deafness on educational achievement

The barriers to mainstream classroom participation by deaf students, which I have raised in the foregoing section clearly suggest that deafness has a potential negative impact on educational achievement. This is more evident in mainstream classrooms which exclusively adopt aural-oral methods of teaching. The main driver in educational under-achievement of deaf children in these regards is poor literacy skills. Early studies (Harris, 2010; Allen, 1986; Conrad, 1979; Trybas and Karchmer, 1977) have shown that deaf children develop reading at a slower rate than their hearing counterparts for instance. According to these studies, deaf children achieve approximately one third of the reading progress of the average hearing reader each year. The severity of this reading delay increases with number of years in school culminating in the average deaf school leaver to afford a reading age of only approximately 9 years (Conrad, 1979; Bon and Mak, 2007). This suggests progressive and persistent lack of adequate sign language exposure in the process of schooling. However, higher levels of reading achievement have been reported among deaf children with cochlear implants (Marschark et al., 2007).

The reading problems typically experienced by deaf children emanate from the fact that the written language which is predominantly used for academic assessment is essentially derived from spoken language to which deaf children have limited access. After all, deaf children are reported to have weaker phonological skills in terms of phonological awareness and phonological coding which are predictive of reading achievement (Herman and Morgan, 2011). Clearly deaf children are subjected to reading a language of which they are not native users. This poor reading ability is the major cause of educational underachievement among the deaf and not low intellect as predicted by some uninformed people. Interventions such as sign language interpretation coupled with the use of specialist teachers of the deaf who are eloquent in sign language may significantly improve the educational achievement of deaf students. Sign bilingual education, which is the concurrent use of oral and sign language, has demonstrated positive outcomes in Nordic countries, USA, UK and Hong Kong.

7. Consequences of lack of early exposure to language

The impact of deafness on language development is most evident when there is a lack of early exposure. Some of the general consequences for this lack of early exposure to sign language can be summarized as follows:

- Deaf children run the risk of never being fluent in either sign or spoken language.
- Deaf children start school without a fully developed language.
- Harm to the deaf children's psychosocial health, putting them at risk of depression, behavioural problems, social disorders, juvenile delinquency (Leigh, 2009; Schick et al., 2006; Northern and Downs, 2002) and social isolation and discrimination.
- Severe language deprivation.
- Poor academic achievement and high propensity for dependence on social service safety nets.

- Disruption of cognitive development leading to poor verbal memory, mastery of literacy and numeracy and high order cognitive processing (Ronnberg, 2003; MacSweeney, 1998).

8. Discussion and conclusion

Honestly, deafness has tremendous negative impact on child development yet it is a cultural defining attribute for sign language and cultural development. Effectively, the impact of deafness on child development is depended on the child's exposure to and/or fluency in sign language. The hearing environment into which many deaf children are born and develop in perpetuates this impact of deafness on child development. It is known that at least 90% of deaf children are born to hearing parents (Humphries et al., 2004) suggesting that many deaf children are exposed to aforesaid impact of deafness. This revelation reflects on the dilemma these children experience when it comes to communication, social and cognitive development hence academic achievement. The revelation also illuminates discourses on the restrictions to theory of mind development among deaf children. At least deaf children of deaf parents are at an advantage because of their early exposure to sign language and deaf culture. Coupled with lack of literacy skills among the deaf children of hearing parents, it is evident that lack of theory of mind development has tremendous implications for their holistic development. This calls for a serious re-consideration for exposing deaf children to sign language as well as to deaf culture. To be overly effective, the exposure should be afforded early in life.

This is notwithstanding the natural fact that the deaf are a minority and are expected to live within the hearing society. It is from this scenario that deafness tends to unleash its devastating impact. This paper therefore concludes that; while deafness does impact on child development, quality exposure to and fluency in sign language can facilitate theory of mind development hence mitigate the impact. In the same vein, the impact of deafness becomes an even more critical phenomenon with regards to theory of mind development discourses. This paradox calls for the revitalization of research in the area of deafness versus theory of mind development. From this analysis, the paper advances the following recommendations:

- There is a need for parents, educators and other stakeholders to reconsider giving deaf children more exposure to sign language and deaf culture from an early age. This can be achieved through practices such as sign bilingual education which promote equal development of spoken and manual language skills.
- Research needs to be conducted on connection between the impact of deafness and theory of mind development. Implications can then be drawn for practices that promote the overall development of deaf children.

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