

# The Psycholinguistic and Neurolinguistic Nature of Communications and Education in Early Development of Bi/Multilingual Autistic Children

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Poorly developed joint attention and communicative acts during early childhood may result in poorer interactional language development. The aim of this study was to investigate knowledge of parents and educators of preschool and school-aged autistic children about the nature and cognitive benefits of joint attention, and raising these children with bi/multilingualism using the psycholinguistic and neurolinguistics bases of language acquisition, language production, language comprehension and neurocognition respectively. The participants were bi/multilingual parents (n=10) and bi/multilingual educators (n=10) from 4 schools purposively selected from Empangeni and Durban in KwaZulu-Natal, South Africa. Data was collected through semi-structured interviews from which anecdotes and lived experiences were also drawn. The interviews were audio-recorded, transcribed and analysed thematically. The findings established that many parents developed poor joint attention with their children during infancy, and communications or interactions with their autistic children at home even when they are literate or bi/multilingual due to prior advice from the clinicians or speech therapists or lack of such advice to use bi/multilingualism. The research also found a higher percentage of educators employed one language (isiZulu) when teaching and communicating with children with autism at school. The findings indicated that a larger percentage of parents and educators of children with ASD have little or no understanding that many autistic children (especially those without intellectual disabilities) have the cognitive ability to acquire, produce, and comprehend two or more languages by incorporating bi/multilingualism; and that joint and shared attention while involved in communicative acts during early

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childhood, and the school-age of these children is an essential cognition booster.

**Key words:** *Psycholinguistic, Neurolinguistic, Joint attention and shared attention, Cognitive effects, Bi/multilingualism, Childhood development*

## **Introduction**

Autism Spectrum Disorder (ASD) is a neurological developmental disorder, which typically commences in early childhood but remains throughout a lifetime. Psycholinguistic-cum-neurolinguistic imports have helped in describing the nature and benefits of cognitive effects of bi/multilingualism in early communication, and in turn, its benefits for childhood education either among the typically developing children or among children with developmental disorders. Many researchers have proved that children with autism spectrum disorder (ASD) have the cognitive ability of multiple languages in contrary to the beliefs of most parents, teachers and other caregivers that bi/multilingualism is detrimental and capable of compounding the burden of the spectrum (Ohashi et al. 2012; Finsel, Hewitt & Ha, 2012; Dai et al. 2018 etc.), thus affecting their intelligence level, and socio-communicative competence. Such previously mentioned findings were grounded in psycholinguistic tenets of language acquisition, language production and language comprehension and partly having neurolinguistics bases in terms of how brain processes single or multiple languages at a time. As early as age 24 months, children with autism if exposed to two languages compared to those exposed to one language show no significant difference (Ohashi et al. 2012). Essentially, parents (as well as teachers) of children with autism are the primary caregivers, therefore their roles begin from the infancy of these children, and thus a need for creating means for the autistic children's language and literacy to develop. Employment of bi/multilingualism and joint attention are part of the means, but not all parents understand its significant impact on the overall cognitive development of their children.

## **Psycholinguistics and Language Development among Children with Autism**

Psycholinguistics as one of the core areas of linguistic studies explores connection of language with mind; the processes that the human mind conveys during the several evolutionary phases of language development; as well as the influence of various psychological encounters on language (Khan, Mahmood & Uzair, 2011). One of the best ways to help children with autism from childhood is to know what boosts their cognitive development, but parents and educators have been misinformed, wrongly advised or personally conceded to negative perspectives that exposing children to one language is the best practice at home and school. Most perspectives based on the ground that two or multiple languages will be an overload on the existing impaired language system have been countered by several studies. Therefore bilingualism or multilingualism have no harmful impact on the first-language development of autistic children



but are beneficial to them (Hambly & Fombonne, 2009; Kremer-Sadlik, 2005; Leadbitter, Hudry, & the Preschool Autism Communication Trial consortium, 2009; Yu, 2007; etc.).

Evidently, during the evolutionary stages of language development among children with autism, their language production, language acquisition and language comprehension form crucial aspects of diagnoses (as red flags) as children with ASD face delay or deficit in their language acquisition. This implies that apart from stereotypical behaviours, failure to produce speech, respond to others, and understand others at appropriate age constitute signals to parents that their children may be autistic or have other developmental language disorders (Paul & Cohen, 1982). Researches from these aspects of the psycholinguistic are of interest to theorists and experimentalists, but not too many parents and educators who are closest to these children. For instance, “integrated components of communicative function—motoric, perceptual, intellectual, affective, interactional, and linguistic—can be “teased” apart so that the effect of disruption of one aspect of the system on the others can be seen” (Paul & Cohen, 1982. p. 279). This further suggests that at an early stage of life, all these components need to be keenly observed and worked on to ensure early diagnose, and adequate care which if missed or messed with may lead to severe impairments which can also disrupt the cognitive, linguistic and communicative abilities as well as learning processes of autistic children.

### **Neurolinguistics and Language Development among Children with Autism**

There is an imminent need to indicate the relationship of language with brain, which, of course, is a physical entity unlike language in the mind that is abstract. The brain serves as the primal organ in charge of functions of human mind, as well as language development in terms of evolutionary processes and neurolinguistics has focuses on such areas. The studies of both psycholinguistics and neurolinguistics in relation to each other has aided distinction between the study language in relation with mind, and the distinction and relationship between language and the brain. Therefore, neurolinguistics establishes through various observations the nexus between language and brain with emphasis on the effects of malfunctioning neurons, injury to the brain, and other language pathologies that affect language functions among the affected individuals (Khan, Mahmood & Uzair, 2011; Bambini, 2012).

Importantly, neurolinguistics has a range of broad interests and far-reaching implications for numerous multidisciplinary studies which include cognition, culture, human communication among others (Khan, Mahmood & Uzair, 2011), and children with ASD are better understood from the nature of this field. Language acquisition, language production, and language comprehension for instance are areas of interest whose processes can be viewed from brain functionality on language faculty of human beings, that is, the Broca’s areas, Angular gyrus, Insular cortex and Wernicke’s areas. In typically developing children, second language acquisition involves both structural and functional brain structures in a mediated form (Costa & Sebastián-Gallés, 2014; Li, Legault, & Litcofsky, 2014; Stein, Winkler, Kaiser, & Dierks,



2014), and through neuroimaging studies, no doubt that bilingualism processing is supported by the human brain, and these studies emphasise the similarity or difference in L1 and L2 activation but with some controversies concerning the findings (Liu & Cao, 2016).

In another set of findings (Illes et al., 1999; Nakada, Fujii, & Kwee, 2001; Soles, 2011; Tan et al., 2003 etc.), it was revealed that processing L2 involves employment of L1 brain network. Similarly, it has also been established that the volume and standard of individual's experience in learning L2 affect the brain structure (Stein, Winkler, Kaiser, & Dierks, 2014; Kuhl et al., 2016 etc.) and this experience include both receptive and expressive language skills. Many studies also suggested that while processing L2, additional brain regions are used (Huang, Itoh, Kwee, & Nakada, 2012; Liu, Dunlap, Fiez, & Perfetti, 2007; Nelson, Liu, Fiez, & Perfetti, 2009; Ng, 2008; Park, Badzakova-Trajkov, & Waldie, 2012 etc.), and also that age of acquisition among other factors are responsible for L1-L2 network overlap as well as when they differ (Liu & Cao, 2016).

The scope of neurolinguistics studies goes beyond the above, and autistic children, parents and educators' need to understand a little (if not a great deal) the role of the brain in language acquisition, language comprehension and language production. Such understanding will aid in monitoring the language development together with language deficit or impairment in both expressive and receptive modes because "...even verbal children with ASD use language in ways that are restricted, stereotyped, ritualised, and perseverative" (Prelock & Nelson, 2012. p. 131). These common traits in some individuals with autism (because phenotypes may define another traits) have helped in determining the psycholinguistic abilities which need to be tested or monitored by the neurolinguists while studying the aphasic individuals but now commonly related to autism especially during the evolution stage. The abilities which are core to childhood education or learning of individuals with aphasia "i. Spontaneous speech, ii. Auditory comprehension or processing, iii. Auditory repetition, iv. Spontaneous writing, v. Reading comprehension, vi. Copying, vii. Writing to dictation, viii. Reading aloud, ix. Confrontation naming, and x. written word to object matching" (Khan, Mahmood, & Uzair, 2011: 228). The above list though focuses on aphasia but extends to autistic and other related developmental disorders though with different levels of severity from one person to another and from one developmental disorder to another, as these abilities are needed in a virtual and real formal or informal classroom or teaching and learning situations in which the autistics have deficits in. Similarly, these abilities are significant to social communication, language development and childhood education of bi/multilingual children with autism, and only the roles of their parents and educators are significantly required.

### **ASD, Joint Attention and Childhood Language Development**

Difficulty in social communication has been identified as an integral part of difficulties faced by children with autism, though these among others like speech and language deficits, are a

cardinal diagnosing feature of autism (Prelock & Nelson, 2012). The nature of childhood language development in relation to joint attention reveals that communication which include the use of gaze, physical proximity, non-symbolic gestures, facial expression, tone of voice, and other paralinguistic modulation (e.g. intonation) aid in enriching "...linguistic meanings and convey the emotional tone of the message" (Prelock & Nelson, 2012: 129). All these are essential for the understanding of language and communication development among children with autism and consequently increasing the chances of their better childhood education as they grow.

Briefly, joint attention is a frame of reference that manifests from mental and perceptual capacity for the purpose of processing information, and sharing experience about a common referent with others (Mundy, 2016). In early childhood typical development, joint attention can be evaluated between age of 4-6 months while children with signs of ASD can be evaluated between age of 8-9 months (e.g. Gredebeck et al., 2010; Ibanez et al., 2013; Mundy et al., 2007). Among school-aged children, the validity of this measurement is ill-defined (Lord & Jones, 2012; Mundy et al., 2017). Responding to joint attention (RJA- which entails that infants can point at others' gesture or having visual line of regards for them), and initiating joint attention (ITA) -which means infants' ability to direct the attention or the gaze of other people) are two prominent forms of joint attention (Mundy, 2017). Therefore, some studies (e.g. Gotham et al. 2007; Ibanez et al. 2013; Nygren et al. 2012; Ventola et al. 2007) concluded that joint attention among early preschool children is a means to identify children with ASD or those who may be affected.

Prelock and Nelson (2012) asserted that in typical development, children start with mutual gaze at their caregivers and proceed to joint shared attention to other objects such as pets, other persons etc. While doing this, the caregiver employs verbal and gestural comments to whatever the child pays attention to; and thus leading to vocalisation, body orientation, and attention shifting which are typically adapted from their caregiver. However, young children with autism unlike other children with other developmental disorders have been noticed of using less joint attention acts and gestures, as well as uncoordinated eye gaze, and vocalisations (Shumway & Wetherby, 2009). Importantly, joint attention transcends simultaneous looking, or movement of gaze as it requires shared world of related intentions as theory from advanced research has established that eye gaze/ contact and pointing behaviours may not be substantial for measuring joint attention as children develop, and even if such measuring indicators might be valid for infants and toddlers (Mundy et al., 2017). The reason adduced for the notion was that the processes and development of internalised mental joint attention among infants was perceived to emanate from practice like overt behaviour among the infants themselves (Mundy, 2016). In addition, in older children, mental joint attention does not rely on eye contact, intense pointing only but also supports various social learning functions which include socio-cognition, referential use of language, ability to focus on mutual referents for the purpose of learning from

them, cooperative behaviour, etc. (see Mundy, 2016, Mundy & Sigman, 2006; Mundy et al., 2017).

In both children and adults, joint attention (such as gaze coordination) is needed to enrich and achieve understanding of common social communication or and /or interaction; to infer other's intentions; and clarify linguistic references (Lee et al., 1998; Shockley et al., 2009; Shulze et al., 2013; Tribushinina 2014). Some studies also revealed that joint attention aids in creating cognitive and a mutual perceptual frame needed for developing collaborative and cooperative behaviour during childhood stage (Wu et al., 2013) but is also applicable to autistic children (see Dykstra Steinbrenner & Watson 2015; Mundy et al., 2017). Crucially, the mechanisms on which mental joint attention anchors its functions are connected to psycholinguistics, neurolinguistics, and neurocognition. For instance, neurodevelopmental studies on joint attention (with the use of neuron-imaging) can be evaluated during the childhood stage from 8-18 years (Oberwelland, 2016), and some studies have revealed that there is convergence of functional cortical networks which get activated when one performs joint attention, and the activation of functional neural correlates when one performs certain social-cognitive tasks (Redcay et al., 2013; Mundy et al., 2017).

Similarly, imaging studies (Caruana et al. 2015; Greene et al. 2011; Pelphrey et al. 2005; Redcay et al. 2012; Vaidya et al. 2011) showed that school-aged adults and children with autism have deficit in performing joint attention tasks due to atypical neurocognitive processing. In essence, the studies have clearly indicated the role and measurement of joint attention in both atypical and typical development, and that atypical joint attention from infancy to adulthood can be observed and measured even when it remains unclear whether the index of joint attention's symptoms and its burden can be clinically examined afterward of the preschool stage (Mundy et al., 2017).

In addition, a review of literature on joint attention, social-cognitive brain systems in both ASD and typical development has revealed that cognitive neurodevelopment is relevant to joint attention (Mundy, 2017). Meanwhile, for both parents and educators who are the closest caregivers of children with ASD, understanding the role of joint attention from infancy, to preschool period, and to adulthood from both psycholinguistic and neurolinguistics (including neurocognition) perspectives are crucial to help children with ASD learn at home and school. Such practices boost the cognitive ability, increase performance of Theory of Mind (ToM) tasks, and increase both social communication, and communicative competence of children with ASD.

## **Methodology**

This study employed a qualitative research method as a research process guide (De Vos et al., 2011). The perspectives of both parents and educators who are the closest caregivers of school-



aged children with autism were sought basically concerning their knowledge about the nature and cognitive benefits of joint attention, and raising these children with bi/multilingualism using the psycholinguistic and neurolinguistics bases of language acquisition, language production, language comprehension and neurocognition respectively. Participants were bilingual parents (mostly women) (n-10) and bi/multilingual educators (n-10) from 4 schools purposively selected from Empangeni and Durban in KwaZulu-Natal, South Africa, and the data was collected through semi-structured interviews from which anecdotes and lived experiences were also drawn. The interviews were audio-recorded, transcribed, and thematically analysed. All research participants consented to participate after the presentation of ethical clearance certificate issued by the University of Zululand South Africa. The relevant biodata of all participants are presented in Appendix 1 and Appendix 2.

## Findings

Findings drawn from the data collected for the study established three thematic issues surrounding parents' and educators' knowledge alongside perspectives on joint attention, bi/multilingualism based on the nature of psycholinguistic and neurolinguistic of human's overall language and communication acts. The findings are discussed as follows:

### **A. Little or lack of knowledge on cognitive benefits of bi/multilingual communication, education for children with autism**

The psycholinguistic and neurolinguistics bases of language acquisition, language production, language comprehension and neurocognition respectively have shown that bi/multilingualism joint attention are essential for social-communication and educating children with autism. Table 1 reveals that 80% (n-10) of the parents have been adopting monolingual communications and social interaction with their children with autism at home. Table 2 also that indicates 70% of the educators (n-10) are using the mother tongue of children with autism as a language of instruction, and social communication. This implies that at home and school, the majority of parents and the educators have been employing one language (which is the Mother Tongue/ L1) of children with autism due to fear, expert's advice and lack of understanding that bi/multilingualism has positive cognitive effects on both typically developing and those with developmental disorders. The following are few excerpts from the interviews with the participants.

*"I use my first language to communicate with him because a psychologist and another clinician once told me to stick to one language in order not to confuse my child with autism, and it will help him to talk better...."(DUR-PRT3). Yes, I was told to stick to one language in our interactions, and since then, I stopped using English with IsiZulu. The person who certified him as autistic told me. I don't know if it is helpful or not..."(EPAN-PRT4).*

Some teachers commented that they follow self-reports from parents and clinicians in most cases.

*“We teachers rely much on parents’ report about the use of a language to interact and teach these children here. Some clinicians attached to the school or caring for the children with autism also reinforce the use of one language because we were told it is good for these children (DUR-EDU6). These results are consistent with other findings from Hambly & Fombonne, 2009; Kremer-Sadlik, 2005; Leadbitter, Hudry, & the Preschool Autism Communication Trial consortium, 2009; Yu, 2007; etc.).*

### **B. Absence of adequate joint attention due to lack of knowledge about its cognitive benefits for social-communication, education for children with autism**

The early childhood of children with autism needs adequate joint attention in order to boost their cognitive development, social development and language acquisition. Table 1 and 2 respectively reveal that 70% of the parents (n-10) and 90% of the educators (n-10) have no or little understanding that joint attention is essentially beneficial to cognitive development, acquisition of language, and social development which in turn are basic prerequisites for childhood education (or teaching and learning) at both formal and informal setting. This shortfall of knowledge of joint attention at home and school negatively affects how children with autism may initiate joint attention or respond to joint attention. When asked about their knowledge and consistent use of joint attention that broadly include (sharing of attention, emotions and intentions), majority of parents and educators who are their closest caregivers confirmed their little or no knowledge and thus fail to adequately engage the autistic children in such acts.

*“I have not been engaging in what you called responding to joint attention, as in following the children’s gaze and pointing gestures in classroom or school in general. I don’t know it is so important to train our learners who are with autism....” (EPANEDU-1).*

*“No time to engage my son with autism. I have to work and get tired by the time of coming home. We have not been adequately sharing emotion, attention, gestures and others you mentioned...” (EPAN-PRT3).*

*“At home, I gaze at her, but not to the extent of exchanging emotions and intensions. I think I don’t play with her by pointing or alternating eye contact to share attention with respect to a toy, wall posters and others. Nobody told me all these until now.” (DUR-PRT5).*

Succinctly, it was found that the majority of parents and educators have little or no knowledge, time and skills which are needed at the early childhood stage of children with autism. This implies that these children are systematically and tactically deprived of cognitive benefits of



joint attention both at home and school. This finding corroborates the works of Mundy et al., (2017); Mundy, (2016)., Mundy (2017); Caruana, Brock, & Woolgar (2015) who hold the view that school-aged children with autism have a deficit in performing joint attention tasks

### **C. Little knowledge and concerns to both neurolinguistic and psycholinguistic aspects of communication, education and joint attention**

The majority of the participants are educated with higher education degree(s) but that does not translate to having understanding of some neurolinguistic and psycholinguistic nature of autism. Absence of such understanding includes for instance the inability to relate deficits in social communication to deficits or atypical activation of certain brain regions (like insular cortex, Broca's and Wernicke's area etc.), which in turn affect their understanding of nature of bi/multilingual language acquisition/ production/ comprehension. While the majority of parents pay little attention to joint attention, they also have little or no skills in teaching social communication / interaction (which are both verbal and non-verbal in nature). For teachers, only few have special skills like the use of visual modelling to educate children with autism and thus boosting their cognitive level.

### **Conclusion, Recommendations and Implications for Further Study**

Findings from this study have revealed that the fields of psycholinguistics and neurolinguistics offer insights into the nature and benefits of engaging children with autism in joint attention (which include sharing attention, emotions, and intentions), and bi/multilingual communication at home and at school especially during formal and informal interactions or communications and during teaching and learning processes. The results indicated that the majority of parents and educators with autistic children have little or no knowledge concerning the cognitive, communication, education and other benefits of joint attention, these activities are necessary from the childhood stage and during their school-age period and beyond. It may be concluded that doing these activities requires parents and educators in those periods to be principal actors in developing better language acquisition, and better social interactions and communications that may positively affect language development and childhood education of children with autism in their care. It is recommended that parents and educators should engage these children in bi/multilingual interactions/ communications; and adequate joint attention as early as from their infancy stage for the overall development of cognitive ability of children with autism. Similarly, this study suggests multidisciplinary special education and training for educators of children with autism. This will be a good backup for parents who lack some vital knowledge about the nature and benefits of some aspects of education, language and communications as regards ASD.

The implication of this study for further research is that a longitudinal study, which compares home-based and school-based measures of joint attention, and bi/multilingualism, may be



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required with emphasis on the extent of language alongside cognitive development of children with autism over years, especially from their early infancy to their school-age period. In addition, a study may be required to unravel the nature of special education or training received by educators of children with autism and other developmental disorders.



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## Appendix 1

Participants	Age in Year	Gender	Level of Education	No of Languages with Proficiency	Home Languages for General Social Communication	Home Language(s) for the child with ASD
DUR-PRT1	25	Female	Diploma	2	IsiZulu and IsiXhosa	IsiZulu
DUR-PRT2	28	Female	BSc	2	IsiZulu and English	IsiZulu
DUR-PRT3	34	Female	B.A	3	IsiZulu, Tsonga and English	IsiZulu
DUR-PRT4	43	*Male	M.A	2	IsiZulu and English	IsiZulu
DUR-PRT5	38	Female	M.A	3	IsiZulu, IsiXhosa and English	IsiZulu and English
DUR-PRT6	32	Female	B.Ed	2	IsiZulu and English	IsiZulu
EPAN-PRT1	26	Female	MATRIC	3	IsiZulu, Sepedi and English	IsiZulu
EPAN-PRT2	48	*Male	B.Ed	3	IsiZulu, IsiXhosa and English	IsiZulu and IsiXhosa
EPAN-PRT3	36	Female	M.Sc	2	IsiZulu and Isipede	Isipede
EPAN-PRT4	33	Female	M.Sc	2	IsiZulu and Xhosa	IsiZulu

Table 1. The biodata of the parents of children with autism (Key: DUR=Durban; EPAN=Epageni; PRT= Parent). \*--indicates absence of mothers for the interviews



## Appendix 2

Participants	Age in Year	Gender	Level of Education	No of Languages Spoken with Proficiency	Language(s) for Teaching and for General Communication at School
DUR-EDU1	30	Female	PGCE	(2) IsiZulu and English	IsiZulu
DUR-EDU2	29	Female	BSc	(2) IsiZulu and English	IsiZulu and English
DUR-EDU3	31	Female	B.A	3 ( IsiZulu, Tsonga and English)	IsiZulu
DUR-EDU4	45	Male	M.A	3 (IsiZulu, Afrikaans, and English)	IsiZulu
DUR-EDU5	24	Female	B.Ed	3 (IsiZulu, IsiXhosa and English)	IsiZulu
DUR-EDU6	32	Female	B.Ed	2 (IsiZulu and English)	IsiZulu
DUR-EDU7	26	Female	PGCE	2 (IsiZulu and English)	IsiZulu
EPAN-EDU1	48	Female	B.Ed	3 (IsiZulu, Venda and English)	IsiZulu, Venda
EPAN-EDU2	30	Female	B.Ed	2 (IsiZulu and English)	IsiZulu
EPAN-EDU3	36	Male	PGCE	3 (IsiZulu, Sepedi, and English)	IsiZulu, and English

Table 2. The biodata of the educators of children with autism (Key: DUR=Durban EPAN=Empangeni; EDU= Educator).