How do our brains and the environment interact?

How do our brains and the environment interact to create language.

Language learning is a puzzle which is uniquely mastered by humans only. It prompted the classic nature and nurture debate, where the nativist, innate approach was supported by Chomsky (1959) and the learning, operant conditioning model was developed by Skinner (1957). Fodor (1966) emphasizes that language learning is determined by the interaction of nature and nurture and by integrating the development within the environment. Pribram (1978) also notes that language learning is the product of the brain cooperating and responding to environmental stimuli. This case is supported when the dominant hemisphere undergoes an impairment during childhood, other parts of the hemisphere take over to support the language function. This essay argues how certain environmental factors correlate with the brain regarding language acquisition. It starts by highlighting the pre-natal impacts and its affect on later development. Next, examples stemming from the social environment is going to be discussed regarding language acquisition within the sensitive period of children's lives, such as: home as scaffolding support system, interaction style and infant directed talk, amount of input and story telling, social interaction and the social brain. Finally, the absence of nurturing environment and its affects on language learning is going to be presented through the cases of feral children.

Language acquisition starts before a child is born (DeCasper & Spence, 1986) and results suggest that the human brain is attuning to language environment still in uterus (May, Byers-Heinlein, Gervain, & Werker, 2011). The auditory system around week 24 and 28 is operational and studies

report the significance of talking, singing to babies while they are unborn (Juscyck, 1997). Similarly support is found by other researches when newborn babies brain responses to language and non-language was measured and stronger feedback yielded for the familiar language (Dehaene – Lambertz, Stanislas & Hertz – Pannier, 2002). A related research by Hepper, Scott and Shahidullah, (1993) also reveals that newborns attend longer to their mother's voice compared to other females.

Bruner (1983) reported his research regards the importance of the home and social environment which placed the language acquisition in a different perspective. He hypothesized the existence of " language acquisition support system" in a way that a healthy psychological home is a scaffolding which promotes the child's development. As the child develops further, this scaffolding is removed piece by piece by the parents, so the child can be more independent cognitively. Burner's study suggests that the children's well-being is considerably supported by language. Children have a great desire to master language, it can not be hindered in a proper social and parental learning environment. Other researches also place emphasis on adult-child interaction, which contributes to the language development. The value of verbal and social support found in children's environments is referred to as a scaffolding by Tomasello, (1999); Del Rio, Galvan and Gracia, (2001). This occurs spontaneously under everyday circumstances.

As an environmental factor, the interaction style of the parents or caregivers also have an affect on children's language and cognitive development (Chapman, 2000). Studies show that infant directed talk is associated with faster language development (Gallaway & Richards, 1994; Hoff-Ginsberg,

1991). Schachner and Hannon (2010) presented in their studies the importance of the infant directed talk. Mothers or caregivers speak to a baby in a special way: slowly, with simple grammar, mostly about concrete things which are visible to the child. As the child develops, so does the infant-directed talk, it becomes more complex so the child can learn more. In their experiment, 5 months old babies were presented with adults who used infant directed talk and adult directed talk. The babies showed a preference for the person who spoke in the infant directed manner.

Amount of input from children's environment also has a crucial relevance. Hart and Risley (1992, 1995) conducted their studies regarding parent and child interaction with families of wide ranging socio-economic statuses. One hour of naturally arising interaction was tape-recorded for 16 months and at the end Stanford-Binet verbal IQ assessment was performed. The results show higher scores for the parents of children who spent more time and used more utterances during their communication. Hoff-Ginsberg (1991, 1992) also described that the broad differences between the amount of input can be accounted for the mother's socio-economic class.

Children learn language patterns by interacting with adults and other children under social communication. Studies support that the language acquisition, vocabulary and syntactic development is faster when the children are frequently exposed to stories (Phillips, 2000; Roney, 1989; Speaker, Taylor, & Kamen, 2004). When children listen to the storyteller it demands an active thinking process of them and it is also considered as a form of social experience (Britsch, 1992).

Goldfield and Reznick (1990) investigated children’s language acquisition and vocabulary development and their environment. The growth of vocabulary starts slowly, around the first year of their life children speak barely a couple of words, asthey reach 18 months, they possess approximately 10 words in their vocabulary, but after they undergo a huge development, they are capable of learning a new word almost every day. These words are mostly nouns, objects which can be found in their direct surroundings, environment. These results suggest that a nourishing environment has a larger language creating effect, in contrast to a deprived, depressing home setting.

The collaboration with social interactions and the social brain might be essential to explain how language is created by our brain (Kuhl, 2010). Kuhl, Tsao and Liu, (2003) investigated nine months old American infants when they were exposed to native Mandarin speaking tutors while they were playing and being told stories. The control group consisted of infants with native English tutors who could not be seen, only heard. Their results showed that Mandarin phonetic contrast which can not be found in English, yielded higher results of learning from the real person. A similar outcome was detected when infants who were tested on their learning of speaking with no human presence, but only through stimulation of television and videotape. The importance of other humans in the environment is crucial for creating language with the use of television and videotape showed no learning (Kuhl et al. 2003). Kuhl (2007) also developed the Social Gating Hypothesis regarding the influence of social interaction considering language learning. Gating occurs as the by-product of social interaction created by various

learning situations. It operates by the increase in attention, stimulation and information deriving from the environment, perceiving of a relationship and finally: stimulation of brain systems relating to perception and action.

Finally I wish to explore the interaction of environment and brain when the nurturing environment lacks completely through cases of feral children and can be regarded as crucial evidence. Itard (1801) found Victor when he was twelve years old and despite five years teaching he did not succeed in talking, although he was able to understand many words. Kamala, found when she was 8 years old in a wolf's litter in India, barely learnt to speak couple of words. The next extreme deprivation is demonstrated by the case of Genie (Curtiss, 1977). Genie was locked in her bare room and deprived of any human contact in her first 13 years of life. After she was found, professionals intensively tried to teach her how to speak, but she lagged behind significantly and could not be taught. These observations show that emotional trauma, isolation, lack of social environment, passing the sensitive period of language acquisition lead to the inability to learn how to speak (Clark, 2009). Children acquire their first language within a critical period of time, usually up to 5 years of age, although the exact critical time period is subject to debate (Johnson & Newport, 1989; Krashen, 1973).

Language acquisition is one of the mysteries of psychology and as yet no model, process has been discovered which can fully account for language acquisition. We can conclude that the broad ranging effects of the social environment is one of the main triggers for language acquisition rather than an explicit tutor. Children learn how to speak a language effortlessly in any part of the world if they are mentally healthy and they do not undergo

deprivation. The interactions originating from the environment are necessary for the brain to create language. Key arguments within this essay confirmed that nurturing home environments, attention of the mothers or caregivers and by being an empathic language partner, the infants language acquisition can be promoted. Social gating provides a possible explanation as to why social factors play key roles (Kuhl, 2007). Children are born with the desire to communicate, it can be hindered only by extremely poor parenting. Lack of communication during the critical period might result in the decay of brain synapses and therefore children are not able to learn to speak (Wasserman, 2007). Feral children are mostly unable to acquire language as they pass the critical period of time and opportunity to learn. It is highly possible that the language learning process is the result of the combination of a born force and linguistic input from the environment (Clark & Karmiloff-Smith, 1993).

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