Chomsky and piaget: assimilation and accommodation essay

This account compares the Piagetian and Chomskian views on language acquisition and attempts to present a framework in which each has a place. The majority of the evidence suggests that the domain specific processes are predominant in language acquisition, supporting Chomsky’s (1983) claim that the abstract structure of language is innately specified in humans. However, as the innate specification can not explain the acquisition of language in its entirety, there is still support for cognitive involvement as prescribed by Piaget.

This is the mapping of innate predispostions to the input of the child’s native tongue through a complex process of semantic and syntactic bootstrapping. A substantial amount of evidence now supports a Chomskian view of language development with a number of studies providing support for the involvement of innate mechanisms in language acquisition (Gardner, Kornhaber, & Wake, 1996). The following account compares the Piagetian and Chomskian views on language acquisition and attempts to present a framework in which each has a place. The report presents the proposal that early ‘ sensorimotor’ cognitive development, as described by Piaget (1983) is not necessarily a precursor to the development of language, but a co-occurrence. This proposal is supported by considering the underlying neurological subsystems that are common to both sensori-motor and language functions. Finally a Piagetian influence is discovered with the involvement of cognitive processes in the mapping of innate predispostions to the input of the child’s native tongue (Karmiloff-Smith, 1992; Mandler, 1993).

In this context language can be considered to be that faculty that permits communication by voice in a distinctively human manner using structured syntactic arrangements of grammar (Delbridge ; Bernard, 1995). This unique human talent has attracted widespread interest, resulting in a comprehensive debate regarding the acquisition and origins of language (Piatelli-Palmarini, 1980; Rieber ; Voyat, 1983). The two opposing sides have debated whether language acquisition is a domain-general process or a domain-specific process (Karmiloff-Smith, 1992). Leading the domain specific camp is a nativist view. Authors who take this approach argue that the “..

. possession of human language is associated with a specific type of mental organization… ” (Chomsky, 1972, p. 70).

This idea of ‘ mental organization’ emphasises a language (or domain) specificity that is related to Fodor’s (1983) notions of modularity, in which the brain is structured as modular processing units, each dedicated to a specific function. These processing modules contain innately specified linguistic structures called ‘ universal grammars’ that constrain the child’s processing of linguistic input (Bloom, 1990; Chomsky, 1983; Pinker, 1989). Piaget (1955), following a domain-general view, looked at development in terms of a change in the level of intelligence. Intelligence in this case, refers to the acquisition of more complex domain-general structures and processes that lead to an improvement in cognitive abilities (Slobin, 1973). The term intelligence is also used in a phylogenic sense to explain language acquisition (e. g.

, Bickerton, 1995). Chomsky (1972) strongly opposed both these views, “ As far as we know, possession of human language is...

not simply a higher degree of intelligence” (in the phylogenic sense, p. 0), but this report will focus on intelligence in terms of a developmental approach as supported by Piaget (1955, 1983). Piagetian views traditionally do not accept the existence of any innate knowledge that may contribute to the development of language (Karmiloff-Smith, 1992). Piaget (1983) argues that the acquisition of language is a product of the development of intelligence during the sensorimotor period (0-24 months of age) and the associated capacity for symbolic (or semiotic) representation. This occurs in the form of the semiotic function which includes symbolic play, deferred imitation and mental imagery.

The onset of language is associated with the development of symbolic representation which is dependent upon the progressive coordination and internalization of sensorimotor action schemes. If Piaget was correct in his assumptions of cognitive prerequisites for language development, it would be expected that linguistic retardation would accompany severe cognitive deficits (Karmiloff-Smith, 1992). However, competent linguistic abilities have been shown to coexist with severe cognitive impairments such as that occurring in cases of hydrocephaly and spina bifida (e. g. , Cromer, 1994; Udwin, Yule, ; Martin, 1987).

Other research indicates that deaf children can develop sign language skills when they are only partially through the sensorimotor period (Orlansky ; Bonvillian, 1985). These findings indicate that sensorimotor development is

not necessarily a precursor for language development. While language and other cognitive skills are thought to be a product of separate and skill specific brain nuclei or modules (Chomsky, 1983; Fodor, 1983), recent evidence suggests that common brain areas (such as the cerebellum) are utilized in a variety of cognitive skills (e. g. , Leiner, Leiner, ; Dow, 1991).

Kimura (1993) argues that through the course of evolution language has become intrinsically bound to various motor program systems. She also suggests that a large portion of the brain's motor function in the form of spatial and temporal sequencing properties are innate in origin. This proposal is supported by a vast array of evolutionary (e. g. , Hewes, 1992) and neurological evidence (e.

g. , Gazzaniga, 1992). For example, patients with localized brain damage have been found to have co-occurring linguistic and motor coordination deficits, suggesting the damaged area is required for both motor and linguistic functions (Kimura, 1993). Other evidence suggests that the human cerebellum contributes to motor function and also sensory, cognitive, linguistic, and emotional aspects of behavior. For example, advances in functional imaging techniques have shown that in the absence of any motor activity, the cerebellum is active when humans engage in certain cognitive and linguistic tasks (Leiner et al. , 1991, 1993ab).

The involvement of these common brain systems in different cognitive skills may explain why links have been drawn between sensorimotor behaviour and language acquisition (e. g. Piaget, 1983), since both would require the utilization of the spatial and temporal sequencing capacity of the motor

system. Their innate origin also challenges Piaget’s theory of sensorimotor development, thought to be a product of active construction on the child’s part. Mehler (1980) points out that very young children appear capable of performing very complex and unexpected sensorimotor coordinations that suggest innate dispositions. These findings also challenge Chomsky’s assumption that language behavior is organized quite separately from non-language behaviors in the brain.

However, it is still generally accepted that at some level there are skill specific brain nuclei that develop largely independently of one another (e. g. , Gazzaniga, 1992). Chomsky (1983) also does not describe in detail how children learn to apply meaning to their grammar, and though he does mention that the environment has the effect of shaping, he does not elaborate on this process. However, the Piagetian style of cognitive psychology has been useful in explaining this process.

This next discussion provides one answer to how children may work out the mapping between concepts and the lexicon of their native tongue. While phonological development has been considered as innately programmed (Chomsky, 1983), the process of mapping words onto an external reality, and the acquisition of verbal reference depends on cognitive development (Kinsbourne, 1983). The most widely accepted answer of how children acquire conceptual meaning in language is based on Piaget’s (1955) theory of sensorimotor intelligence (Mandler, 1992). This theory considers that in the first year and half of life an infant develops perceptual (sensorimotor) categories of objects. Initially these categories are not conceptual in nature

but by two years of age a transformation occurs where conceptual representations begin to develop.

However, Piaget’s theory lacks detail in its description of how sensorimotor schemas are transformed into concepts. There are also empirical difficulties, with findings suggesting a much greater understanding of the nature of objects beyond what sensorimotor intelligence would predict (see Baillargeon, 1993; Spelke, 1985). Furthermore the acquisition of sign language provides evidence for the beginning of symbolic functioning as early as 6 to 7 months of age (e. .

, Orlansky ; Bonvillian, 1985). Thus, the evidence suggests that conceptual thought is present during the time when Piaget posited it to be absent. Piaget also thought that the roots of infants’ conceptualizations of the world lie in their physical interaction with objects. However, much conceptualization of objects and events during infancy appears to come from observation rather than interaction (Mandler, 1993). Mandler (1993) argues that perceptual analysis rather than interaction is the mechanism by which concepts are first formed.

Infants engage in a process of perceptual analysis which extends beyond their rapid and automatic computation of the perceptual input. This analysis results in the formation of what Mandler calls perceptual primitives that are assimilated or redescribed into an accessible image-schematic format. The image schemas are nonpropositional, analog representations that form intermediary relations between perception and language. The image schemas are thought to facilitate the mapping between language and

conceptual categories, thus, contributing to semantic development in language.

This notion of the formation of image schemas is similar to Piaget's description of cognitive development proceeding through a process of accommodation and assimilation. However, it differs in that the formation of image schemas is thought to require innately specified mechanisms of analysis, though the content, as Piaget would agree is not necessarily innately specified (Mandler, 1993). This notion of the redescription of language into image schemas suggests a stronger relationship between language and cognition for semantics, than in the case of syntax (Karmiloff-Smith, 1992). Piagetians would not entertain the idea that infants are sensitive to purely syntactic constraints on linguistic input. They would argue that such sensitivity would be dependent on improvements in general intelligence.

However, one study illustrated that 17 month old infants used syntactic information to distinguish between a noun referring to a class of objects and one functioning as a proper name (Katz, Baker, ; Macnamara, 1974). Furthermore Bloom (1990) shows that children order abstract linguistic categories but not conceptual categories, and never make syntactic violations such as " Big he, little she". Numerous other findings also describe how learners acquire syntactic knowledge for which there is little, if any, decisive evidence for environmental determinants. Certain linguistic properties are thought to be innate because they appear universally and in the absence of corresponding experience (see Crain, 1991, for an overview). This supports Chomsky's notion of a language faculty that is characterized

by central properties of “ universal grammar”, a characteristic which he regards as an “ intrinsic”, genetically determined factor, and as analogous to the basic properties of the human visual system (Chomsky, 1983, p. 36).

This report began by exploring domain specific and domain general processes. The majority of the evidence suggests that the domain specific processes are predominant in language acquisition. Thus, much of the recent work on language acquisition appears to support Chomsky’s claim that the abstract structure of language is innately specified in humans, with many of the facets of syntax and discourse cohesion remaining unavailable to metalinguistic report, even in adults. However, as the innate specification can not explain the acquisition of language in its entirety, there is still support for cognitive involvement as prescribed by Piaget. This is the mapping of innate predispostions to the input of the child’s native tongue through a complex process of semantic and syntactic bootstrapping (Karmiloff-Smith, 1992; Landau & Gleitman, 1985; Naigles, 1990).

Furthermore, to understand how linguistic representations become flexible we must consider a process of representational redescription involving the mapping of abstract linguistic structure with semantic concepts (Mandler, 1993) in a process that can be considered to be similar to Piaget’s notion of cognitive development through assimilation and accommodation.