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Nonfluent aphasia and the evolution of proto-language☆

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ABSTRACT

This paper briefly explores the relevance of patterns of related symptoms of nonfluent aphasia arising from left inferior frontal brain damage for the evolution of speech, language and gesture. I discuss aphasic lexical speech automatisms (LSAs) and their resolution with recovery into agrammatism with apraxia of speech and draw parallels between this recovery and the early evolution of language to protospeech and protosyntax. I focus attention on the most common forms of LSAs, expletives and the pronoun + modal/aux subtype, and propose that further research into these phenomena can contribute to the debate on the evolution of speech and language.

1. Introduction

This paper examines some aspects of aphasic symptomatology from the perspective that they may represent fossilised clues to the emergence of human language extending arguments developed earlier (Code, 2005b). The aim is to briefly explore some evolutionary implications of a limited range of common and closely related nonfluent impairments of language and speech-action production arising from left inferior frontal lesions, and outline relevant interactions between them. I examine aphasic lexical speech automatisms (LSAs), commonly occurring in aphasia from frontal lesions and often evolving into agrammatism, and explore some evolutionary implications of this relationship.

☆ Susan Edwards has been at the forefront of work on impairments of syntactic processing in aphasia, and a friend and colleague for many years, and this paper is dedicated to her in honour of her substantial contribution.

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First I outline some contemporary theoretical approaches to the evolution of human communication that form some basic theoretical foundations. There is a major assumption that normal development of language and communication in humans and other primates can serve as models to generate hypotheses and develop theory and that the development of language in infancy mirrors the evolution of language over time (the 'ontogeny recapitulates phylogeny' assumption). Our standard model of the brain is founded on an evolutionary-phylogenic and developmental-ontogenic perspective. Hughlings Jackson (1884) based his model of the brain on Darwin, and particularly Herbert Spencer's ideas on evolution. Jackson developed the idea that the mammalian brain evolved from the ancient, primitive automatically organised subcortical regions (limbic-basal ganglion) to higher and more non-automatically organised cortical regions. Processes are embodied in what Jackson called 'levels of representation' from lower down to higher up. Primitive behaviours from lower levels are inhibited by higher levels (e.g., frontal-executive). In brain damage primitive behaviours (automatisms being Jackson's classic example) can emerge from primitive regions with damage to inhibitory processes. That a failure of inhibition can contribute to aphasic speech automatism production has been recently confirmed (Code, Tree, & Dawe, 2009). My assumption is that patterns of recovery and dissolution of impairments of speech, language and gesture following brain damage can provide additional insights and questions, and can converge with evidence from other approaches.

A current issue is whether speech and language evolved primarily from pre-existing communicative vocal sounds or from gesture. Whatever is the case, much recent research has emphasised that language and speech share cognitive and neural spaces with action/gesture and perception representations (e.g., Martin, Ungerleider, & Haxby, 2000, for review), and an evolutionary relationship. This discussion can be followed elsewhere (Arbib, 2005; Corballis, 2002).

Many evolutionary linguists and anthropologists believe that modern human language may have been preceded in its emergence by some form of protolanguage and/or protospeech, which is seen as a stage preceding the development of recursive syntax (Bickerton, 1990). Bickerton (1990) argues that pidgin languages, infant language, and the language taught to apes in captivity are all protolanguages made up of utterances comprising two or three words without syntactic structure beyond word order.

2. Frontal impairments of speech, language and action

Work in human neuroscience (Arbib, 2005; Corballis, 2002; Martin et al., 2000), cognitive psychology (Glenberg & Kaschak, 2002, 2003) and comparative animal research (e.g., Tomasello & Call, 1997) stresses the close relationships between speech, language and gesture/action. Embodiment studies have emphasised that language and other aspects of cognition are grounded in action and perception in the brain (Feldman & Narayanan, 2004; Glenberg & Kaschak, 2002, 2003; Martin et al., 2000) and the emergence of articulate speech, voice, action/gesture and lateralisation are seen to be closely linked in evolution (Arbib, 2005; Corballis, 2003; Greenfield, 1991; Kimura, 1976).

Surprisingly, given the phylogenesis of the nervous system, there have been but a few attempts to draw parallels with the evolution of language and its dissolution with brain damage (see Geschwind, 1964; Walker, 1987). Recently, MacNeilage (1998) proposed the Frame/Content theory to explain the evolution of speech from the close–open cycle of the mandible that originally evolved for mammalian ingestive functions of chewing, sucking and licking. This basic mandibular cycle is the basis for the speech frame, and was exapted and paired eventually with vocalization to become the basis for CV syllables. Drawing parallels from developmental and pathological data, MacNeilage and Davis (2005) have confirmed the convergence between the development of the CV syllabic characteristics of babbling in children and the nonlexical speech automatisms (NLSAs) made up of recurring CV syllables (e.g.,/tu tu/, /du du/) that are also commonly observed in severe nonfluent aphasia (Code, 1982a).

In what follows I explore the notion that the evolution of *lexical* speech automatisms (LSAs) to agrammatism, a pattern commonly observed in severe nonfluent aphasia, might also provide useful insights into the early evolution of language.