

Review

# From manual gesture to speech: A gradual transition

Maurizio Gentilucci<sup>a</sup>, Michael C. Corballis<sup>b,\*</sup>

<sup>a</sup>*Department of Neuroscience, University of Parma, Parma I-43100, Italy*

<sup>b</sup>*Department of Psychology, University of Auckland, Private Bag 92019, Auckland, New Zealand*

Received 6 October 2005; received in revised form 15 February 2006; accepted 16 February 2006

## Abstract

There are a number of reasons to suppose that language evolved from manual gestures. We review evidence that the transition from primarily manual to primarily vocal language was a gradual process, and is best understood if it is supposed that speech itself a gestural system rather than an acoustic system, an idea captured by the motor theory of speech perception and articulatory phonology. Studies of primate premotor cortex, and, in particular, of the so-called “mirror system” suggest a double hand/mouth command system that may have evolved initially in the context of ingestion, and later formed a platform for combined manual and vocal communication. In humans, speech is typically accompanied by manual gesture, speech production itself is influenced by executing or observing hand movements, and manual actions also play an important role in the development of speech, from the babbling stage onwards. The final stage at which speech became relatively autonomous may have occurred late in hominid evolution, perhaps with a mutation of the FOXP2 gene around 100,000 years ago.

© 2006 Elsevier Ltd. All rights reserved.

*Keywords:* Speech; Gesture; Mirror system; FOXP2 gene; Evolution

## Contents

1. Introduction . . . . .	949
2. The gestural-origins theory . . . . .	950
2.1. The argument from signed language . . . . .	950
2.2. Primate origins . . . . .	951
2.3. The mirror system . . . . .	951
2.4. A gradual switch? . . . . .	953
3. Connections between hand and mouth: empirical evidence . . . . .	954
4. Evolutionary speculations . . . . .	956
4.1. When did the changes occur? . . . . .	956
4.2. The “human revolution” . . . . .	957
5. Conclusion . . . . .	958
Acknowledgments . . . . .	958
References . . . . .	958

## 1. Introduction

Language is composed of symbols, which bear little or no physical relation to the objects, actions, or properties they represent. This poses problems in the understanding

\*Corresponding author. Tel.: +649 373 7599; fax: +649 373 7450.  
E-mail address: [m.corballis@Auckland.ac.nz](mailto:m.corballis@Auckland.ac.nz) (M.C. Corballis).

of how language evolved, since it not obvious how abstract symbols could become associated with aspects of the real world. One theory proposed by Paget (1930), called “schematopoeia,” holds that spoken words arose initially from parallels between sound and meaning. For example, in many languages vowels are opened in words coding something large, but are closed in words coding something small (*gr/a/nde* vs. *p/i/ccolo*; note too that “a” is differently pronounced in the words *large* and *small*). Nevertheless most of the things we talk about cannot be represented iconically through sound, and with very few exceptions (*zanzara*, *buzz*, *hum*) the actual sounds of most words convey nothing of what they mean. This raises the paradox that was well expressed by Rousseau (1775/1964), who remarked that “Words would seem to have been necessary to establish the use of words” (pp. 148–149).

In this article we argue that the problem is to some extent alleviated if it is supposed that language evolved from manual gestures rather than from vocalizations, since manual actions can provide more obvious iconic links with objects and actions in the physical world. Early proponents of this view were the 18th-century philosophers de Condillac (1711/1756) and Vico (1723/1744) but it has been put forward, with variations, many times since (e.g., Arbib, 2005; Armstrong, 1999; Armstrong et al., 1995; Corballis, 1992, 2002; Donald, 1991; Givón, 1995; Hewes, 1973; Rizzolatti and Arbib, 1998; Ruben, 2005).

The remainder of this article is in three parts. First, we outline the arguments for the gestural-origins theory. Second, we present recent data demonstrating close links between movements of the hand and mouth, adding support to the theory. Third, we speculate as to the possible sequence of events in our evolutionary history that may have led to the replacement of a visuo-manual system by an auditory–vocal one.

## 2. The gestural-origins theory

### 2.1. The argument from signed language

Part of the argument is based on the fact that the signed languages of the deaf are entirely manual and facial, but display most, at least, of the essential linguistic properties of spoken language (Emmorey, 2002; Neidle et al., 2000; Stokoe, 1960). It is well recognized that signs are fundamentally different from gestures of the sort that occur in everyday life, independently of any linguistic function, and which are iconic or indexical rather than symbolic. Despite the symbolic nature of signs, though, there is also an analog, iconic component to signed languages, suggesting a link to a more iconic form of communication. In the course of evolution, then, pantomimes of actions might have incorporated gestures that are analog representations of objects or actions (Donald, 1991), but through time these gestures may have lost the analog features and become abstract. The shift over time from iconic gestures to arbitrary symbols is termed

*conventionalisation*. It appears to be common to both human and animal communication systems, and is probably driven by increased economy of reference (Burling, 1999).

Nevertheless some have argued that the properties of sign languages are fundamentally different from those of speech, suggesting that the two may have evolved independently. For example, it has been claimed that signed language does not exhibit *duality of patterning* (e.g., Armstrong et al., 1995), which Hockett (1960) proposed as one of the distinguishing features of language. In speech, duality refers to the distinction between *phonology*, in which elements of meaningless sound are combined to form meaningful units called morphemes, and *syntax*, in which morphemes are combined to form higher-order linguistic entities. For signed language, Stokoe (1991) proposed a theory of semantic phonology, in which the components of signs are themselves meaningful, thus precluding duality in the strict sense. More recent sign-language models, though, suggest that the sublexical units of signs are not meaningful, and use the term “phonology” to apply equally to sign languages as to speech (e.g., Brentari, 1998; Liddell and Johnson, 1989; Sandler, 1989; Van der Hulst, 1993).

The four basic phonological categories of American Sign Language (ASL), known as *parameters*, in ASL are handshape, location, movement, and orientation of the hands (Emmorey, 2002), and the same elements have been identified in Italian Sign Language (LIS, Volterra, 2004/1987). As evidence that these are independent of meaning, it has been shown that deaf signers show a “tip-of-the-fingers” (TOF) effect comparable to the “tip-of-the-tongue” (TOT) effect shown by speakers. The TOT is induced when speakers cannot retrieve a word they know, but can often correctly produce one or more phonemes (usually the first). Similarly, TOF refers to a state in which the signer cannot produce a sign she/he knows, but correctly produces one or more parameters of the target. Just as TOT depends on a distinction between semantics and phonology in speech, so TOF indicates a similar distinction in signed language, supporting duality of structure (Thompson et al., 2005).

Another difference lies in the nature of the lexical units. Although many signs have lost their iconic form, sign languages retain iconic or analog components that have led some authors to doubt that spoken language could have evolved from gestures (e.g., Talmy, in press). In particular, sign languages have a “classifier” subsystem that is analog and gradient in character, and that has no parallel in spoken languages. This system applies primarily to the representation of spatial attributes like motion and location (Emmorey, 2002). For example, a signer might represent the motion of a car passing a tree by making the sign for a car (thumb raised, index and middle finger extended forward) with the dominant hand, and a tree (forearm upright and five fingers extended) with the nondominant hand, and then moving the dominant hand horizontally across the torso past the nondominant hand.

Download English Version:

<https://daneshyari.com/en/article/938189>

Download Persian Version:

<https://daneshyari.com/article/938189>

[Daneshyari.com](https://daneshyari.com)