ELSEVIER

Co-verbal gestures among speakers with aphasia: Influence of aphasia severity, linguistic and semantic skills, and hemiplegia on gesture employment in oral discourse

Anthony Pak-Hin Kong [a,*], Sam-Po Law [b], Watson Ka-Chun Wat [b], Christy Lai [b]

[a] Department of Communication Sciences and Disorders, University of Central Florida, HPA-2 106, PO Box 162215, Orlando, FL 32816-2215, USA
[b] Division of Speech and Hearing Sciences, The University of Hong Kong, Hong Kong SAR, Hong Kong

ABSTRACT

The use of co-verbal gestures is common in human communication and has been reported to assist word retrieval and to facilitate verbal interactions. This study systematically investigated the impact of aphasia severity, integrity of semantic processing, and hemiplegia on the use of co-verbal gestures, with reference to gesture forms and functions, by 131 normal speakers, 48 individuals with aphasia and their controls. All participants were native Cantonese speakers. It was found that the severity of aphasia and verbal-semantic impairment was associated with significantly more co-verbal gestures. However, there was no relationship between right-sided hemiplegia and gesture employment. Moreover, significantly more gestures were employed by the speakers with aphasia, but about 10% of them did not gesture. Among those who used gestures, content-carrying gestures, including iconic, metaphoric, deictic gestures, and emblems, served the function of enhancing language content and providing information additional to the language content. As for the non-content carrying gestures, beats were used primarily for reinforcing speech prosody or guiding speech flow, while non-identifiable gestures were associated with assisting lexical retrieval or with no specific functions. The above findings would enhance our understanding of the use of various forms of co-verbal gestures in aphasic discourse production and their functions. Speech-language pathologists may also refer to the current annotation system and the results to guide clinical evaluation and remediation of gestures in aphasia.

Learning outcomes: None.

© 2015 Elsevier Inc. All rights reserved.

1. Introduction

Gestures are used by human as a natural non-verbal means of communication. They generally refer to arm, hand, or bodily movements for expressing ideas, intentions, or personal and emotional feelings (Knapp & Hall, 1997) and can be culturally specific (Kendon, 1997; McNeill, 1992). McNeill (1992) provided a more precise definition for gesture, which is the arm and hand movements that synchronize with speech. Co-verbal gestures are commonly found in everyday verbal

---

interactions and serve the purpose of supplementing language content, regulating speech flow, maintaining the attention between a speaker and listener during a conversation, shifting a conversational topic, facilitating the continuation of a topic, and emphasizing a particular topic or content (Kendon, 2004; Mather, 2005).

1.1. Connection between gestures and language production

It has been reported in the literature that gesture and language production were highly related and could be originated from a single process (Krauss, Chen, & Gottesman, 2000). In particular, when a lexical item is activated at the stage of conceptualization, its corresponding gesture can be originated at the same time and interacts and temporally synchronizes with the language output. In other words, gesture use among typical speakers can facilitate lexical retrieval during spontaneous speech production, at least at the conceptual level where mental lexicons are activated (Hadar, & Butterworth, 1997; Krauss & Hadar, 1999). With the use of functional imaging data, Xu, Gannon, Emmorey, Jason, and Braun (2009) suggested these two forms of human communication were processed by the same neural system in the human brain. This view of close connection between gesture and language output is consistent with and further supported by an earlier report of a higher proportion of gestures associated with retrieving lexical items of lower familiarity (Morrel-Samuels & Krauss, 1992). Rauscher, Krauss, and Chen (1996) also emphasized the positive effects of gesture specific to lexical access in normal speakers. When participants were restricted from using arm and hand movements, an increase in non-juncture filled pauses and a decrease in speech fluency of verbal expression involving spatial content were found. Moreover, studies examining the relationship between gesture use and language competency among normal speakers have revealed that individuals with a lower overall lexical diversity at the discourse level had a tendency to produce more co-verbal gestures (Crowder, 1996).

Studies have been conducted that aimed to prove the above-mentioned Lexical Retrieval Hypothesis but failed to do so (see, for example, Beattie & Coughlan, 1999). Some researchers opted for the notion that gestures are employed for packaging information conceptually before it is coded into a linguistic form for oral output. This was supported by findings that contradicted the Lexical Retrieval Hypothesis. For example, Kita (2000) described the Information Packaging Hypothesis and emphasized the assumption that speakers were active in employing gestures (and, therefore, intended to use gestures) during language production. Instead of a simple concurrent activation of gestural and linguistic information (as well as maintenance of the activated spatial information), co-verbal gestures were produced to structure and package linguistic information into units in the language formulation process. This view was further supported by Kita and Özyürek (2003) and Özyürek, Kita, Allen, Furman, and Brown (2005) who reported that the complexity of gestures employed in a task of orally describing an object's motion paralleled speakers' use of single or multiple clauses. Speakers who produced a single clause to describe the manner and path of a motion tended to use a single gesture, while those who produced multiple clauses had a tendency to employ separate gestures in the task. Moreover, gestures play a primary role in enhancing communication through providing extra information to the listener (see review by de Ruiter, 2006). According to the conclusion by de Ruiter, gestures served as a communicative device that could provide information to compensate for verbal breakdown in language output.

1.2. Independent annotation of gesture forms and functions

Although a relationship between gesture use and language production is apparent, coding gestures with respect to form and function and quantifying how they may be related to language processes is far from straightforward. Variations among different gesture coding systems have complicated the annotation and interpretation of gesture use as well as their function during production of spontaneous speech (Scharp, Tompkins, & Iverson, 2007). Kong, Law, Kwan, Lai, and Lam (2015) have recently proposed a gesture classification framework to independently annotate co-verbal gestures in terms of their forms and functions. This was motivated by the fact that mixed coding of gesture forms and functions within one quantification system, a characteristic of many existing frameworks (see review by Kong et al., 2015), can be conceptually problematic and may create confusion when it comes to interpreting gesture employment. This is especially the case when a particular gesture form carries more than one function under different communication conditions. In the Kong et al. framework, there are six forms of gestures, including (1) iconic gestures that model the shape of an object or the motion of an action, (2) metaphoric gestures that show pictorial content to communicate an abstract idea, (3) deictic gestures such as familiar pointing gestures that indicate objects in conversational space, (4) emblems with standard properties, language-like features, and culturally-specific conventionalized meanings, (5) beats including rhythmic beating of a finger, hand or arm that are used in the format of a simple hand or arm flick or a moving motion of finger(s), hand(s), or arm(s) in an up-and-down or a back-and-forth fashion, and (6) non-identifiable gestures such as uncodable finger, hand, and/or arm movement due to its ambiguous connection or lack of a direct meaning to the language content. While the first four forms are content-carrying, the other two are non-content-carrying.

In the dimension of functions, Kong et al. (2015) classified gestures by their primary function in relation to the language content, including (1) providing additional information to message conveyed, i.e., the content of the gesture gave additional information related to the speech, (2) enhancing the language content—gestures that signal the same meaning as the language content and potentially facilitate a listener to decode language content, (3) providing alternative means of communication—gestures that carry meaning or information not included in the language content, (4) guiding and controlling the speech flow—gestures that reinforce the speech rhythm with the rate of gesture movement synchronized