



# Many hands make light work: The facilitative role of gesture in verbal improvisation



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## ABSTRACT

Verbal improvisation is cognitively demanding, placing great burden on working memory as the speaker is tasked to generate a novel, spontaneous narrative. It is at this point of cognitive overload when individuals pursuing other creative tasks would typically shift the burden and externalise some of their thinking. How do successful verbal improvisers manage without shifting some of their workload into an external space? We argue in this paper that the improviser makes use of what is, quite literally, to hand. Ninety participants were asked to take part in a one-to-one improvisation task and a control task, order counterbalanced, in which they were engaged in a brief conversation to elicit every day speech. Participants' gestures were analysed in both conditions and improvisations rated for quality. As predicted, participants gestured significantly more in the improvisation condition. An analysis of gesture type revealed that improvising elicited greater iconic and deictic gestures, whereas everyday speech was more likely to be accompanied by self-adaptor gestures. Gesture rate was related to the quality of the improvisation, with both the strongest and weakest improvisers producing the most gestures. These gestures revealed the extent to which participants used gestures to facilitate the improvisation task. The strongest improvisers elicited a higher gesture rate for iconic and beat gestures, while weakest improvisers produced more gestures in reference to the abstract, improvisation object. Findings are discussed in relation to the idea that gesture can facilitate performance in verbal improvisation.

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## 1. Introduction

Creativity is most commonly referred to as the ability to generate ideas that are novel, yet useful (Runco & Jaeger, 2012; Sternberg & Lubart, 1999). Ideas that are high in novelty are recognised as demonstrating a greater degree of creativity. While creativity is clearly present in varied art forms, everyday life both demands and demonstrates various expressions of creative thinking and acting. While we are all creative to some extent, individuals who excel in creative pursuits are said to be more imaginative, exercising fluent and flexible ways of thinking (Goncu & Perone, 2005; Guilford, Christensen, Merrifield, & Wilson, 1978). However, the nature of creativity often only allows us to observe the product of the creative process. Since “creative thought is invisible” (Tversky, 2008, p.1), capturing the process of creativity is problematic and as such, evaluating the creative outcome does not necessarily indicate the creative process.

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Improvisation is one of the few, if not the only, form of creativity that is seen as the process *and* the product of creativity (Montuori, 2003; Nooshin, 2003; Sawyer, 2000). Improvisation, the process of creating something new on the spur of the moment, can take many forms. In this paper we focus on verbal improvisation; the spontaneous process of generating strings of words that avoids the use of pre-planned phrases. Verbal improvisation is of interest given the significant challenge that it presents to the speaker. There is little respite for the improviser, as novel information must be generated continuously within short time frames, a process that is best when performed outside of the recipient's conscious awareness and likely to quickly exhaust the mental workspace. It is at this point of cognitive overload when individuals pursuing other creative tasks would typically shift the burden and externalise some of their thinking (Wilson, 2002), making use of sketches. Tversky (2002) suggests that the physical act of sketching allows us to “externalize thought, expand the mind, force abstraction, provide a playground for exploration of new ideas, make ideas visible to self and others” (p. 1). Individuals can then reflect on these sketches in order to improve the creative product. These sketches are schematic in nature (Tversky, 2002) and the creative process allows these schemas to be expanded into novel ideas. Thus, for a range of creative endeavours, sketches not only ease the burden but provide insight into the creative production process. However, improvisation does not afford the uses of sketches, as the product *is* the process. How do successful improvisers manage without shifting some of their workload into an external space?

Verbal improvisation is cognitively burdensome. We know speakers experience cognitive overload when improvising because the quality of their speech suffers. The fluency of speech has long been held as a marker of the processing load experienced by the speaker during speech planning (e.g. Bock & Levelt, 1994; Levelt, 1989; Maclay & Osgood, 1959). A comparison of the fluency of speech produced during an improvisation task and normal conversation revealed a greater production of pauses and filled-pauses when improvising, indicating higher cognitive load (Pawley & Syder, 1983). Disfluency is also heightened when a greater range of speech options are available to the speaker (Schachter, Christenfeld, Ravina, & Bilous, 1991), as is the case in improvisation. Put simply, when there are more words to choose from the frequency of filled pauses (Ums and ers) increases (Schachter, Rauscher, Christenfeld, & Crone, 1994).

Thus the task of producing improvised speech is cognitively demanding, as revealed by a decrease in speech fluency. How do successful verbal improvisers manage without shifting some of their workload into an external space? We argue that the improviser makes use of what is, quite literally, to hand. The hand gestures that accompany speech have been demonstrated to lighten the cognitive load of the speaker. The cognitive load hypothesis, advanced by Susan Goldin-Meadow, argues that gesturing reduces demands on a speaker's cognitive resources, freeing up cognitive capacity to perform other tasks. Goldin-Meadow, Nusbaum, Kelly, & Wagner (2001) asked children and adults to complete a math problem, and then gave them a list of items to remember. Participants were asked to explain their math solutions before being tested on their recall of the items on the list. Half of the time, participant's gesture was restricted when giving their explanations to the math problem. The proportion of correctly remembered items was significantly higher when children and adults were free to gesture than when their gestures were restricted. Not only did restricting gesture have a negative impact on item recall, but in addition those individuals who were free to gesture but chose not to remembered significantly fewer items than participants who spontaneously gestured. The authors concluded that gesturing frees up cognitive resources that can be successfully expended elsewhere. Subsequent work by Ping & Goldin-Meadow (2010) demonstrated that gestures lighten the load on working memory regardless of whether they refer to present or absent objects. Gesture is argued to make absent objects present and it is through this mechanism that gesture reduces cognitive burden. Ping & Goldin-Meadow (2010) suggest that the global nature of gesture (compared to the linear and segmented constraints of speech, McNeill, 1992) brings “mental coherence” (p. 616) to the speaker's thoughts.

Gestures have been demonstrated to perform a range of intrapersonal functions, assisting the speaker at various stages of speech production, from lexical retrieval (Pine, Bird, & Kirk, 2007; Rauscher, Krauss, & Chen, 1996) to information packaging (Alibali, Kita, & Young, 2000; Kita, 2000). Thus gesturing while improvising may facilitate lexical access and the packaging of ideas into units ready for speech. Moreover, gesture may play an active role in the generation of novel ideas. McNeill views the processes of utterance formation and gesture creation as the continuous transformation of thought. Thus for McNeill, there is ‘thinking in speech’ (McNeill, 1992, p.247), and according to this view we would expect that thought is transformed by the act of speaking (and gesturing). An analysis of children's hand gestures in the classroom revealed that children's gestures not only provide a mechanism to externalise the problem that they are working on, but making their ideas visible with their hands altered their course of thinking about the problem (Crowder, 1996). Thus, seeing one's hands move in space can change the way that we think and influence what we say.

In generating an improvised narrative, the speaker will likely be conjuring image-rich mental representations and will need to keep these in mind as they translate these novel ideas into speech. Gesturing may facilitate this process by maintaining mental imagery in working memory during speech production, as suggested by the Image Activation Hypothesis (IAH; De Ruiter, 1998, 2000; Wesp, Hesse, Keutmann, & Wheaton, 2001). Wesp et al. (2001) suggested that the repeated motor activity of hand gestures maintains any spatial features that have been activated as a result of the cognitive task that is being required of them.

Recent research has begun to explore how physical movement may impact upon creative thought processes (Opezzo & Schwartz, 2014; Slepian & Ambady, 2012). In a series of experiments, Slepian & Ambady (2012) examined whether fluid, relative to non-fluid, hand movements would enhance creative generation. Participants were asked to trace one of two sets of drawings, one of which contained fluid, curved lines and the other non-fluid, angular lines. Participants then completed a number of measures of creativity. Participants who made fluid movements scored higher on a creative problem-solving

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