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# Simple Gesture Analysis in Narrative Speech: Expert-novice Differences

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## Introduction

A key observation in gesture research is that gestures accompany narrative speech. One hypothesis posits gesture and speech in a single stream of (motoric) processing (McNeill, 1992). Beat gestures are prevalent and persistent gestures, characterized by their simple, rhythmic movements, and their cooccurrence with narrative speech (Alibali, Heath, & Myers, 2001). However, the relationship between fluency and gesture is not solidified in the literature. Exploring this relationship in a naturalistic setting is novel; an analysis of expert and journeymen speech allows a test of this hypothesis.

Expert and journeymen scientists spoke of their working knowledge (cued condition) and understanding of their data (3D condition). By virtue of group differences, experts are expected to be more fluent. The characterization of speech and beat gesture posits the expert group to have higher rates of beat gestures. The journeymen group, with less practical expertise shall be less fluent and produce fewer beats.

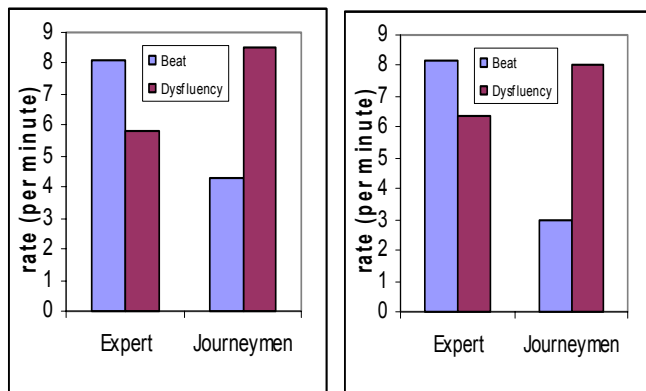


Figure 1: 3D condition on left. Cued condition on right

## Design and Methods

Eight experts (4 meteorologists, 4 neuroscientists) and 12 journeymen (10 meteorologists, 2 neuroscientists) answered questions in an in vivo design. In naturalistic settings, subjects' responses were video recorded, transcribed, and gestures coded with sufficient IRR ( $k = .88$ ,  $p < .0001$ ). Beats were coded using standard protocol established by McNeill (1992). Dysfluency was tallied using a taxonomy in Alibali et al (2001). Rate calculations use a per minute metric.

## Analysis

As Figure 1 shows, a clear pattern emerges. At the narrative level of speech, experts show greater fluency as indicated by lower dysfluency rates. They spoke with fewer repetitions, speech errors, or fresh starts. Strong trends in both conditions reveal beat gestures produced in higher concentration in those subjects with more expertise, indicating a connection between speech fluency and simple gestures in this naturalistic data set.

## Discussion

Beat rate variations in expert and journeymen likely relate to other differences between these two naturally occurring groups. In theoretical agreement with Alibali et al. (2001), these results support her notion of beats functioning as an internal aid for the speaker. These gestures may be understood to carry verbal rhythm for the speaker. Although not conclusive, the presented results posit that the generic characters of the gesture are parsimonious with the notion of keeping the speaker fluid and online with his/her language production. This analysis provides a more complete characterization of beat gestures and how they assist speech. Production of beats may help maintain fluent language.

Naturally occurring expert and journeymen groups provide an ideal opportunity to examine functionality of spontaneous gestures. More research with subjects like this is needed to increase the power of these results. Real world design and in vivo conditions indicate how gestures occur naturally and spontaneously with possible speaker- internal functionality.

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