

## Experiments in Cross-modal Associations: Problems with the current framework, suggested solutions, and possible implications for language origins.

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Cross-modal associations are defined as the reliable association of measurement in one sense to stimuli from another, for example, a bright light being judged as “loud”. Drawing on a variety of work from both linguistics and psychology, the upcoming research will begin by establishing a connection between synaesthesia, common cross-modal associations, phonetic sound symbolism, and metaphor. We will propose a theory as to how these phenomena may have provided the basis for an evolutionary proto-language (e.g., Bickerton, 1990; Wray, 1998), which developed through the grammaticalisation of metaphor (Deutscher, 2005; Hoefler & Smith, 2008), eventually coming to resemble modern human languages.

Ramachandran & Hubbard (2001) suggested a similar story for language origins, based on the phenomenon of synaesthesia. Synaesthetes have a rare condition in which “ordinary activities, (e.g. listening to music or reading) trigger consistent, extraordinary experiences (e.g. colours or tastes)” (Simner, 2006, p. 23). Essentially, synaesthetes experience a response from two modalities when only stimulated in one. Ramachandran & Hubbard (2001) posit that the senses of normals are also connected in regular ways; specifically that “phonemic representations in auditory regions...may have non-arbitrary links to an external object’s visual appearance” (p.20).

In this talk, I will argue that this theory is largely uninformed from a linguistic standpoint; it does not account for the arbitrariness of language and often misrepresents phonetics. Additionally, it is supported only by anecdotal or limited experimental evidence, and is generally only loosely connected to other work in the evolution of language. In order to address these problems, we have set a program for future research that will provide linguistically sound experimental evidence supporting our theory, as well as tie it to current study in language evolution.

In research slated to take place this summer, we will seek concrete evidence using an experimental framework informed both from linguistics and psychology, drawing on and improving previous cross-modal association studies. In particular, we have re-worked the *bouba/kiki* experimental framework, in which participants are asked to match the non-words *bouba* and *kiki* to two dimensional shapes, one rounded and one spiky (Köhler, 1929, 1947; Ramachandran & Hubbard, 2001; Maurer *et al*, 2006). Specifically, we have removed orthographic, lexical, and articulatory confounds inherent in the existing methodology. We expect to find equally robust results with the removal of confounds, providing sound and valid support for our theory.

In addition to this, we aim to run experiments that illuminate common cross-modal associations in a variety of other modalities, providing further support for our theory of the emergence of proto-language. Building on work done by Marks (1974; Marks *et al*, 1987) and Verhagen & Lina (2006), we will aim to relate non-words to a range of touch and taste stimuli. Using valid experimental evidence, and drawing from various current work in the evolution of language, we seek to articulate a coherent, well-supported theory for the emergence of an evolutionary proto-language, and the consequent processes that may have led to modern arbitrary human language.

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