Generating contrastive alternatives: Activation and suppression mechanisms

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The meaning of a contrastively focused sentence consists of two parts: 1) an asserted fact, and 2) a set of contrastive alternatives, often indicated by a pitch accent in spoken language. *The museum thrilled the SCULPTOR* (accent on *sculptor*) conveys that 1) the sculptor was thrilled, and 2) other alternatives like a painter were not thrilled (Rooth, 1985). This study proposes that comprehenders generate the set of contrastive alternatives through two mechanisms which are used in tandem: activation of contrastive and non-contrastive associates, followed by suppression of non-contrastive associates.

Inferring a set of contrastive alternatives is often necessary for carrying on a conversation, since speakers typically do not provide them explicitly. Previous research has established that comprehenders are sensitive to contrastive alternatives (Weber, Braun, & Crocker, 2006; Ito & Speer, 2008), suggesting that they are inferred upon hearing a contrastive pitch accent. However, the mechanisms comprehenders use to arrive at the proper set of contrastive alternatives are not well understood. This study examines one possibility. Because alternatives like *painter* are semantic associates of *sculptor*, they may be automatically activated; however, the same is true for *statue*, which is inappropriate as an alternative. Since only the former are contrastive, a suppression mechanism may be used to inhibit non-contrastive associates. These processes unfold in time: activation occurs first, followed by suppression (Gernsbacher & Faust 1991).

Experiments 1 and 2 used a word/non-word cross-modal priming paradigm with auditory sentences containing a prime (*sculptor*) and three types of visual targets: a contrastive associate (*painter*), a non-contrastive associate (*statue*), and an unrelated word (*register*) (Braun & Tagliapietra, 2010). Latent semantic analysis (LSA) was used to determine the association strength of contrastive, non-contrastive, and unrelated targets to prime words and to match the association strength of contrastive and non-contrastive associates item by item. Target length and frequency were also controlled (Table 1). Sentences were recorded twice: once using neutral prosody and once using focus prosody on the prime (i.e. a contrastive pitch accent on *sculptor*). To examine time course, SOA varied between experiments: Experiment 1 used a 0 msec SOA to examine initial activation of contrastive and non-contrastive associates; Experiment 2 used a 750 msec SOA to examine suppression of non-contrastive associates.

Experiment 1 provides evidence for the initial activation of contrastive and non-contrastive associates. Relative to unrelated targets, both contrastive and non-contrastive associates were facilitated in the focused and neutral conditions at 0 msec SOA. Experiment 2 provides evidence for suppression of non-contrastive associates, while contrastive associates persisted. While contrastive and non-contrastive associates in the neutral condition and contrastive associates in focused condition all continue to be facilitated, non-contrastive associates in the focus condition were no longer facilitated by 750 msec.

Together, these studies suggest a time course for the generation of contrastive alternatives. Potential candidates for an alternative set are initially activated based on mere semantic association, leading contrastive and non-contrastive associates to both become activated. Non-contrastive associates are then inhibited, generating the proper alternative set and creating an appropriate semantic representation.

Table 1: Target Stimulus Properties

	Length	Frequency	LSA
Contrastive	5.89	502.06	0.4325
Non-contrastive	5.58	665.90	0.4347
Unrelated	5.58	547.08	0.0569

Table 2: Priming of Contrastive and Non-contrastive Associates (in msec)

Experiment 1 (SOA: 0 msec)		
	Contrastive	Non-contrastive
Focused	24	22
Neutral	18	7

Experiment 2 (SOA: 750 msec)		
	Contrastive	Non-contrastive
Focused	23	0
Neutral	22	16