HSP 2025 - “What Catches the Eye: Recognition Memory as a Function of Contrastive Accenting and Sentence Position in the Visual World Paradigm”

Bethany B. Clements, Scott H. Fraundorf, Laurel E. Brehm

Pitch accenting has been shown to prompt quicker and more accurate answers to comprehension questions (Almor & Eimas 2008; Sanford et al. 2006) in native speakers of various languages (Braun & Tagliapietra 2010). Items that receive a contrastive (ToBI L+H*) accent, in particular, benefit memory compared to items with a presentational (ToBI H*) pitch-accent (Fraundorf et al. 2010). However, the question remains as to *how* attention, focus, and memory are intertwined: do contrastive-pitch accents strengthen memory for accented items or inhibit memory for non-accented items? The current study examines how recognition memory for words within short narratives is facilitated by visual attention, contrastive-pitch accenting, and word position within the narrative. We do so by adapting Fraundorf et al.’s Experiment 1 to a visual-world eye-tracking paradigm, allowing us to measure visual attention to, and encoding of, in-focus narrative elements by tracking eye fixations (Zormpa et al. 2023; Huettig et al. 2011). Learning more about attention, focus, and memory is integral in understanding how people make sense of words in real life, narratives and conversations.

Eye fixation data from 30 college students (L1 English) was collected in lab using an EyeLink Portable Duo eye-tracker as they listened to 40 American English narratives from Fraundorf et al. (2010) over headphones (see Example 1) and viewed a grid of critical images (see Figure 1). The 20 critical narratives first introduced two contrast sets, each containing a pair of items (i.e. “cat” and “rabbit” in Example 1); then, continuation portions specified one of the two items in each set (i.e. “rabbit” in Example 1). Pitch accents on critical words were manipulated between presentational (H*; italicized in Example 1, i.e. “*ferret*”) and contrastive (L+H*; capitalized and italicized in Example 1, i.e. “*RABBIT*”). Item conditions were counterbalanced across participants, and each participant received trials in a unique random order. Immediately following the listening portion, participants performed a recognition memory test. Four images representing the four items from the contrastive pairs were displayed on the screen alongside the text of the narrative, and participants pressed keys on the keyboard to select the correct item for the first word slot, followed by the second (see Figure 2). Narratives were presented in the same order they had been in the listening portion.

A generalized linear mixed-effects model indicated that contrastive-pitch accenting improves recognition memory; this effect is more pronounced in the *first* word slot of the sentence, as indicated by a significant interaction between word slot and focus ($\beta = -0.71$, $z = -2.46$; See Figure 3). This partially replicates Fraundorf et al. (2010): pitch accenting benefits recognition memory. However, since Fraundorf et al. (2010) did not find a significant difference in recall accuracy for each word slot, these findings suggest that stimulus modality (audio only vs. audio plus visual) impacts language processing– potentially because of the extra time it takes to encode visual stimuli. Participants displayed more visual attention to contrastively-accented items than to presentationally-accented items, especially when they occurred within the first word slot of a narrative versus the second word slot (see Figure 4). Increased visual attention was also linked with improved performance in the recognition memory test as items which were fixated on for more time during encoding were remembered most accurately ($\beta = 0.34$, $z = 3.39$).

Combined, the results of the current study show that linguistic focus benefits memory encoding, but that memory for non-contrastively-accented words in word slot two appears to be inhibited when a contrastive accent is present in word slot one (relative to when no accenting was present). Further exploring processing during the encoding of pitch accents will lead to a more in-depth understanding of how linguistic focus is distributed and made salient over the course of a narrative. In addition, the idea that processing audiovisual stimuli takes longer– and may limit the encoding of words presented later in the sentence– could also be an interesting avenue of further research in educational and conversational settings.

Example 1

[Context] Although Jennifer owned both a [cat and a rabbit]*, the two pets got along great with each other. There wasn't a problem until her cousin visited and brought along her [ferret and bird]**.
[Continuation] (All combinations of answer and accenting appeared across trials)

	Word Slot 1*		**Word Slot 2****	
Jennifer's	*RABBIT*	hated the cousin's	*ferret*	and chaos broke out in the house.
	rabbit		*FERRET*	
	CAT		*bird*	
	cat		*BIRD*	

Presentational H* represented in italics, contrastive L+H* represented in capitalized letters and italics.

Figure 1 - Visuals during encoding

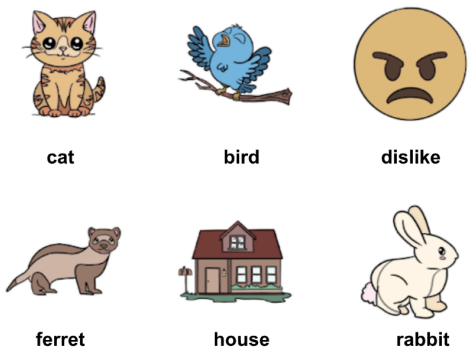


Figure 2 - Schematic of recognition memory test

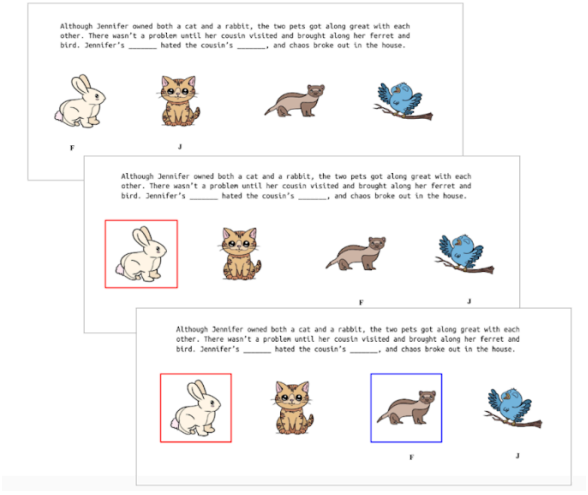


Figure 3 - Memory test results

Average recognition memory accuracy in filler v. L+H*/H* v. H*/L+H* (left to right)

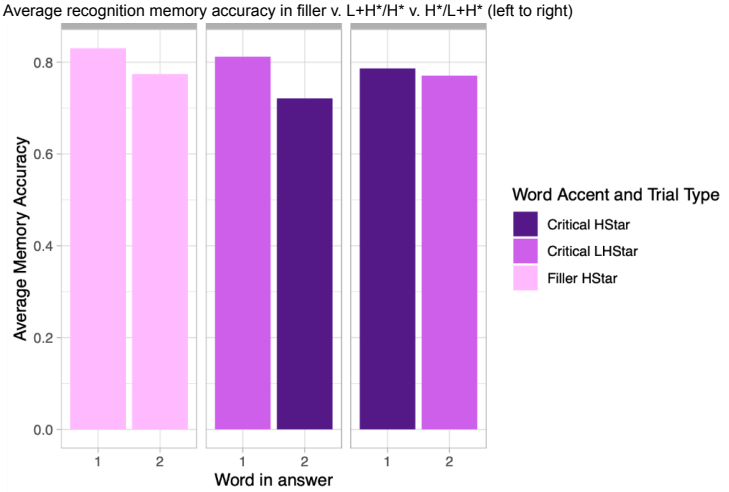
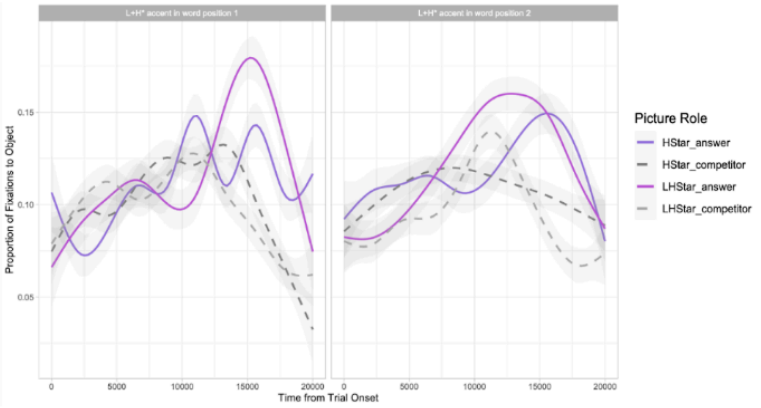


Figure 4 - Visual attention during encoding

Proportion of fixations to an object across one trial
L+H* accent present in word slot one (left) v. two (right)



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