Memory for violated expectations in semantic focus

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Comprehenders prioritize semantically focused material in sentence processing. In reading, they retain the content of, and detect changes to, foci better than non-foci [1,2]. In listening, they allocate attention to focus in advance of its occurrence [3,4]. In English, this is possible because a single-word focus must have a pitch accent, and listeners use the acoustic cues in the preceding syllable to allocate attention to that focus [5,6]. Lexical information may also strongly cue a focus: a focus-sensitive particle (*only*) can occur in a sentence position that obligatorily narrowly focuses the following word (and accents it if spoken), as in (1c). As more attention and memory resources are directed towards single-word foci, comprehenders may more accurately encode signal characteristics. However, as comprehenders may also form strong expectations about these foci, it is possible that incongruent signal details may be lost or repaired. In two recognition memory studies, we tested listeners' sensitivity to an obligatory pitch accent on a single-word focus, when cued by lexical cues alone (E1), or by both acoustic and lexical cues (E2). Violating the strong expectation of a pitch accent could create processing difficulty or result in listeners not successfully representing the violation, instead representing the intonation they expected. We investigated listeners' recognition of mismatching lexical and prosodic cues to determine which dimensions of focused material are most reliably encoded, and how prosodic cueing interacts with structural expectation pressures, like those imparted by focus particles.

Experiments. A native English speaker recorded 48 sentence sets as in (1) for each experiment. In all stimuli, target nouns were spliced in from different original recordings. In E1, as shown in (2a), both a target noun and its preceding syllable (always a determiner) were spliced. In E2, as shown in (2b), only the target noun was spliced, causing a prosodic incongruity when an unaccented noun occurred after an originally pre-accentual determiner [5]. All stimuli crossed pitch accent (Pres, Abs; within subjects) with focus particle (Pres, Abs; between subjects) with the recognition manipulation of whether exposure and test had matched or mismatched. Native English listeners were asked to attend to the content and intonation of an exposure sentence and wordlist. After two distractor math problems, they heard a sentence or wordlist target, with fillers balanced such that non-filler trials always had a sentence target. Participants then made a binary recognition decision followed by a 3-point confidence rating.

Results. Data were analyzed using Unequal Variance Signal Detection Theory [7] using the pROC package in R [8,9]; results are in Table 1 and Fig. 1, 2. Lower sensitivity in both particle conditions of E1 (+Acc $D_{boot} = -2.78$, $p < 0.005$; -Acc $D_{boot} = -1.9$, $p < 0.056$) indicates memory for prosodic structure is decremented by the lexical cue of a focus particle. This is compatible with comprehenders storing a repaired prosodic contour, overwritten during encoding due to the lexically-triggered requirement for a focal pitch accent. But in E2, when a prosodically incongruent cue preceded focused material, the effect of focus particles disappeared (-Acc $D_{boot} = -0.03$, $p = 0.98$), and even reversed in the accented conditions (+Acc $D_{boot} = 2.5$, $p < 0.01$), such that accuracy was highest when both pre-target syllable and focus particle signaled an upcoming accent. This suggests that, while structural cues to focus are generally prioritized over prosodic cues when in conflict, acoustic detail is better retained when both align to create a strong expectation for an upcoming pitch accent.

(1) Original Recordings

a. No Particle, Accent: The teacher gave the STUDENT an extension.
b. No Particle, No Accent: The teacher gave the student an extension.
c. Particle, Accent 1: The teacher gave only the STUDENT an extension.
d. Particle, Accent 2: The teacher gave only the STUDENT an extension.

(2) Stimulus Splicing

a. Experiment 1:

{ **Part** The teacher gave only …
NoPart The teacher gave … }

b. Experiment 2:

{ **Part** The teacher gave only the …
NoPart The teacher gave the … }

		Experiment 1	Experiment 2
Accent Match	*Exposure*	the STUDENT	STUDENT
	Target	the STUDENT	STUDENT
Accent Mismatch	*Exposure*	the STUDENT	STUDENT
	Target	the student	student
No Accent Mismatch	*Exposure*	the student	student
	Target	the STUDENT	STUDENT
No Accent Match	*Exposure*	the student	student
	Target	the student	student

b. { **Part** … an extension.
NoPart … an extension. }

Table 1: pROC results

E	Particle	Accent	d_a	A_z	p
1	+Part	+Acc	1.3	0.83	**0.005
	-Part	+Acc	1.6	0.87	
	+Part	-Acc	0.47	0.63	*0.056
	-Part	-Acc	0.62	0.67	
2	+Part	+Acc	1.99	.92	*0.01
	-Part	+Acc	1.73	.89	
	+Part	-Acc	0.74	0.7	0.98
	-Part	-Acc	0.78	0.71	

Figure 1: Experiment 1 ROC Curve

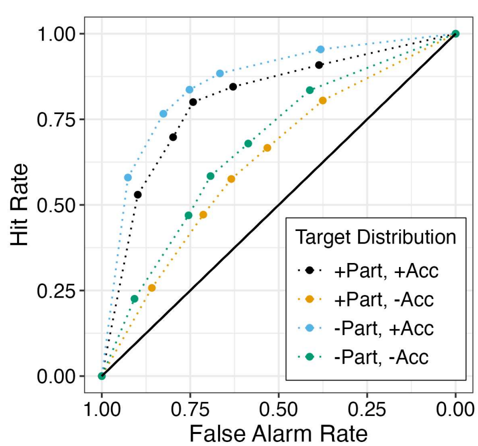
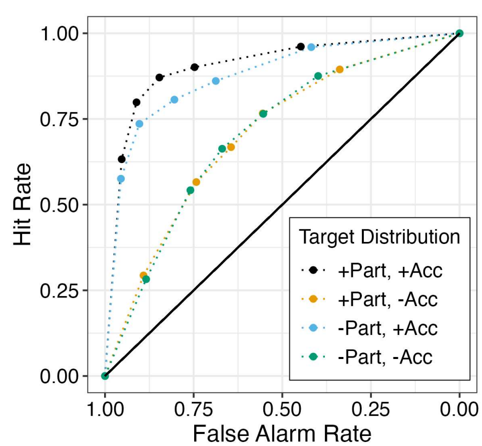


Figure 2: Experiment 2 ROC Curve



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