

Lexical, Phrase and Contrastive Stress: Similarities and Differences

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Background. Prosodic stress can be used to distinguish between lexical items, different types of phrases, and contrastively to respond to a previous utterance (e.g., “Do you want the pumpkin pie? *No, I want the APPLE pie*”). Although much research has investigated stress [1-3], less work has investigated how different types of stress, each with unique linguistic or communicative functions, are related to one another. Moreover, little research has examined the relationship between the comprehension and production of prosody, and whether such a relationship is stronger or weaker for stress than other forms of prosody. In a study of college students’ comprehension and production of stress, we found that performance on lexical, phrase and contrastive stress tests were moderately correlated. These findings are consistent with there being both factors that are shared among lexical, phrase and contrastive stress, and factors that are unique to each of these.

Methods. Sixty-eight (48 female, 20 male) native English-speaking college students participated. To assess comprehension and production of prosody, we created the Online Profiling Elements of Prosody in Speech Communication (O-PEPS-C), an online adaptation of the in-person clinical PEPS-C test [4]. The O-PEPS-C includes tests of prosodic form (ability to detect differences in prosody and imitate prosody) and prosodic function. The 6 prosodic function tests assess comprehension and production of affect (like/dislike), question/declarative prosody, phrase boundaries (e.g., *chocolate, cake, and cookies vs. chocolate cake and cookies*), and lexical, phrase and contrastive stress.

To assess lexical stress, participants listen to and produce pairs of words that differ minimally in stress (e.g., *inSULT* and *INsult*). To assess phrase stress, participants listen to and produce minimal pairs of phrases embedded in sentences (e.g., *The green house/greenhouse spoils the view*). To assess comprehension of contrastive stress, participants listen to a context story (e.g., “Earlier today, the person on the screen bought some socks. But when she got home, she had forgotten to buy one color”). They then hear the forgetful shopper say either, “I wanted BLUE and black socks” (indicating the shopper forgot to buy blue socks) or “I wanted blue and BLACK socks” (indicating the shopper forgot the black ones), and say which color socks the shopper forgot to buy. To assess production of contrastive stress, participants use contrastive stress to “correct” an utterance (e.g., if they hear *the green sheep has the ball*, but the computer screen displays a green cow with a ball, they must correct the speaker by saying *the green COW has the ball*).

The experiment was conducted using the Finding Five experimental platform which presented stimuli and recorded participants’ keystrokes, spoken responses and reaction times. Whereas for comprehension trials, accuracy was automatically computed, for production trials, 4 trained O-PEPS-C coders evaluated all spoken responses (4-coder inter-rater reliability Krippendorff’s $\alpha = .83$) and their mean accuracy was used in analyses.

Results. Because the data were not normally distributed, Spearman’s *rho* was used to investigate relationships among subtest scores, with the significance set at $p < .01$. Overall, collapsing across all subtests, prosody comprehension and production were moderately correlated (Spearman’s $r = .44, p < .001$). In addition, comprehension and production scores were

significantly correlated for lexical stress ($r = .44, p < .001$) and phrase stress ($r = .38, p = .001$), marginally correlated for contrastive stress ($r = .25, p = .039$) and boundary stress ($r = .24, p = .04$) and not correlated for the other 3 tests. Because production and comprehension scores were only correlated for some subtests, we investigated the relationships among lexical, phrase and contrastive stress separately for comprehension and production. For comprehension, all 3 stress tests were correlated with one another (lexical/phrase stress Spearman $r = .35, p = .003$; lexical/contrastive stress $r = .37, p < .001$; phrase/contrastive stress $r = .40, p < .001$). Because only 1 of the other 18 comprehension correlations was significant (contrastive stress/form $r = .33, p = .006$), this suggests that the significant correlations among lexical, phrase, and contrastive stress comprehension scores do not merely reflect general proficiency with prosody comprehension. The production findings were similar, with the three stress tests being related with one another (lexical/phrase stress $r = .43, p < .001$; phrase/contrastive stress $r = .31, p = .009$; lexical/contrastive stress $r = .30, p = .013$). In addition, lexical stress production correlated with both prosodic boundary production ($r = .43, p < .001$) and form production ($r = .42, p < .001$), and contrastive stress production correlated with boundary production ($r = .52, p < .001$). In summary, overall comprehension and production of prosody were related, as were comprehension and production of lexical stress and phrase stress. For both comprehension and production, scores on the three stress subtests were correlated.

Discussion. Our results suggest that overall, people who are successful at producing prosody are better at interpreting prosody, with the production/comprehension link being stronger for stress than other types of prosody. However, even for stress, the production/comprehension correlations are moderate at best. This argues against applying to prosody the type of motor theory/analysis through synthesis model that has been proposed for phoneme perception [5]. Our results also suggest that, although stress serves different functions, people who are proficient in one type of stress tend to be proficient in the other two types of stress in both comprehension and production. However, again, the relationships among the different types of stress are far from perfect. Within linguistics, lexical stress, phrase stress and contrastive stress are considered to be different from one another both in terms of their acoustic realization and function. That the correlations among lexical, phrase and contrastive stress are only weak to moderate is consistent with these differences in linguistic function being psychologically real.

References.

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