Title: Cross-modal priming of words with positive and negative environmental sounds: An ERP investigation

Author's Names: James P. Duffy, Hannah Ligon, Gwen A. Frishkoff, and R. Toby Amoss,
Department: Department of Psychology
Faculty Sponsor: Gwen Frishkoff

Introduction: Recent studies have explored neural mechanisms underlying semantic evaluation and emotional appraisal of environmental sounds (e.g., a laugh, a gunshot). Pleasant sounds facilitate recognition of words that are positively valenced, and unpleasant sounds prime negatively valenced words. Some studies show N400 semantic effects of emotion priming, suggesting that sounds automatically prime the cognitive representation of valence (i.e., concepts of "good" vs. "bad"). Other studies show early emotion effects, but no N400 semantic effects, in emotion priming. In the present experiment, we had two questions. Question 1 was, *Will emotion priming elicit N400 effects*? We predicted that N400 effects would only be seen when the task focused attention on semantic processing. Question 2 was, (2) *Will N400 effects differ for pairs that are mismatched in meaning and valence vs. pairs that are mismatched in meaning only*? Because valence is a core dimension of meaning, we expected that double mismatches would elicit larger N400 effects than simple semantic mismatches.

Methods: We recorded event-related potentials (ERPs) to words ("targets"), which were preceded by auditory stimuli ("primes"). There were three stimulus conditions: (1) Semantically and affectively related, SRAR, pairs (e.g., [coughing] sound followed by "cough"; [applause] sound followed by "success"), (2) Semantically unrelated/ affectively related, SUAR, pairs (e.g., [screaming] sound followed by "cough"; [music] followed by "success"), and (3) Semantically and affectively unrelated, SUAU, pairs (e.g., [applause] followed by "cough"; [coughing] followed by "success"). Each participant completed one of two tasks: semantic relatedness judgment (*Do the sound and the word have the same or similar meanings*?) or valence judgment (*Is the word meaning pleasant or unpleasant?*).

Results: Pilot data show robust N400s for semantically unrelated versus related stimuli (i.e., SUAR vs. SRAR conditions). Ongoing analyses will examine outcomes for the two main comparisons of interest: (1) SUAR vs. SUAU pairs in a semantic judgment task, and (2) same contrast within an emotion judgment task.

Conclusion: Results are expected to inform our theories of semantic processing, emotion appraisal, and emotion–cognition interactions.