Using psychophysiological measures to assess affective response to communication challenges across the lifespan

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Affective states such as annoyance, effort, fatigue, and distraction can all contribute to a person’s motivation to adopt, maintain, or abandon a communication-related behavior, whether that is short-term (i.e. participation in a particular conversation) or long-term (i.e. continued use of a hearing aid). Thus, in order to understand why someone might choose to change (or not change) a behavior related to communication, it is important to evaluate the contribution of their affective state to such decisions. The experience of positive or negative emotions, stress, effort, and fatigue all affect autonomic nervous system (ANS) arousal, and may be identified from changes in multiple end-organ behaviors, including pupil and capillary dilation, eccrine sweat gland activity, and heart rate as well as in the activity of specific facial muscles. Because such physiological responses are unconscious and ubiquitous, they can provide insight into a person’s internal affective state without requiring interruption or distraction from the task being performed. On the other hand, measurements of end-organ activity are often difficult to interpret because they reflect complex and often composite interactions between competing demands on ANS function, only some of which are necessarily related to any ongoing challenge to communication. Moreover, ANS function and end organ responsiveness change with age and vary considerably across individuals and conditions, meaning that interpretation of results from studies involving a wide range of ages can be challenging. In this talk I will present some results from a series of studies in my lab investigating the use of peripheral psychophysiological measurements to evaluate listeners’ and speakers’ affective responses to a variety of challenges to spoken communication. Across multiple studies, younger, middle-aged, and older adults (ages 18-75) listened to speech that was made more difficult to understand either through distortion (synthetic speech, non-native accent) or noise masking. In some tasks, the stimuli were sentences or strings of words to be repeated. In others, they were short stories and listeners were asked to answer multiple-choice questions about them. In one experiment designed to explore different aspects of clinical tests of hearing in noise, responses made in noise were contrasted with those made in quiet. Discussion will focus on the interaction between individual differences in age and noise sensitivity with cardiovascular, electrodermal, and facial muscular activity in challenging communication contexts, and on implications for further application of these measures to understanding speech perception in challenging conditions across the lifespan. (Partially funded by grants from the Office of the Provost and Office of the Executive Vice President for Research, Purdue University).

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