

*This is an excerpt from a report on the Perceptual Learning and Perceptual Recognition II Workshop at the University of Toronto, Mississauga in May of 2012, written by Kevin Connolly, John Donaldson, David M. Gray, Emily McWilliams, Sofia Ortiz-Hinojosa, and David Suarez, and available at [http://networksensoryresearch.utoronto.ca/Events\\_%26\\_Discussion.html](http://networksensoryresearch.utoronto.ca/Events_%26_Discussion.html)*

## **6. How Do We Recognize Distinct Types of Emotion in Music?**

Caroline Palmer's talk analyzed how musicians give expression to music by manipulating acoustic signals in ways left underdetermined by the musical score itself. For example, when Glenn Gould plays Bach's *Goldberg Variations*, while the score provides the pitch and duration values, Gould must additionally choose the tempo, intensity, and exact durations in order to perform it. Palmer sought to illuminate such musical expression by drawing from a substantial literature on linguistic expression. In spoken language, speakers add expression to words (sarcastic intonation, for instance), which go beyond the literal meaning of the words. Linguists refer to this as "prosody." Similarly, Palmer argued, musicians add expression to music that goes beyond the musical score. For instance, just as a speaker adds expression to her words by making some of them more prominent than others, so too does a musician add expression to her music by making particular notes or phrases more prominent (for more examples see Palmer and Hutchins, 2006).

Unlike speech, many genres of music do not rely on words to convey emotion. How then are we able to recognize such music as conveying a particular type of emotion, say, sadness or happiness? Perhaps one way to make progress toward answering this question is to pinpoint the auditory cues that musicians themselves employ in order to convey a particular type of emotion. In one of her experiments, for instance, Palmer asked twelve adult singers to speak and then sing a particular statement, and she instructed them as to how to speak or sing it—as very happy, happy, neutral, sad, or very sad. The sad speeches or songs tended to have slower durations (that is, slower tempos), while the happier ones tended to have faster durations. Secondly, the sad

speeches or songs tended to have less intensity (that is, roughly, less volume), while the happier ones tended to have greater intensity. Furthermore, Palmer's analysis of the subjects' facial movements indicated distinct muscle patterns for each emotional connotation.

In a further experiment, Palmer presented listeners with silent (visual only) recordings of the speakers, or with audio only recordings. Listeners were highly accurate overall in gauging the emotional intent of the speakers. However, they were more accurate in gauging emotional intent for speech than for song, and this disparity was largest when visual cues to facial expression were absent. Palmer argued that some acoustic variables convey emotion in a similar manner in speech and song, transcending the inherent musical and linguistic structures.

In her commentary on Palmer's talk, Diana Raffman extended Palmer's analysis of prosody, in part by relating it to work on linguistic meaning. For instance, the sentence "Pat or Kate and Bob will come" is ambiguous between two interpretations:

1. [Pat] or [Kate and Bob] will come, or
2. [Pat or Kate] and [Bob] will come. (Raczaszek et al., 1999, p. 374)

Following Raczaszek et al., Raffman pointed out that prosody is important for disambiguation in such cases. Of particular significance is the duration of the *feet* relative to each other, where a foot is understood as "a string of syllables that begins with an accented syllable and extends to another accented syllable" (for instance, "Pat or" is one foot, and "Kate and" is another).

(Raczaszek et al., p. 375) One lesson is that duration acoustic cues are extremely important cues for listeners. In the case raised by Raffman, duration correlated with the perceived interpretation of the sentence. Similarly, in Palmer's initial experiment, duration correlated with the intended emotion conveyed.

## **References:**

Palmer, C., & Hutchins, S. (2006). "What is musical prosody?" In B. H. Ross (Ed.), *The psychology of learning and motivation: Advances in research and theory*. Vol. 46, (pp. 245–278). Oxford: Elsevier.

Raczaszek, J., Shapiro, L. P., Tuller, B., Case, P., & Kelso, J. A. S. (1999). "Categorization of sentences as a function of a changing prosodic parameter: A dynamical approach." *Journal of Psycholinguistic Research*, 28(4), 367–393.