

1-1-1999

## Society for Music Perception and Cognition Conference

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### Recommended Citation

Mathes, James (1999) "Society for Music Perception and Cognition Conference," *Journal of Music Theory Pedagogy*: Vol. 13, Article 6.

Available at: <https://digitalcollections.lipscomb.edu/jmtp/vol13/iss1/6>

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## *Reviews*

### *Conference Report: Society for Music Perception and Cognition*

Reviewed by James Mathes

The Society for Music Perception and Cognition held its annual conference August 14-17, 1999 on the beautiful campus of Northwestern University in Evanston, Illinois. One of the attractions of the meetings of this society is the opportunity to listen to and interact with researchers within and outside of the discipline of music, including a large number of participants from outside of the USA. Institutions from Canada, the UK, Germany, France, the Netherlands, Sweden, Finland, Brazil, and Argentina were represented. Music addressed ranged from western classical music to jazz, popular and folk music, to Hindustani music. In all, twenty-seven paper sessions were held over a four-day period as the work of over 140 researchers was presented. These numbers are indicative of the wide range of topics that were addressed by the diverse group of participants. Although the field of music perception and cognition is traditionally associated with psychology, music theorists have taken more active research roles in recent decades, reflecting a growing interest across disciplines. The music theory departments from Northwestern and Ohio State Universities, particularly active in music perception and cognition research, were especially well represented on the programs. Though it was not possible to attend and to report on many intriguing sessions that were held—concurrent papers were continuously offered—I hope to give some idea of the types of research being conducted as evidenced by this conference.

The conference began on Sunday morning with three papers on atonal music as one of two concurrent sessions. All three papers reported on experiments concerning theoretical description and

aural perception of similarity relations among atonal sonorities. Tuire Kuusi (Department of Composition and Music Theory, Sibelius Academy) reported on an experiment in which 58 subjects (unspecified) first rated similarities between pairs of pentachords, and then rated individual chords based on a number of separate verbal dimensions. She concluded that consonance or dissonance seemed to be the most important factor in rating similarities (chords associated with familiar sonorities, notably the dominant seventh, were rated highest), though whole-tone associations and chord settings (spacing, register, salient intervals) were noted as important factors. The results confirmed that interval-class content alone cannot explain aural perceptions.

Panayotis Mavromatis (Eastman School of Music) reported on research conducted with Virginia Williamson (School of Music, Penn State University) in which thirty novices (undergraduate psychology majors) and thirty-eight music majors participated. Their earlier work using expert listeners had identified the significance of interval content, common tones, and salient intervals in perception. Extensive handouts documented their more recent findings that expert listeners tend to correlate atonal sonorities with theoretical descriptions and that their perceptions are much different from non-experts. Perhaps most interesting, the consistency of responses among experts correlated significantly with the number of years of applied training though not with academic music credits completed or with absolute pitch.

Arthur Samplaski (School of Music, Indiana University) reported on an experiment taken by twenty-two "trained" musicians. Pairs of Z-related tetrachords [0146] and [0137], and [0157] were heard in varied voicings and timbres (clarinet and Shepard tones). The pitch height (6-14 semitones in his voicings) between outer voices was interpreted as the most important factor and the position of dissonant intervals as a secondary factor. The different timbres were apparently not a significant factor.

Each of these papers in different ways addressed the need for further research to clarify how different listeners prioritize various factors that shape perceptions of atonal pitch structures. Subsequent discussions emphasized that perception of atonal sonorities should be studied in context rather than in isolation, a recurring issue in

many perception studies. Williamson and Mavromatis' work toward the long term goal of a perceptual definition of similarity and categorization of atonal sonorities seems especially promising.

A session on memory included two papers of particular interest. Christine Koh and Lola Cuddy (Department of Psychology, Queen's University at Kingston) conducted an experiment in which trained pianists were asked to recall unfamiliar folk melodies through reproduction at the piano. Their interest was in studying the ability to recall actual melodies rather than artificially generated sequences through reproduction (rather than notation). Subjects were given aural versions with no notation, notation with no aural version, or notation/sound together. They then had to play the tune back and MIDI data was collected. The researchers analyzed the mistakes to determine if serial (left-to-right, note-to-note) processing was used, or whether subjects processed in a hierarchical manner, i.e. subjects would forget embellishing but not structural pitches. An expert had rated the pitches of the melodies on the basis of structural importance. Their analyses of data showed that subjects were strongly inclined toward serial rather than hierarchic processing and that the conditions with visual presentation produced much better recall than the aural-only mode. One observer noted that in dictation exercises students often fill in the cadence, a hierarchic type of listening encouraged by aural skills. Thus, the results of this experiment seem to indicate that the mode of recall is a function of the task. For those involved in aural skills training, this research suggests the need to consider further the specific requirements of the different skills we teach. Comparison across different types of music training modality, suggested by the researchers, could be invaluable.

W. Jay Dowling (University of Texas-Dallas, Program in Cognitive Science) presented a paper on "The Flow of Music and Memory" in which he discussed how our memories of what we have just heard change as time passes. In a series of experiments, he observed that if we hear a melody and are asked to judge whether a comparison melody is exact or altered, we do better after a moderate-length delay than after a very short delay. His most interesting assertion was that brain processing of music just heard continues even as we hear new music. The implication is that a listener needs time and

reflection to process structure and that the memories of a piece fluctuate in the course of listening.

A session on Sunday morning focused expressly on how various musical skills are acquired. Papers here tended to address specific performance problems—presentations on student practice habits, and on motor learning in advanced and novice performers were given—with one notable exception. In his paper “Auditory Imagery and Music Pedagogy: Reciprocity and Untapped Potential,” Edward Klonoksi (School of Music, Northern Illinois University) offered a challenge to researchers in the field of auditory imagery as well as those involved in aural skills pedagogy. Though these fields in some ways follow parallel lines of inquiry, he argued, many perceptual studies focus on tasks that have limited application in real musical environments. Much of the research in auditory imagery, for example, demonstrates or examines basic imagery processes. In music pedagogy the capacity for basic imagery is assumed and the emphasis is on refining and expanding that capacity. On the other hand, the pedagogical ordering of aural skills, as was examined briefly by comparison of the tables of contents of two ear-training texts, is quite varied and largely based on anecdotal evidence; in his view, “no systematic, scientific backing” has been established to help shape current pedagogical strategies for aural skills. Auditory imagery researchers, he asserted, are well positioned to investigate how auditory imagery is developed and refined and thus have great potential for helping to shape music instruction. Conversely, aural skills pedagogues can provide a “virtually limitless stockpile of musically relevant questions” for investigation. For example, can imagery tasks be ordered according to difficulty? Most likely Klonoksi’s basic assertions and concerns would resonate with anyone who has faced the challenge of teaching aural skills, and his conclusion that only positive outcomes can result from increased interaction between the two fields rings true. What other types of musically relevant questions need to be asked, or a program of research for the problems and concerns raised was not addressed.

The question of innate musical capacities was raised to some extent during a session on the subject of tonality in music. In a paper directly related to aural training, Renè Van Egmond (Nijmegen Institute for Cognition and Information) reported on

research conducted with Mila Boswijk on the perception of tonality in musical excerpts and chords. Listeners were asked to identify tonic by singing and by playing a keyboard 1) after each hearing of twenty musical excerpts from popular music, and 2) after hearing major, minor, and diminished triads, and dominant seventh chords in arpeggiated and block chord forms. Two different experiments were conducted, one using subjects with dissimilar training, the other using subjects with similar training. The subjects included music majors with limited ear training (one semester or less) and subjects who had completed a two-year ear training sequence. The results of the experiments as reported were interesting on several counts. In experiment 1, neither familiarity with the actual music nor the amount of ear training were significant factors in performance. In both experiments, listeners who scored 100 percent on the first task also indicated one tonic as uniquely belonging to the chords heard in the second task; the group who scored 75 percent or less produced many different tonics for the chords. Perhaps not surprisingly, the lower group most often heard the root of a dominant seventh as a tonic. These results suggest that the ability to identify a tonic pitch may be more innate than learned. One observer commented that there may not be as much difference between the skill level at the beginning and end of an ear training sequence, though others disputed this. The researchers emphasized their belief that discrepancies with other studies cited may reflect the difference in pools of subjects as well as the type of stimuli used: classical versus popular music, real music versus isochronous tone sequences.

Another study presented by Alexandra Lamont (Department of Psychology, Leicester University) examined the sensitivity of trained and untrained children (6-16 years of age) and adults to tonal content and hierarchy using probe-note methodology. To briefly summarize her findings, trained subjects had better sensitivity to tonal hierarchy though musically trained children aged 15-16 had more stable (consistent) results than musically trained adults. By extreme manipulation of materials, which minimized salient melodic features, she demonstrated the limits of probe-note methodology. Examples were played—a welcome part of the presentation too often omitted in many papers—that clearly illustrated the care one must

take in considering the relation of the experimental model and the task at hand to real musical contexts when interpreting results.

A session on style and structure had presentations that largely focused on cognitive rules and perception. Eugene Narmour (Department of Music, University of Pennsylvania) gave a thought provoking presentation on the subject of whether or how listeners may or may not invoke cognitive rules that shape musical expectations. Though he argued persuasively that listeners do use rules, he raised questions of how we distinguish compositional rules from listening rules, and how stylistic and time-span constraints affect the application of rules.

David Temperley (School of Music, Ohio State Univeristy) reported on his efforts to model a listener's perceptions of contrapuntal music through a preference rule system and computational model. His research served to verify the importance of interval size, tempo, and rhythm in the perception of linear components, and identified some problems with the rigidity of certain well-formedness rules, e.g. the prohibition of crossing voices. Mila Boswik addressed a similar concern with preference rules as she applied Lerdahl and Jackendoff's well known methodology to the analysis of popular music. Her basic argument was that popular music requires different preference rules than classical music in the western tonal idiom. Nicola Dibben (Department of Music, University of Sheffield) reported on research conducted with Alexandra Lamont on the perceptions of similarity relations in tonal and atonal music. Listeners were asked to rate similarity between first and second themes of sonata form movements (Beethoven, Op. 10, No.1, I and Schoenberg Op. 33a) The subjects included musicians and non-musicians, with both predictable and surprising results. Non-musicians tended to be attentive to similar surface features (largely thematic) in both examples while musicians were more attentive to differences in pitch and tonality. This finding would be expected. What was puzzling was their finding that the first theme of the exposition often was not rated as very similar to the first theme in the recapitulation in either work. A problem was determining how the researchers or subjects were defining similarity and how factors were weighted, neither of which was entirely clear from the abstract or the presentation. (Unfortunately, no examples were played.) One explana-

tion may be that multidimensional scaling was used, which groups the stimuli by listener ratings but does not interpret those groupings (the experimenter does). Further, there are several musical dimensions to be considered, and varied weighting of different dimensions may critically affect ratings and interpretation of results. These concerns aside, their ongoing research on perceptual versus functional notions of similarity in music, and on the perceptual relationship between musical surface and structure is addressing important questions concerning how expert and non-expert listeners hear music.

Both of the above topics were visited in other sessions. In a session on cross-modal cognition and music, Siu-Lin Tan gave an engaging report on research, conducted by a group of psychologists from Kalamazoo College, which examined the listening strategies of musically trained and untrained listeners. Subjects were told to write marks in a large rectangle as they listened to five, stylistically diverse orchestral excerpts, each one minute long and heard twice; no words, letters, or conventional musical symbols were permitted. They then were given five minutes to explain their markings through written descriptions. The thirty subjects who scored high on a musical literacy test tended to focus on elements of musical structure (theme/motif, tonality, form) and musical surface (i.e. tempo, volume, register), while thirty subjects low in musical literacy tended to focus on affect (emotive descriptions) and extra musical associations. These may be predictable results, but the types and consistency of the responses is noteworthy. Only 1 percent of the untrained listeners ever mentioned theme or motive; none mentioned key. The trained listeners generally leaned toward abstract though simplistic symbols but gave detailed musical descriptions, while the untrained listeners leaned toward pictorial symbols and often gave "silly narratives." Other observations pointed to the influence of a knowledge of musical notation on responses and generally corroborated that the formal training of musicians influences their listening perceptions.

In the same session, Candace Brower (School of Music, Northwestern University) presented her research and ideas on spatial imagery in music. After briefly discussing established models of musical space from historical treatises such as those by Heinichen,



Mattheson, Vogler, and Schoenberg to current writings by theorists and psychologists including Krumhansl, Balzano, Lerdahl, and Cohn, she explored the metaphorical implications of such models. Her metaphorical notions of containers (e.g. space within a chord or key), pathways (ongoing motion), and goals (tonal arrivals) led to discussion of a model for what she termed "image-schematic analyses." Time did not permit an elaborated example of such analyses, but her discussion seemed to imply a greater emphasis on spatial motion and on aspects of the musical surface than are found in most other types of structural analysis. A question was raised concerning whether her work is developing a perceptual or an analytic model, and subsequent discussion addressed the sometimes elusive distinction between the two.

Two different sessions on expressive performance reflected the interest and value of studying expert performances as another way of examining the relation between musical surface and structure, and of reconsidering the basis and validity of that dichotomy. Of particular interest, based on the abstract and subsequent discussions, was the work of Van Egmond and Richard Ashley (School of Music, Northwestern University), which illuminated the importance of considering multi-dimensional aspects of musical structure in explaining contrasting performances of melodies in different contexts. Unfortunately, as in many cases, time and logistics prevented my attendance at the presentation.

I have highlighted specific sessions and papers that hopefully are of interest to readers of this journal, though a wealth of other topics were covered. Sessions on melody, timbre, rhythm, cognition and meter, music and language, music and media, emotion, and improvisation and expression, among many others, were presented. An evening session on music and evolution was especially interesting, with a particularly entertaining presentation by David Huron (School of Music, Ohio State University) on music-making as an evolutionary adaptation. Sessions such as this, as well as many of the papers and sessions mentioned, frequently involved topics, methodologies, or ideas normally outside the purview of traditional music disciplines or curriculums. Such research often challenges, in meaningful ways, our basic assumptions about music and about how we teach it, making attendance at an SMPC conference a valu-

able experience for anyone interested in music.

In closing, I must applaud the excellent organization and direction of the conference, overseen by Richard Ashley, and the wonderful hospitality shown by the faculty, staff, and students of Northwestern University. A memorable evening at Ravinia with great food and a gala concert by the Chicago Symphony Orchestra highlighted four stimulating days of activity. Attendance at an SMPC conference comes highly recommended. The next meeting will be in Toronto, a joint meeting of fifteen music societies to be held November 2-5, 2000.

