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Computer evaluation of musical performance from the acoustic signal: An exploratory study on performance anxiety **FREE**

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or for purposes of recording, the sounds made by these instruments can augment or be substituted for the sound coming from the violin itself. Consequently, it is possible to specify such novel results of performance as having sounds become quieter the more vigorously the strings are bowed, having bells or other instruments sound when the strings are bowed, or having sounds come from a variety of locations. Compositional and performance practice of music using the electronic violin recognizes that it can function as a controller as well as a soundmaking instrument in its own right. The nature of its interaction with other soundmaking resources must be specified along with the other elements of music making such as pitch and form. Several musical examples from various uses of the electronic violin will be shown from videotape and discussed.

10:00

4MU4. Computer evaluation of musical performance from the acoustic signal: An exploratory study on performance anxiety. Diana Deutsch, Lee Ray, Mark Dolson, Sidney Zizook, and F. Richard Moore (Depts. of Psychology, Psychiatry, and Music, Univ. of California at San Diego, La Jolla, CA 92093)

Performance anxiety, or stage fright, is a serious and frequently incapacitating disorder among musicians. Decrements in performance resulting from this condition include somatic disturbances such as tremor, and disturbances of perceptual and cognitive function, such as distortions of time perception and failures of attention. Two experiments on the effects of anxiolytics on accuracy and consistency of performance are here described. Professional violinists who suffered from mild performance anxiety were asked to play repeating musical passages as accurately, consistently, and steadily as possible. The performances were recorded and subjected to computer analysis. In one experiment, the consumption of a small amount of alcohol was found to be associated with a significant increment in regularity of tempo, a marginally significant increment in steadiness in playing the notes, and yet a highly significant decrement in consistency of intonation. A second experiment which examined the effects of two prescription anxiolytics is also described.

10:30

4MU5. The relationship between tempo and delay and its effect on musical performance. Bob Willey (Ctr. for Music Experiment, Q-037, Univ. of California, La Jolla, CA 92093)

A study was made into the effects of delayed auditory feedback on musical performance. Subjects heard their performance with various lengths of delay while playing at various tempi. This allowed for an investigation into the possible disturbing effects of delayed auditory feedback caused by different combinations of tempo and delay. Delay was most disturbing when its length was in a ratio with metronome beat length between 1:2 and 1:1. "Consonant" ratios were the least disturbing, with 2:1 and 3:1 as easy, or easier than the "fundamental" ratio of 1:1. This is in contradistinction to findings in speech research where the greatest disruption occurred when there is approximate equality between delay and syllable length. Research in delayed auditory feedback with speech has been more concerned with an absolute worst case for delay independent of rate. The results of this study are consistent with previous research that showed the most disturbing delay for music performance to be between 200 and 300 ms. In addition they support the hypothesis that disturbance depends on the ratio between the lengths of delay and beat. The implications for music performance are discussed, including the effect of pitch transformation during computer-mediated improvisation.

11:00

4MU6. Conducting the MIDI Orchestra: Integrating the *synthetic performer* with the Acoustic Ensemble. Richard Boulanger (Music Synthesis Dept., Berklee College of Music, Boston, MA 02115)

The commercial adoption of the Musical Instrument Digital Interface (MIDI)—a protocol that provides the syntax and structure for meaningful communication between virtually any computer and any digital synthesizer—brought a powerful set of tools for music composition, notation, sound design, and real-time performance from the university research labs to the private studios of the individual artist in the form of an affordable, powerful, and portable MIDI-based music workstation. Since its inception 7 years ago, MIDI has had a far reaching impact on virtually every aspect of professional music making. From the recording studio to the college classroom, MIDI-based workstations are *playing* a major role. Most importantly, however, is that MIDI has brought real-time computer-controlled and computer-generated sound to the concert stage. This paper addresses the question of how a composer today might integrate this computerized *virtual instrument* with traditional acoustic instruments. From the innovative use of commercial software, to the specialized applications of new computer interfaces such as Max Mathews' *Electronic Stradivarius*, *Daton* MIDI conduct-