INTERACTIVE WORKS: NEW PROBLEMS AND POTENTIALS

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ABSTRACT: Interactive works demand rethinking and problem-solving by performers, composers, and scientists. New challenges to the performer include increased creative input, advanced techniques of "hyper" instruments playing, concentrated listening in high-density sound environments, and exploration of instrumental multi-timbres. Enhanced expressiveness should be a primary goal to all.

Composers, performers, and scientists are faced with a new era of interactive works. Works which deem the performer's input as paramount necessitate new orientations and training. The performer's creativity, technique, concentration, and musical sensibilities all should be re-examined in detail.

Such explorations could help develop concrete programs for re-defining human creativity and input in the performance sector. This overview is meant as a step in that direction.

New substantial and creative roles for the performer are required by many contemporary composers. These roles incorporate a range of improvisation techniques, spontaneous applications of timbres to accompanying digital textures, and on-the-spot decision regarding operation of triggers through hardware devices in musical compositions. Such roles emphasize the importance of the performer in the actual composition of work. Compositional decisions in real-time demand new responsibilities. Decision-making also requires each performer to re-assess his current skills, and gear himself toward possible retraining. In many new interactive works, the roles of "composer" and "performer" are often blurred. This cross-fertilization of performer and composer takes on a new significance. In "Modes of Discourse" (Dahlin, S., Horonstein, S., 1995), the performer is asked to invent complex linear structures in real-time. These structures are re-called in various permutations in a canonic counterpoint effect, in combination with sound structures generated from probability tables through MAX. This creative "environment" places strenuous inventive demands on the performer, demands which require new compositional sensibilities. As a result, a new generation of performer-composers, equally adept in exploring potentials of computer-performer interaction, as well as mastering of acoustic and digital worlds, is growing.

New physiological techniques relating to "hyper" instruments also require new thought. The contemporary "hyper" wind instrument, for example, can be complemented by an array of microphones (external and internal), pad sensors, lip sensors, pedals, etc. With these additional devices, "normal" physical manipulations of thumb, palate, tongue, and diaphragm may suddenly give way to unexpected sound conglomerates. The constant state of sound flux requires a new focus and sensibility, as well as an openness to the definition of instrumental "control". A performer may be faced with new reactions to "old" instrumental gestures. In addition, he is called upon to execute a myriad of new gestures. He is suddenly thrust into a world of constant foot movements, awkward hand movements, and exaggerated tonguing techniques to enable the computer to capture the trigger. The performer is challenged to incorporate these foreign gestures into his technique vocabulary, and to implement them naturally in his expressive realization of the musical work. In "Lamentations" (Oppenheim, V., 1993), for instance, the composer required ten pedal shifts in fifteen seconds (triggering musical phrases and changes in timbre), as well as simultaneous manipulations of tongue and heritage to change dynamics and sound. Needless to say, a spontaneous, expressive performance is doubly challenging under such conditions. Furthermore, to "practice" techniques of often
problematic, for few conventional instrumentalists possess the necessary hardware to realize interactive works. Without proper training and research conditions, performance of interactive works may lack depth of expression, and may be, at best, peripherally correct.

An additional trend for concern is the gap between development of computer technology and hyper-instrumental hardware geared to humanistic performer needs. For the computer to track the performer's input properly, the performer is often required to execute exaggerated tonguing, forced extreme dynamic changes, slower unnatural speeds, minimized use of pitch bend nuance, and reduced timbre change. These necessary restrictions can easily detract from the performer's natural expressivity. The performer's comprised "adapting" to such restrictive environments is one of the unfortunate results of this process.

Another major area of concern is the effect of high sound density on the performer. New and strange psycho-acoustic problems arise from a performer's prolonged interaction with the highly dense world of digital sound. One such phenomenon is the performer's feeling of "insignificance," "smallness," and "powerlessness" in the midst of swirling masses of thick digital sound. Amidst amplified masses of sound, disproportion of acoustic and digital sound mass leads to feelings of futility. High sound density may also impede concentration. This performer/composer's experience in the performance of such works as "Lamentations" have shown that prolonged exposure to high density sounds may effect the ability to concentrate, and the "losing" of one's "self" in the stream of time (Horenstein, S., 1993). The effect seems to be more of a hypnotic trance-like state than common ear fatigue. In such dense sound structures, deeper concentration and enhanced hearing is especially vital to isolate sound elements which may provide important cues and triggers in the performance of an interactive work. New techniques to sustain performers in these areas are essential to the advancement of fruitful interactions between humans and computers.

One positive potential of new interactive works and rich digital sound is the growing need for performer exploration of instrumental multi-timbre. Through increased use of throat movements, palate shifting, tongue placement, teeth position, oral cavity transformation, and embedded vocal effects the acoustic wind performer matches the extended timbre range and mass of digital sound. On the other hand, performers/composers of both acoustic and digital sounds will also find a wealth of new ideas in the replication biological phenomenon of acoustic instrument playing in expressive realizations of musical compositions. Alongside of exactitude and mathematical perfection, the element of expressivity and creative real-time input remains one of the primary challenges of composers, performers, and scientists. In "Passages" (Horenstein, S., 1995), the performer is required to produce a rapidly-changing stream of timbres through multi-phonics, overblowing, and vocal effects. The stream interacts with the Wavestation L/D (through analog inputs and MIDI, Roland Pitch-to-Midi). As the sound conglomerates emerge, the performer must invent new timbres which complement and develop what has been played. To produce such sounds, the performer must practice all the persistent techniques to allow for the widest range of timbre creation and flexibility.

All of the above leads to a rethinking of how performers are trained in the twenty-first century. Forward-looking programs for new instrumental instruction should be formulated to complement recent developments in technology. These programs should stress the vital importance of the human performer and his innate creativity in new musical works. Such curricula might include workshops in the following:
1) Increased concentration in high density environments
2) Enhanced hearing in high density textures
3) Pedal and triggering techniques of new hyper instruments
4) Improvisation systems
5) Sound streaming
6) Extended vocal cavity manipulations (winds and vocalists)
7) Multiphonics exploration and codification (winds)
8) Tonguing positions and techniques (winds)
9) Basic knowledge of MIDI, MIDI modules, and DSP
10) Basic knowledge of interactive programs such as M\*X

Such a curriculum is currently under study at the Jerusalem Institute of Contemporary Music in collaboration with Hebrew University.

Existing research and educational institutions should be encouraged for developing performance programs which explore all the above issues. Likewise, computer scientists and technicians might find it fruitful to sensitize themselves to humanistic issues. Potentials for cross-fertilization are immense. Open and forward-looking thinking will aid in a more comprehensive, unified and expressive approaches to new interactive works, and hopefully lead us into a new humanistic technological twenty-first century.