Readings by Sloboda, Povel, and Clarke

In the third chapter of his book *The Musical Mind*, John Sloboda discusses research into how musicians tackle the performance of a written musical work. Sloboda divides this musical process into three stages. The first stage involves the "unpremeditated performance" of a work, i.e. sight reading. Secondly, a musician undergoes a period of practice in which the musician has "repeated access to the score." The final stage occurs when the musician is ready to perform the piece of music, a stage which often involves "total memorization of the score" (67).

Sloboda devotes a significantly large portion of this chapter to the phenomenon of sight reading. He evokes parallels between the ability to sight read language and music, but this analogy has limits since the reading of music is not necessarily a linear process. For example, studies show that the techniques for reading homophonic music differ from those techniques used to read contrapuntal music (70). Yet from these differing techniques, a broader method emerges: "The significant strategy appears to be to identify significant structural units in successive fixations" (71). For tonal music, these "significant structural units" are phrases. Of course, the identification of phrases can be difficult for beginners. Moreover, music in which predictable structures are not evident, such as more modern twentieth-century works, pose special challenges in sight reading for even the most trained reader due to their unique surface groupings.

However, much of sight reading involves being able to predict patterns in the music. Sloboda demonstrates this trait through a series of experiments in which errors in the score were "corrected" by performers during sight reading (78). The performers, according to Sloboda, sometimes only require a general sense of the music's direction to be able to supply common patterns for the music's execution. "One learns how to create an impression of accuracy in a performance that is actually far from faithful to the score" (85). Sloboda uses these discoveries to argue for the pedagogical validity of scales and etudes, for these exercises "ensure that the learner is exposed to a whole range of programming problems in a systematic way" (90).

In trying to understand the way musicians practice, Sloboda focuses on a study by Gruson. This study showed that "conventionally advocated rehearsal techniques increase in frequency with increasing skill" and vice-versa (92). In other words, skilled musicians tended to more often use traditional practice techniques, such as playing with hands separately (in the case of pianists) or repeating large sections of music. Unfortunately, though, the study did not differentiate between age and skill, as the unskilled musicians were all of a young age while the skilled musicians were all older, so separating "general cognitive strategies" from musical experience was not possible (93).

Expert performance, Sloboda's final category, involves the "interaction of specific knowledge of [a] piece with general knowledge acquired over a wide range of musical experience" (94). Success in both sight reading and expert performance, therefore, depends on the ability to recognize stylistic patterns and common structures in the music. As a corollary, both skills require a fairly broad and deep knowledge of the repertoire to which the piece one is sight reading or performing belongs. In particular, the successful memorization of a piece of music relies on the ability to grasp large-scale chunks and basic structures of the music. The necessity of analytical comprehension for expert performance thus acts as an important argument for the utility of music theory in the education of the performing musician.

While Sloboda cites experiments conducted with musicians as test subjects, Povel and Essens discuss experiments in which non-musicians participate. In their article, Povel and Essens are interested in determining basic human cognitive processes used to codify temporal patterns, i.e. rhythms. Povel and Essens take the model of a flexible, hierarchical internal clock common to all people as the starting point for a trio of psychological experiments (414). Their internal clock is reminiscent of the *tactus* as described by Lerdahl & Jackendoff; both pairs of authors, for example, make reference to foot tapping as a physical manifestation.

In Povel and Essens's first experiment, participants were given as sequence of tones and then asked to reproduce the sequence by tapping a button. The sequences given to the participants were ranked in the order of which would best induce an internal clock. This ranking divides each rhythm into categories of increasing complexity, using rules that often map to one of L&J's metrical preference rules. Perhaps unsurprisingly, the participants in the study were more easily able to reproduce those rhythmic patterns that induced a stronger sense of the hypothesized clock.

The second experiment was similar to the first except a lower tone was added to help induce the best internal clock. This lower tone, acting as the equivalent of a musical tactus, coincided with the higher tones in all cases since subjects apparently became too confused if it did not. The result of this experiment was that participants were more easily able to reproduce the rhythmic patterns. Therefore, "the induction of an appropriate clock does improve the internal representation of a temporal pattern" (431).

For their final experiment, Povel and Essens looked more closely at rhythmic patterns for which two possible clocks might be assumed. These two clocks were basically a division into triple or duple time signatures. The rhythmic patterns used in the experiment necessarily had tones falling on metrically strong beats in either triple or duple time. Povel and Essens desired to test whether participants would, in fact, select the more "economical" organization of the rhythmic patterns. The predicted model did, in fact, match the experimental observations, and thus the theoretically more efficient organizations of notes were found to be those that were cognitively simpler as well.

The chapter by Eric Clarke gives an overview of research related to rhythm and timing, focusing mostly on small- and medium-scale temporal phenomena instead of dealing with issues of form. This division of perceptual phenomena into two categories actually stems from research on cognitive processes, which describe two different lengths of "auditory stores" (476). These distinct and separate levels of hearing argue against the Cooper & Meyer view of form as evolving out of local accents in a continuous hierarchy. Instead, the division between "time perception and time estimation" gives further credence to L&J's division between meter and grouping. The *rhythmograms* of Todd derived from filtered audio signals also strengthen the L&J view through a close similarity with L&J's tree-like grouping analyses. Other experiments, such as psychological research by Longuet-Higgens which showed that the sense of meter does not exceed about 5 seconds, continue to support the Schachter/Rothstein/L&J consensus view on rhythm and meter (484).

Clarke also discusses timing and the perception of timing in music. Specifically, Clarke shows how timing changes, which are integral parts of expressive performances, closely interact with the structure of the music. For example, a listener's ability to detect changes in timing is strongest within the middle of a phrase. Thus, as Sloboda showed, not only are phrase boundaries critical to the performer in both sight reading and expert performance, but these phrase boundaries affect how listeners parse the musical surface as well. Clarke also mentions how musicians cannot easily reproduce "an imitative expressive profile that does not maintain a conventional relationship with musical structure" (493). Such a realization points to the difficulty in separating research on timing from the music itself. One may thus assume that the more abstract experiments by Povel & Essens may change when other musical factors (harmony, melody, etc.) are introduced. It is in the effort to quantify all of these aspects, however, that these authors seek to better understand the cognitive process of music making and listening as a whole.

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