Non score-dependency:
Theory and assessment

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Untrained listeners demonstrate implicit knowledge of syntactic patterns and principles. Untrained generative music ability, for example singing, humming, and whistling, is a largely unconscious or intuitive application of these patterns and principles. From the viewpoint of embodied cognition, listening to music should evoke an internal representation or motor image which, together with the perception of organized music, should form the basis of musical cognition. Indeed, that is what listeners demonstrate when they sing, hum, or whistle familiar and unfamiliar tunes or when they vocally or orally improvise continuations to interrupted phrases. Research on vocal improvisation using continuations sung to an interrupted musical phrase, has shown that one's cultural background influences the music generated. That should be the case for instrumentalists as well: when they play familiar or unfamiliar tunes by ear in different keys (transposition) or when they improvise variations, accompaniments, or continuations to interrupted phrases, the music they generate should reflect the same cognitive structures as their oral improvisations. This study is attempting to validate a test of (non) score-dependency that will enable assessment of the music student's implicit knowledge of these structures during performance on the principal instrument.

Keywords: non score-dependency; improvisation; assessment; oral proficiency; performance

Both language and music as auditory phenomena are unique to the species (McDermott and Hauser 2005). Both are ubiquitous elements of all cultures (Molino 2000) and develop spontaneously during childhood. In the temporal

domain both are rule-based systems composed of sequential events that unfold in time (Lerdahl and Jackendoff 1983). Both exhibit specific rhythm and specific segmental and suprasegmental information organized into (recursive) higher-order structures (Besson and Schön 2001, Raffman 1993).

Syntactic knowledge allows the mind to accomplish a remarkable transformation of the input: a linear sequence of elements is perceived in terms of hierarchical relations that convey organized patterns of meaning (Patel 2003). Listeners demonstrate implicit knowledge of syntactic patterns and principles in a number of ways, including judgments of correctness, memory advantages for rule-governed sequences, and production of plausible substitutions when linguistic or musical sequences are recalled less than perfectly (Blacking 1973, Sloboda 1985).

With the Shared Syntactic Integration Resources Hypothesis, Patel (2003) posited that overlap in syntactic processing of language and music would correspond to overlap in the neural areas and operations which provide the resources for syntactic integration.

There are, therefore, many reasons to expect that proficiency in language might exhibit similar characteristics as proficiency in music. Specifically, oral proficiency in a non-native secondary language may exhibit characteristics similar to non score-dependent proficiency in playing a music instrument. Just as in the case of a foreign language, mastery of a music instrument is not learned spontaneously during childhood. Unlike singing, instruments are frequently learned in a formal educational setting.

Oral (second) language proficiency can be assessed in functional situations including a large number of components, for example: vocabulary, syntax, pronunciation, accuracy, spontaneity, fluency, understanding, etc. (Kramsch 1986). Similarly, non score-dependent proficiency could be assessed by observing richness of musical vocabulary, correctness of musical syntax and comprehensibility of phrasing and prosody in the context of replicative, manipulative, and generative performance.

The purpose of this study was to validate an assessment protocol for the purpose of determining the measure of (non) score-dependency among instrumentalists, for example as part of an entrance examination. To that end, an assessment protocol was tested with conservatoire students. A brief description of the protocol follows.

Recordings of short tonal fragments were played and test subjects given various musical tasks to perform after listening to each fragment. Participants were requested to replicate, manipulate, or generate a response to a range of aural models.

- *Replicate:* (1) Repeat the music fragment exactly as heard, (2) transpose to another key, (3) transpose to the relative minor, (4) play a similar melodic contour starting at a higher note, while maintaining the same tonality.
- *Manipulate:* (1) Add a second voice (descant, bass, or alto voice, in thirds/sixths), (2) harmonize the melody (for keyboard players), (3) play a variation on the theme.
- *Generate:* (1) Play a continuation to an interrupted phrase, (2) play a spontaneously improvised melody, (3) whistle or hum a spontaneously improvised tune.

Analysis of the results is based on:

- In the case of replication, melodic similarity between model and performance.
- Appropriateness of substitutions and additions.
- Richness of musical vocabulary.
- Correct syntax.
- Dynamics and timing to discover discrepancies between structure and expressive performance.
- Results of the two conditions "play a spontaneous melody" and "whistle or hum a tune" are compared with discover discrepancies between the oral and manual domains.

Possible tools for analysis are:

- Tonal and harmonic analysis to uncover discrepancies in structural richness and regularity.
- Discrepancies in timing and dynamics between both domains.
- Statistical analysis to reveal discrepancies in, for example, variation in the frequency of appearance of the seven tones of the scale.

Results of the various tests are being correlated to validate their use within the test battery in instrumental performance. At submission of this report no results are yet available.

MAIN CONTRIBUTION

This study hopes to establish an assessment procedure that would allow conservatoires to test non score-dependency of prospective students at applica-

tion to professional institutes as well as later in the course of their studies. In addition the results of this study are being used to distinguish between score- and non score-dependent musicians in an associated fMRI study on the role of cerebral resonance behavior in the control of music performance.

IMPLICATIONS

The disappearance of improvisation from the curricula of conservatoires challenges educators not only to develop adequate teaching methods for tonal improvisation but also to develop assessment procedures to measure their effects.

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