



Comment

Knowledge clustering and the acquisition of creative expertise
Comment on “Musical engagement as a duet of tight synchrony
and loose interpretability” by Tal-Chen Rabinowitch



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ARTICLE INFO

Communicated by J. Fontanari

In Rabinowitch's tight-loose framework for understanding musical interactions [1], tightness is thought to arise from temporal synchrony, and looseness from ambiguity of music's meanings which leads to creativity. There's a robust literature, nicely summarized in the paper, that explores the demands and consequences of rhythmic synchrony, but comparatively less evidence is brought to bear on the alleged looseness of music's interpretations. Here we consider the source of looseness in musical meaning, as well as the consequence of loose contexts in enabling imagination and creativity.

While Rabinowitch links looseness with high flexibility and creativity, we believe this link deserves further examination. Creativity is the ability to produce work that is both original and appropriate [2]. It is defined not only by flexibility and looseness, but also by the ability to shift between convergent and divergent thinking (cf. blind variation and selective retention) [3,4]. Studies in the neuroscience of creativity and improvisation have highlighted the dual roles of anticorrelated neural networks that subserve convergent and divergent thinking processes [5]. Within the domain of musical improvisation specifically, real-time creative processes rely on the coupling of the auditory-motor pathway with executive and default networks [6]. The executive network is linked to convergent thought processes where there is a *tight*, one-to-one mapping between a problem and a solution, while the default network allows access to *loose* interpretability and spontaneous flights of the mind [7]. As such, the acquisition of expertise in creativity hinges not only on looseness, but also on the interplay between tightness and looseness – or more specifically, on the internalization of tight constraints prior to looser interpretations. To give a concrete example, a musician in an improvisational situation would first need to understand the tight rhythmic structure of an ongoing (group) improvisation situation before joining in by loosely deploying motifs/phrases, harmonies, and/or discrete pitches/scales at the appropriate times. Creative musical interactions thus rely on a tight shared knowledge of rhythmic or harmonic structures, as supported by duetting studies of musical improvisation [8].

This shared knowledge has also received recent scholarly attention in studies on imagined narrative. In a highly unconstrained task, designed to accommodate maximum looseness, participants were asked to describe any story they imagined while listening to musical excerpts. The target article cites this work as evidence that “listeners from different cultures pro-

DOI of original article: <https://doi.org/10.1016/j.plrev.2022.12.019>.

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cess and interpret narratives in instrumental music differently" (p. 127). But this characterization misses the other half of the findings: participants who shared a broad cultural background imagined highly similar stories to individual excerpts, and were able to select from two options with near-ceiling accuracy which story another participant had generated to that excerpt [9,10]. Given the world of possibly imaginable stories, within-culture listeners often freely generated more or less indistinguishable plotlines in response to specific excerpts. Some conjured up pastoral scenes of the sun rising over animals beginning to stir; others conjured up more dramatic scenes of chases featuring repeated attempted captures and escapes.

It's important to note two things about these studies: people weren't generating a single word descriptor or label; they were concocting multi-word stories. Additionally, they weren't selecting stories from a narrow list of possibilities; they were making them up independently with no special guidance or limitation provided. The convergence in their individual imaginings applies even when confronted with highly unfamiliar music [11], suggesting that at least in some ways, music's meanings may be less ambiguous than the target article claims.

The stories that individuals provide in response to particular excerpts can be plotted in semantic space, which may be conceptualized along a tight-loose continuum as well. Many of the stories cluster close to the center for a given excerpt, indicating that the individual imagined something like the "standard" story evoked by that excerpt. But some stories float further away on the periphery, indicating one of two possible varieties of looseness: one, the person was unaware of the music's conventional associations and imagined something idiosyncratic, or two, the person knew what the typical association was, but was able to flexibly adapt it into something more creative and unique. These two possibilities can be disentangled by subsequently asking participants to select which of a set of stories represents more conventional associations for that excerpt. Moreover, how creative their unusual responses were can be rated by a new group of participants. We'd hypothesize that the stories generated by participants who knowingly departed from the standard story would be evaluated as more creative than participants who simply came up with something unusual. This serves as just one example of the ways that the looseness required for creativity depends on tightness. The tight interplay between these attributes makes it difficult to claim that the tightness and looseness of musical interactions reside in entirely separate dimensions.

As music is a product of social learning and cultural evolution, Rabinowitch's idea that tolerant group membership emerges from a shift along the tight-loose balance (p. 123) is also reminiscent of the bifocal stance theory of cultural evolution [12], which proposes that the co-existence of innovative change and stable tradition results from our ability to adopt different motivational stances flexibly during social learning and transmission. By considering how music taps into shared and distinct knowledge between individuals in imaginative and creative tasks, future studies in the cognitive science of music may further relate musicality to theories of social context and social change, as exemplified by the tight-loose framework.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

This work was supported by the National Science Foundation (NSF-CAREER 1945436, NSF-BCS 2240330) and National Institutes of Health (NIH R01AG078376, R21AG075232).

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