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3. Creativity and Tradition: Music and Bifocal Stance Theory
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10. Abstract

We argue that music can serve as a time-sensitive lens into the interplay between instrumental and ritual stances in cultural evolution. Over various time scales, music can switch between pursuing an end goal or not, and between presenting a causal opacity that is resolvable, or not. With these fluctuations come changes in the motivational structures that drive innovation versus copying.

11. Main text

We believe that music, as a model system of culture, offers a time-sensitive lens into the interplay between instrumental and ritual stances in cultural evolution. Music perception and production has been posited as a real-time, flexible form of creativity (Loui, 2018). As such, musical experiences can switch between pursuing and not pursuing an end goal. Musical actions can present a causal opacity that is at times resolvable, and at times unresolvable. With these fluctuations come changes in the motivational structures that drive innovation and tradition.

These motivational shifts unfold at various timescales. At the slowest timescale, consider the decades-long evolution of musical styles. Take jazz music: rhythmic syncopation and the use of swing tempo are hallmarks of jazz. This signaling may have arisen from a causally transparent goal to create variation from its predecessor of ragtime, such as by Morton's re-recording of Joplin's "Maple Leaf Rag" (Temperley, 2004), which activated the instrumental stance. In the

hands of a modern jazz performer, however, swing and syncopation are automatically adopted, or copied with high fidelity from “the greats” during jazz instruction. The use of syncopation and swing can be seen as ritualistic, as they are normative articulations of action sequences that signal one’s membership as a jazz musician, as opposed to, e.g. a classical musician. Here, over the course of decades, the shift from instrumental to ritual stances drives the production of music from innovation to cultural evolution.

At a faster timescale, social interactions in music-making unfold on the order of minutes. Many experiments in music cognition have shown that a few minutes of moving in rhythmic synchrony with a partner leads to more prosocial behavior in children and adults (Hove and Risen, 2009; Kirchsner and Tomasello, 2010; Cirelli et al, 2014; Tarr et al, 2016; Rabinowitch and Meltzoff, 2017; Stupacher et al. 2020). Applied to BST, moving in time entails action sequences that activate the ritualistic stance, bringing about social bonding (Savage et al, 2021). At an even finer timescale, the brain generates predictions that are continually tested with millisecond accuracy by incoming events on the musical surface (Vuust et al, 2022). The dopaminergic system relates musical sounds to reward by learning from the systematic fulfillment and violation of these predictions (Salimpoor et al, 2015). Thus the acoustic and statistical properties of music help minimize prediction errors, freeing up attentional resources to be directed toward specific gestures embedded in observed actions, and activating more “Type 1 processing” in social learners.

Studying imitation versus innovation in musical interactions where goal-relevance is rigorously controlled could provide an excellent test model for Bifocal Stance Theory. Each of the pathways of the Cultural Action Framework depicted in Figure 3 of the target article could be probed by musical interactions with child participants. For the first row, in which no end-goal is present, children could enter a room with a drum, sitting across from an experimenter drumming a rhythmic pattern followed by pauses during which the child could join in. For the fourth row, in which the end-goal is present, but causally opaque and unresolvable, children could be expressly told when they enter that they are trying to play a rhythm that will make a set of puppets dance. The experimenter would play the rhythmic pattern, after which a second, unseen experimenter would make the puppets move in a different rhythmic pattern. Again in this situation, the prediction would be that children’s drumming would show high levels of exact copying of the rhythmic pattern drummed by the experimenter. For the second and third rows, the children would once more be expressly told that their goal is to play the rhythm that makes the puppets dance. But in the case of the third row, where the causality is opaque but resolvable, when the experimenter’s drumming stops, the puppets will dance in the same rhythm as had just been played on the drum, rendering the relationship resolvable. The child could extrapolate the relationship between drumming and dancing to conclude that the puppet would move to whatever rhythm they play, resulting in more novelty and less copying in their own drumming pattern. In the case of the second row, the relationship between drumming and dancing would be made causally transparent by the puppets moving once per strike to the experimenter’s drumming pattern as it is played. Here, the prediction is that children, fully aware of the mechanics of the interaction, would explore more with novel drumming patterns.

What makes music an especially useful domain within which to explore switching between the ritual and instrumental stance is that copying is a highly common, ecologically valid mode of interacting musically; music is characterized by more repetition at more different levels than speech (Margulis, 2014). Musical behaviors can be explored not only in the context of production, as in the examples above, but also in the context of perception. In the case of perception, copying behavior may consist of listening and relistening to the same song or exploring new ones. Consider the listening behaviors that adolescents adopt when they see their friends listening to certain songs outside the context of a specific end-goal, versus when one is clearly present: listening to hype themselves up for a party that night, or to increase focus during studying, or to help them lift heavier weights at the gym. The first case might inspire the teenager to cue up their friend's specific songs, whereas the latter ones might yield a wider range of choices, involving the exploration of new playlists designed for a similar function.

Makers and consumers of music with expressly functional roles—aiding relaxation, soothing infants, rallying troops—may adopt an instrumental stance when using it toward an end goal. In contrast, people who download and listen to the same music may not be able to resolve its causal mechanism. Thus, they may view it instead from the ritual stance, motivating the “copy all, correct later strategy” of overimitation.

12. Acknowledgements Statement

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13. Conflict of Interest Statement

None.

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OLD STUFF

Extra text

Basic thesis: examining music can help illuminate the influence of instrumental and ritual stances in cultural evolution

Music making is a time-sensitive lens into the shifting between instrumental and ritual stances in cultural evolution.

In music, sometimes the end goal is present, sometimes not. Sometimes causal opacity is resolvable, sometimes not. It switches back and forth, over various time-scales. And that changes the motivational structures for innovation vs. high fidelity copying.

A unique feature of music is that its (acoustic and statistical) properties inform prediction and serve to minimize prediction errors, which in turn direct attention towards the gestures in observed actions, thus activating more “Type 1 processing” in the social learner.

Instrumental stance:

Obviously, practicing music has the end goal of making it sound better, and musical instruments are cultural artifacts that are developed around making better sounds.

But music can also inform BST in more obscure, perhaps more interesting ways. For example, Functional Music (like [Brain.fm](#) and its competitors) has a clear end goal, which puts its makers in an instrumental stance.

Ritual stance: music involves:

End goal demotion

Orientation to social and affiliative outcomes

Attention to the gestural level (lower than script/behavior)

(This is part of what differentiates music’s effects from “the experience of working together on an instrumental task, such as fixing a vehicle or building a fence”)

High copying fidelity in some musical traditions

Music establishes discrete in-groups & helps define identity

Causal opacity is often irresolvable

Studying imitation vs. innovation in musical interactions where goal-relevance is controlled for = excellent test model for BST

Cf: “BST would predict that magical practices crossing a group boundary are likely to undergo modification (because they are more likely to be copied by outsiders via an instrumental stance) while the transmission of the same magical practice within a group would entail higher fidelity copying (because it is part of the conventional repertoire that is maintained via affiliative motivations).”

Drawing from the Cultural Action Framework (Figure 3), we propose to illustrate each of its pathways with specific examples in music in everyday life.

For example, functional music for focus, for relaxation, for working out, for soothing infants, for rallying troops. ← clear end goal

Song example from page 23: not making flowers grow

Kirchner and Tomasello - Musical thing together, role of repetition

Rabinowitch and Cross and Meltzoff

Cirelli and Trainor

Phillips-Silver and Trainor

Makers and consumers of this music may adopt an instrumental stance when using such music towards an end goal.

But people who download functional music and listen to it may not be able to resolve its causal mechanism and therefore treat it as a ritual, thus motivating “the ‘copy all, correct later’ strategy that is typical of instrumental overimitation.”

Tradition and Invention: The Bifocal Stance Theory of Cultural Evolution

Music and the Bifocal Stance Theory

We argue that music can serve as a time-sensitive lens into the interplay between instrumental and ritual stances in cultural evolution.

Over various time scales, music can switch between pursuing an end goal or not, and between presenting a causal opacity that is resolvable, or not. With these fluctuations come changes in the motivational structures that drive innovation versus high-fidelity copying.

- Stylistic change over decades – cultural evolution. The evolution of musical style is signaled by communicative pressures that switch from an instrumental stance to a ritual stance. , that of conscious articulations of communicative intent on the musical surface (notes and durations) a ritual stance.
- Particular musical / social interactions
- Fine timescale of (typical) predictive coding studies (MMN)

Music’s acoustic and statistical properties help minimize prediction errors, directing attention toward specific gestures embedded in observed actions, and activating more “Type 1 processing” in social learners.

Tension between instrumental and ritual stances

Studying imitation versus innovation in musical interactions where goal-relevance is rigorously controlled, could provide an excellent test model for Bifocal Stance Theory. Starting from the Cultural Action Framework depicted in Figure 3 of the target article, we propose to illustrate each of its pathways with specific examples from music in everyday life.

For example, music can serve a **functional role**: aiding relaxation, soothing infants, supporting exercise, or rallying troops. Makers and consumers of this music may adopt an instrumental stance when using such music toward an end goal. In contrast, people who download and listen to the same music may not be able to resolve its causal mechanism. Thus they may view it instead from the ritual stance, motivating the “copy all, correct later strategy” of instrumental overimitation.

Obviously, practicing music has the end goal of making it sound better, and musical instruments are cultural artifacts that are developed around making better sounds.

But music can also inform BST in more obscure, perhaps more interesting ways. For example, Functional Music (like [Brain.fm](https://www.brain.fm/) and its competitors) has a clear end goal, which puts its makers in an instrumental stance.

Perception might be more causally opaque and production more causally transparent

Recommendations or predictions from BST for music cognition research, how does music help look at BST

How do we link these timescales from predictive coding through meso-scale social interactions to stylistic change over decades

Savage curr biol

Fitch choric (music) / dialogic (language) distinction – simultaneous vs sequential

The Bifocal Stance Theory offers a comprehensive account of the flexible switching between tradition and invention that gives rise to cultural evolution.