



Artificial Intelligence and the Limits of ‘Understanding’ Indigenous Oral Music Traditions

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“To err is human; to forgive, divine” - Alexander Pope (1688-1744)

Abstract

In many Indigenous music traditions, knowledge is transmitted orally through performance, gesture, body movement, and community interaction rather than via written notation or formal music theory. This is called ‘embodied knowledge’, a form of tacit, deeply cultural learning that resides in physical practice, memory, and social context. In contrast, AI systems learn from large datasets that are digitized, decontextualized, and labelled, and depend on quantifiable input. This creates a potential mismatch between how music is known, experienced, and transmitted and how AI understands and processes it. The main difference is in listening. What it hears versus what a human hears and understands culturally and consciously are the key questions in this context. This article examines the ethical role of artificial intelligence in its interpretation and representation of oral, embodied, and performative musical knowledge that is not typically documented in musical notation or standardized formats. This study explores indigenous music traditions to investigate what might be lost when these musical forms are fed into machine learning systems. In conclusion, the article discusses how artificial intelligence, particularly generative models like music synthesis or style imitation tools, interacts with issues of cultural authenticity, authorship, and representation in musical traditions.

Keywords: Musicology, Digital Humanities, AI ethics, Indigenous studies, Musical Anthropology

Introduction

The concept of ‘Embodied cognition’ in modern Psychology studies challenges the assumption that thinking is confined to the brain, and emphasizes that cognitive processes are grounded in bodily experience and interaction with the environment. Research across philosophy, psychology, and neuroscience suggests that perception, memory, and even abstract reasoning take shape by the body’s morphology, physiology, and movement, meaning that cognition is inseparable from embodied practice^{1,2}. This perspective is important in music traditions where learning occurs through gesture, movement, and performance rather than written notation.

¹ American Psychological Association. *How the Body Shapes Knowledge*. APA, 2010, <https://www.apa.org/pubs/books/how-the-body-shapes-knowledge-intro-sample.pdf>.

² “Embodied Cognition.” *ScienceDirect*, 2023, <https://www.sciencedirect.com/topics/psychology/embodied-cognition>.

Closely related is the concept of ‘Tacit knowledge’, a form of unspoken, experiential understanding that is acquired through practice and social engagement. Skills such as musical timing, improvisation, or cultural interpretation often resist codification and make tacit knowledge indispensable yet difficult to transmit outside lived contexts³. In many Indigenous traditions, this ‘embodied’ and ‘tacit knowledge’ forms the foundation of musical transmission. Artificial intelligence complicates this picture by introducing machine listening. Because it is a system that analyze and interpret audio data. While these systems can process vast amounts of sound, they lack the cultural rooting that shapes human listening. Scholars emphasize that listening is not a neutral act. It is formed and developed in social, political, and cultural dynamics⁴. Machine listening, therefore, raises questions about power, representation, and the reduction of music to quantifiable data⁵.

From an anthropological perspective, understanding requires empathy, and dominant Western constructs of ‘empathy’ often fail in intercultural contexts. This is how a lack of empathetic understanding of cross-cultural exchanges can lead to misinterpretation⁶. This article brings these concepts together to examine the ethical and cultural stakes of applying AI to Indigenous musical knowledge and tradition.

Objectives

The main objectives of this study are-

1. To examine how AI-generated music interacts with Indigenous musical traditions,
2. To analyze ethical, cultural, and epistemic implications of applying AI to Indigenous music, including issues of community consent, cultural ownership, authenticity, and potential appropriation.

Methods and Data

This study examines how Indigenous musical knowledge, particularly its embodied and holistic dimensions, resists computational abstraction when processed by generative AI models. A dataset of nine songs was drawn from open-access sources representing chant traditions, pedagogical practices, and performance contexts. These selections were chosen because they carry traditional and grounded aspects of musical knowledge that are difficult to encode within computational logic. For example, some traditions emphasize bodily interaction and pedagogy rooted in gesture, breath, and physical synchronization. Some musical traditions has a direct connection to natural environments, where mood, weather, and community context shape composition in real time. In some traditions, songs are not discrete musical objects but stories that weave together lived experiences, environment, and collective memory, like Jaduni Kolija songs of the Tripuri Community of North East India.

³ Gourlay, Lesley. “Tacit Knowledge in Research Practice.” *Higher Education Research & Development*, vol. 41, no. 7, 2021, pp. 2143–2157. Taylor & Francis Online, <https://doi.org/10.1080/07294360.2021.1937066>.

⁴ Adorno, Theodor W. *Introduction to the Sociology of Music*. Translated by E. B. Ashton, Continuum, The Seabury Press, 1976.

⁵ Hedayati, Mona. “Listening Otherwise: Machine Listening and Cultural Politics.” *Computational Culture*, 2024, <https://pmc.ncbi.nlm.nih.gov/articles/PMC11208846/>.

⁶ Eichbaum, Quentin, et al. “Empathy and Its Discontents: Intercultural Challenges in Global Health.” *Academic Medicine*, vol. 97, no. 10, 2022, pp. 1413–1419. PubMed Central, <https://pmc.ncbi.nlm.nih.gov/articles/PMC9491267/>.

Analysis focused on comparing original recordings with AI-generated productions available to identify what was reduced, lost, or transformed. Throat singing traditions, Mongolian for instance, were examined for differences in vocal texture and embodied resonance between human and generated versions. Pedagogical videos were observed to understand how body movement and breathing patterns inform musical timing, like in Inuit singing. Songs imitating natural sounds and microtones produced by the human voice revealed the limitations of computational reproduction of music. Finally, lyrical analysis of one song (Jaduni Kolija songs) demonstrated the conversational, social function of song, highlighting divergences from standardized equal-tempered scales often assumed by AI systems.

Data Analysis

Nine (9) songs from open access sources (Based on what kinds of musical knowledge resist computational logic) were collected and analysed. Here is a representation of Data analysis-

Indigenous songs	Characteristics	Loss of Nuances in AI
Mongolian Throat singing	Community or individual participation	Meditative experiences by the performer, the body vibration is lost
Inuit Singing	Community participation	Body contact to synchronize breathing for a common spirit is lost
Tuvan Throat singing	Meditative, dual tone from one individual voice	The machine creates a dual tone by assuming them as two tracks. The mindful singing experience creating human wonder is missed.
Jaduni Kolija songs	Deeply rooted in nature and lived experience, unscripted, IKS, non-equal-tempered scale	Holistic lived experience is lost
Turkish Throat singing	Meditative, community, or individual participation.	Creative layers influenced by modern music are added, beats changes meaning and significance

Issues

AI-generated music reduces human experiences

AI-generated music abstracts human experience, and reduces embodied, cultural, and communal knowledge that are inherent in traditional practices. Expressive timing, microtonality, and context are flattened. It limits the psychological and consciousness-expanding effects. Without ethical engagement with originating communities, AI risks misrepresentation, appropriation, and loss of the relational and performative dimensions that are central to Indigenous musical traditions.

Applying artificial intelligence to Indigenous music traditions raises several critical challenges. A primary concern is the loss of nuance. Many traditional practices rely on expressive timing, microtonality, and subtle emotional inflections that cannot be fully captured by computational systems. Generative AI often simplifies these complexities into standardized formats. It will strip the music of its cultural depth and embodied qualities.

Equally important are ethical considerations. Digitizing and analyzing cultural heritage without the meaningful involvement or consent of Indigenous communities may risk appropriation and

misrepresentation. Such practices may transform living traditions into data points, and detach them from the social and spiritual contexts in which they hold meaning.

Finally, it is important to recognize that Indigenous melodies are not universally generalizable. Each tradition is deeply situated in its community, environment, and history. Treating these practices as interchangeable datasets undervalues their uniqueness and perpetuates forms of cultural reductionism.

Theoretical Frameworks

Some theoretical perspectives on cultural representation, decolonization, and ethnomusicology guides this study substantially. Stuart Hall's work on cultural representation emphasizes that meaning is not a neutral reflection of reality but an active process shaped by power relations. Through his encoding/decoding model, media producers (encoders) construct messages using signs and symbols, which audiences (decoders) interpret in dominant, negotiated, or oppositional ways. Hall argues that representation is central to identity formation, as identities are continually mediated by cultural contexts and the representations encountered in social and media practices⁷.

Complementing Hall, Linda Tuhiwai Smith's *Decolonizing Methodologies* critiques Western research paradigms and advocates for Indigenous-led approaches to knowledge production. Smith stresses that each Indigenous community possesses distinct epistemologies and histories, which cannot be generalized or interpreted through colonial methodological lenses. She calls for research rooted in community engagement, reclamation of epistemic sovereignty, and the recognition of local narratives as legitimate sources of knowledge⁸.

Ethnomusicological theory further informs this study. Steven Feld's concept of "voicing" shows how sound and song operate as dialogical acts, through which Indigenous communities move with their own cultural agency and maintain ownership over narrative and sonic expression. Giving ground to the concept of the relational and performative dimensions of music, Feld emphasizes the inseparability of cultural meaning from embodied and communal practice⁹.

Theoretical Anchor

The ethical and cultural implications of applying artificial intelligence to Indigenous knowledge can be understood through studies on algorithmic bias, cultural epistemologies, and digital colonialism. AI systems, particularly those designed and deployed within Western systems, risk perpetuating colonial modes of representation with systemic biases, marginalizing Indigenous epistemologies, and appropriating cultural expressions without consent or contextual understanding.

Muldoon and Wu argue that the production of AI is deeply entangled with historical colonial power structures. They identify a "colonial supply chain of AI," in which global economic and political imbalances are reinforced through the international division of digital labor, and extract value from majority-world labour to benefit Western technology companies. This

⁷ Hall, Stuart. *Representation: Cultural Representations and Signifying Practices*. Sage, 1997.

⁸ Smith, Linda Tuhiwai. *Decolonizing Methodologies: Research and Indigenous Peoples*. 2nd ed., Zed Books, 2012, p. 90, <https://nycstandswithstandingrock.wordpress.com/wp-content/uploads/2016/10/linda-tuhiwai-smith-decolonizing-methodologies-research-and-indigenous-peoples.pdf>.

⁹ Feld, Steven. *Sound and Sentiment: Birds, Weeping, Poetics, and Song in Kaluli Expression*. University of Pennsylvania Press, 1990.

process perpetuates hegemonic knowledge production and marginalizes non-Western epistemologies, constraining opportunities to decolonize AI¹⁰.

Similarly, Ofosu-Asare argues that Western-centric AI models not only reproduce bias but also limit the ethical and inclusive potential of AI technologies. Indigenous realities are frequently misinterpreted or ignored, producing solutions that are culturally insensitive, ineffective, or potentially harmful¹¹. Addressing these disparities requires challenging the epistemic dominance of Western paradigms and bringing technologies that are both ethical and contextually grounded.

Discussion

Anthropology and Understanding Indigeneity

Anthropology teaches to see the world through the subject's eyes. The difference between methodological outputs creates a great impact. The majority of the population, if they become AI savvy, then we cannot expect empathy from humans to understand what indigenous culture lives with and want to sustain. Therefore, certain matters should be kept away from AI, or the responsible use of AI should be mandated.

Who decides what is authentic?

Authenticity in Indigenous music is to be determined by community owners and cultural stewards, who hold and govern Indigenous Cultural and Intellectual Property (ICIP) based on ancestral protocols, not by external developers, colonised power settlers, or AI systems.

Harm to the tradition and benefits of Indigenous pedagogy and practices.

When AI models replicate songs without community consent, they strip away spiritual context and communal authorship, undermining place-based learning grounded in lived experience and oral traditions.

AI to recreate Indigenous music risks reducing songs to mere data and erasing their intergenerational memory, spiritual depth, and cultural identity essential to Indigenous pedagogical systems.

Human's right to experience

Indigenous music is a lived experience of contemplation, community understanding and realisation, understanding each other without words and evolving. Even if AI is upgraded more to replace or recreate human participation to create music, it should not do so. Because it may distract the generation from its roots.

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¹⁰ Muldoon, James, and Boxi A. Wu. "Decolonizing Artificial Intelligence: Power, Labor, and Knowledge in Global AI Production." *AI & Society*, vol. 38, 2023, pp. 1–19, <https://link.springer.com/article/10.1007/s13347-023-00687-8>.

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