

Language and Music Cognition in the Classroom



Universiteit
Leiden
Academy of Creative
and Performing Arts

Teresa Proto

Leiden University & Meertens Institute, Netherlands
t.proto@hum.leidenuniv.nl



Framework

- Teaching about the evolution of language and music to a disparate audience
- Evolutionary theorizing and ethnomusicology

Research Question

IS SINGING REALLY THE MOST ANCIENT FORM OF MUSICKING?

C. Sachs: "Music began with singing" (1943: 21)

- For ethnomusicologists, vocal music preceded instrumental music, essentially for technological reasons
- Earliest musical artefacts (Geißenklösterle, Germany) date to 42-43 Kya

Paleolithic flute made from an animal bone



Picture by José-Manuel Benito Álvarez, CC license

- However, music is assumed to be much older (cf. Tomlinson, 2015)

1. Does protomusic equal protosong?

- This is explicitly/implicitly assumed in most evolutionary models (cf. Brown, 2000; Mithen, 2005)
- BUT musicality can be expressed in different modalities:
 - vocally vs. instrumentally
- Only vocally expressed musicality requires a vocal learning mechanism



1st theoretical necessity:
Dissociate musicality from vocal learning

2. Musicality: Capability for Melody and Rhythm

- Structurally, musical **melody** involves a set of discrete pitch intervals (and timbres) and phrasing. Prerequisite: frequency and spectral sensitivity of the auditory system, articulatory control
 - Singing requires in addition a vocal channel capable of producing those pitches
- Structurally, musical **rhythm** involves temporal patterning and alternation of weak and strong beats. Prerequisite: auditory and motor networks, capacity for rhythmic entrainment
 - The capacity for rhythm does not presuppose a vocal-auditory apparatus meant for vocalization

Proposal: keep the two capacities distinct!

- Neuropsychological evidence:
 - hemispheric lateralization (right hemisphere for melody, left hemisphere for rhythm)
 - different types of congenital amusia (Peretz, 2003) result in deficits on either the melodic (tone deafness) or the rhythmic dimension (beat deafness)
- Ethno-musicological evidence: most vocal genres are differentiated along these two dimensions

2nd theoretical necessity:
Dissociate melodic from rhythmical musicality



3. Hypothesis: instrumentally expressed musicality first

In the rudimentary form of bodily percussion, stomping, clapping etc.

- Protomusicality involves beat perception and synchronization to the beat (BPS)
 - BPS is an internal response to a regular, recursive sequence of stimuli
- Ontogenetically: beat perception is already present in newborn infants (Winkler et al., 2009)
- Phylogenetically: nonhuman primates lack BPS. Trained monkeys perform better at BPS with a visual rather than an auditory metronome (Patel, 2018)
 - Elephants and some birds species who have vocal learning also show BPS, but other species only have one capability (e.g. sea lions)
- Ethno-musicological evidence: rhythm and timbre (not melody) are central features of many African and Asian musics (e.g. drumming)
- Theoretical advantage: no need to posit vocal learning, compatible with protosign.

4. Hypothesis: rhythmical musicality first

- Protomusic is about rhythm not melody
- Scenario: at a time when hominins were able to communicate with signing, they were also able to synchronize to some regular beat (using auditory, or more likely visual and vibrotactile information, cf. deaf people)
- Evolutionary advantage: Rhythmical musicality favors coordination in collective actions
- Ethno-musicological and anthropological research suggests that a principal function of music in oral traditions is to promote coordination, group cooperation and cohesion.

5. What about melody?

- Melodic protomusicality evolved in conjunction with the development of a vocal-auditory system capable of distinguishing and producing the details of the acoustic signals
- It developed out of the vocalization system (calls) of our ancestor with monkeys
- Initially it took the form of a holistic processing of contour, not the discretized perception of stable pitches
- Acquisition studies: Contour processing is the most salient musical feature in infant listeners (Trehub et al., 1984), but beat perception is earlier

6. Discussion Points for Comparing Music and Language

- The ability to sing is the endpoint of an evolutionary (and developmental) process, not the starting point.
- Holistic processing of contour might be common between language and music. What about rhythm? Which aspects of rhythm are shared?

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