MPATC-GE 2042:
Psychology of Music

Evolution and Origins
Notes for this week

- Discussion leading schedule is posted now:
  https://docs.google.com/document/d/1S7xgkPVTZB4v0LGUJghGnEETHl4VzBWR7qWPwWtN89DI

- If you haven’t filled out the background questionnaire yet, please do so as soon as possible:
  https://docs.google.com/forms/d/1XZv09HR1rWZJpiyA7bnWwzikGWwPxttvloC7rsi0eYQ/

- Research group assignments will be posted on September 18 (the day after the drop date)

- Grades for reading questions and other assignments will be posted on NYU Classes
Reading research articles

• Typical format:
  – Abstract
  – Intro
  – Method (Participants, Procedure, Materials)
  – Results
  – Discussion

• How to read an article?
  – Method and results are the most technical sections
  – Start with Intro
Thompson, Chapter 1: Abiding controversies in music cognition

- Researchers vary in their approaches to studying music cognition. Some typical areas in which there have been differences:
  - The kinds of stimuli and methods that are most valuable for gaining an understanding of music psychology
  - Whether music psychology is best explained in terms of brain structures and processes or by more abstract psychological laws, principles, and models
  - The relative importance of innate structures vs. learning to the development of music
- The appropriate level at which to investigate and explain a psychological phenomenon needs to be determined (e.g., makes no sense to explain the cognition of composition in terms of neurons)
- Studies directed at different analytic levels often pose different questions, use different methods, and promote different theories
Some controversies, continued

• Ecological validity
  – Beeps vs. Beethoven
  – What’s universal? What can Western listeners’ perception of Western music really tell us?
  – The difficulties that plague many contemporary studies of, for instance, “musical emotion” may be a symptom of how, in seeking to simplify a phenomenon for experimental purposes, there is the danger of missing the “complicated successions of psychological conditions”
  – A complete understanding of music cognition requires the convergence of data obtained using varying approaches and methods

• Predisposition to certain types of music (innate) vs. environmental influences
  – Many scholars are skeptical of all nativist constructs such as musical talent, and prefer to emphasize social learning, education, and enculturation
  – Others argue that our experiences of music are constrained in subtle ways by innate cognitive principles
  – Developmental studies can help shed light on this issue
Nativism vs. behaviorism

• Behaviorists claimed that all organisms start life with a blank slate and that all animal behavior is learned—the so-called nurture view.

• Nativists have successfully challenged this assumption, proving that some behaviors cannot adequately be explained by learning alone, and that certain innate or “hard-wired” behaviors must exist—the nature view.

• Most researchers studying animal and human behavior today acknowledge the contribution of both nature and nurture.
Recent areas of research growth

• Renewed interest in evolutionary theories of music
• Studying how music can communicate emotion
• Music and the brain
adaptations – traits that emerged in response to evolutionary pressures

Listening to and playing music seem irrelevant to issues of survival and reproduction, so it is difficult to conceive of why such behaviors ever evolved
  – We enjoy it, but our survival doesn’t depend on it

Traits may develop either as adaptations or as a result of other evolutionary or cultural processes (nonadaptations)

Maybe music evolved because it enhanced survival or reproduction a very long time ago in ways that do not apply today

On the other hand, maybe it evolved from purposes that originally had nothing to do with music
Adaptations

• Both physical and mental adaptations can evolve through one of two processes: sexual selection or natural selection
• What evidence might there be for an adaptationist account of music?
  – First, developmental evidence suggests that music is innate: infants are sensitive to musical relationships without the benefit of formal instruction
  – Second, music is highly complex, and the degree of complexity in music is not obviously culturally determined
  – Third, music is recognized as having modular structure, and is considered a distinct type of intelligence
  – Fourth, music is not a recent cultural phenomenon, but has been part of human behavior for thousands of years, perhaps as long as language
Adaptationist theories based on reproductive benefits

• Assumes that music functioned in the attraction of mates for reproduction

• Musicality in humans does not seem to be sexually dimorphic, which casts some doubt on the possibility that musical ability is a sexually selected trait (as opposed to peacock tails)

• Musical skill might be attractive in general
  – There are parallels between musicians and athletes, for example
  – Rock stars
Adaptationist theories based on survival benefits

• Assumes that musical behaviors allowed individuals to survive in the environment long enough to reproduce

• Nurturing social bonds
  – Includes the emergence of vocalizations that evolved into speech and music
  – Builds cohesion among large groups of people

• Training coordinated movement
  – Rhythmic elements of music engage skills of regulated movement, which could benefit group tasks such as hunting and herding
  – One limitation of this hypothesis is that it emphasizes rhythm and leaves other features of music (e.g., melody and harmony) unexplained
Adaptationist theories based on survival benefits, continued

• Enhancing cognitive and social skill
  – Contexts, sounds, and actions associated with musical activities are highly diverse
  – For infants, this property makes music an extremely valuable developmental tool for exploring, testing, and developing cognitive skills such as cooperation and coordination with others, the capacity for sustained and focused attention, pattern detection and recognition, etc.

• Promoting emotional conjoinment
  – Variant of social bonding hypothesis
  – Music, along with dance, originated as part of a multimodal system of parent-offspring communication (vocalizations, body movements, facial expressions)
  – Interactions were not just social, but promoted powerful emotional connections because strong emotional bonds were needed to ensure longer and better parental care of infants
Adaptationist theories based on survival benefits, continued

• Affective engagement
  – Music emerged in evolution not because of its unique characteristics, but as one of many powerful affective systems; music provided the ability and motivation to attune to and influence the affective states of other humans
  – Theorists think these cultural activities were enabled and supported by the evolution within *Homo sapiens* of a powerful new cognitive capacity, called theory of mind
  – Theory of mind allows us to take the perspective of another individual, such that we can more effectively understand, predict, and even influence the behaviors of others
  – Taken from this perspective, our experience with artworks can be understood as a form of affective exploration—a means of investigating affective communication within a safe environment
  – However, although not all musical behaviors transmit emotional messages in a literal sense, all musical experiences do involve a *core affective dimension*, and it is this dimension that allows music to function flexibly over a wide range of contexts (courting rituals, funerals and religious ceremonies, sporting events, social gatherings)
Nonadaptive theories of musical origins

• Nonadaptationist mechanisms include genetic drift, laws of growth and form (such as the general relationship between brain and body size), direct induction of form by environmental forces such as water currents or gravity, and exaptation (when new uses are made of parts that were adapted for some other function)
• Exaptation performs a completely different function from that for which it evolved
• Examples: Feathers were initially selected for insulation and not for flight; insect wings were initially selected as fanlike structures for cooling; legs evolved from lobed fins used for swimming
• Music is not an indivisible whole, but an interaction of several distinct qualities including rhythm, tempo, grouping, melody, harmony, and timbre; many of these qualities are processed in discrete neural areas
• Quite possibly, some components of music may be adaptations, whereas others may be exaptations
Nonadaptationist perspectives, continued: Music as a drug?

- Theory: music induces pleasure merely by stimulating processes that have important adaptive functions
- Such a technology is comparable to the invention of drugs, which are nonadaptive but induce pleasure by interacting with neurochemical systems
- Pinker: In this view, music is “a cocktail of recreational drugs that we ingest through the ear to stimulate a mass of pleasure circuits at once.”
- When something catches our ear, we like it to be repeated endlessly in the song (e.g., we cannot get enough of a good hook)
- The degree of repetition in music often borders on the ridiculous, and suggests that our desire to hear musical hooks over and over is somewhat like an addict desperate for another fix, or an alcoholic frantic for another drink
Precursors of music

• The study of musical origins will always be highly speculative
• Did music originate from animal calls or birdsongs?
• One property that distinguishes human music from most animal calls is intentional transposability
  – Animal sounds such as birdsongs tend to be locked into specific functions, whereas human music is distinguished by its flexibility
  – The vocal signals observed in birds, monkeys, and apes, in contrast, are hard-wired and have limited variability
• Language and music might have emerged at the same time as two distinct signal systems...
  – ... or one system might have developed as an outgrowth of the other system,
  – ... or a precursor to both systems—a “musilanguage”—might have developed and then later diverged into two separate systems
Cross-species perspectives on music
Article discussion: McDermott (2009)

• Discussion leader: Mihir Gaikwad
The article at one point says that ethnomusicology was factored into certain areas of studies, however the studies on Musical Syntax seem still specific to Western ideas. No indication of languages tested was made in the study, but is it plausible that these tests could have had altered results between different languages as the syntax differs in origins of language? For example, Mandarin is a very tonal language as opposed to the stem based Latin languages. Is it plausible that this difference in language syntax could have a large impact on the resulted correlations between language, sound, and the ERP’s that were examined? (Shannon)
Reading questions: Music and syntax II

• In his article, McDermott describes an experiment made by combining sentences with chord sequences that created tension using “unexpected chords” and grammatical errors. The purpose was to explore the correlation between linguistic and musical syntax. Even though the experiment reported "similar behavioral effects" between syntaxes, it is unclear if the test subjects belonged to a particular age or cultural group. Would the results of the experiment vary depending on the cultural context and language of the test group? What would happen if the group used a tonal language such as Chinese? What would happen if the notes used on the chord sequences were part of a non-Western scale, or if the test subjects belonged to a cultural context familiar with microtonal scales? (Julian)
Reading question: Musical syntax III

• In the Musical Syntax section, McDermott mentions two different studies, but fails to describe the characteristics of the participants. Are we to assume that the participants were a diverse group of people with various musical/syntactical knowledge? Would the results be different for people with different amounts of knowledge/experience? The same questions apply to the Relative Pitch section. (Max)
Is it possible the differences between humans and non-human animals in relative pitch recognition are due to differences in linguistic/communicative processing between species (not specific to music but not general to all audio processing)?

Thoughts on this question:

Humans rely on contour when recognizing melodies and transposing the notes does not matter. This to me sounds similar to recognizing patterns in speech. It may not matter the specific pitch of a person's voice (low or high); contour may play a more important role. For instance, having the contour rise towards the end of a sentence can indicate a question, regardless of the specific frequency of the voice. In contrast, pitch may be more important for non humans (such as birds). In particular, the meaning of a particular bird song may rely more heavily on the specific frequencies hit in the song.

McDermott's study showed that humans can recognize transpositions in other aspects of acoustic signals (volume, brightness) while keeping the contour the same. An interesting follow up study would be to train non human animals (i.e. birds) to see if they could recognize transpositions in these domains or if they struggle like they do with pitch. (Henry)
Reading questions: Relative pitch

• On p. 165, the author cites studies that hypothesize our ability to generalize pitch contours indicates the presence of a "music-specific, uniquely human process." Disregarding the author's own work disputing these claims through finding similar results with other musical features like volume and brightness, doesn't spoken language, and not music uniquely, require an ability to generalize pitch contour too? For example, we would understand the sentence "The restroom is there?" to carry the same meaning regardless of its transposition - whether a child with a high-pitched voice or an adult man with a low-pitched voice is speaking. The sentence's pitch contour though, whether it moves up or down in pitch at the end of the sentence, changes whether we would perceive it to be a question or statement. (Willie)
Reading questions: Applications of music

• Is it possible and worthwhile to discuss the origins of music without bringing up the potential biological, societal, and evolutionary functions of music, such as emotional communication, the nurturing social bonds, and reproductive benefits?

• According to McDermott, the evidence for innate influences on the origins of music are all highly specific and comprehension based: being able to identify pitches, tonal structures, and periodic rhythms. Is there more to our experience of music than pitch, tonality, and rhythm? And if so, what else would you include as important in understanding why humans create music? (Johnny)
Reading questions: Meter

- In reference to the following quotation: “It has been argued that meter perception is present in young infants (Hannon & Johnson, 2005), though this remains controversial (Patel, 2008).” (McDermott 167) How do we think that this has been studied, and what validity do we see in this argument? Do you believe that meter perception is innate, or is it a result of exposure to music with different meters? If it is innate, is meter perception purely music-related, or could it be a result of a mechanism that evolved for some other purpose? (Tyler)
In his article, McDermott states that “the periodic organization (of beats) is an apparently universal feature of music not present in speech” and then he adds that, “we generally hear beats as having a hierarchical organization known as meter” Nevertheless, reminiscent African music together with some musical traditions of India, articulate music without a meter and with a flexible periodicity dictated by the length of a sentence. Could this possibly indicate that while rhythm is a biological trait, the perception of meter is rather an adaptation of a particular culture? (Julian)
McDermott suggests that "in addition to exploring how individuals hear or produce musical structure, we need to examine the effect of music on groups of people and on people engaged in other activities." While this seems reasonable, it is unclear to me how such an examination would assist in the quest to discover the origin of music. What kind of results would point to either of the two theories on music's origin? (Max)