

# Music and Animal Emotion Mimicry

Evidence supports that music enjoyment originates from its mimicry of animal emotional signals through similar acoustic features and neurological mechanisms.

## Abstract

Evidence from theoretical reviews, comparative studies, and a few empirical investigations indicates that human music may tap into mechanisms similar to those found in animal emotional cries. Fritz and Koelsch (2013) assert that both humans and African great apes share acoustically mediated emotional contagion. Snowden et al. (2015) report that music exhibits acoustic features—such as pitch, rhythm, and timbre—that parallel those in animal vocalizations. Fitch (2005, 2006) and Panksepp (2009) describe evolutionary homologies and pre-adaptations suggesting that the basic motor and emotional systems involved in animal calls could have contributed to the emergence of music.

Several studies also note that mechanisms for social bonding and group coordination underpin both animal vocal signals and human musical expression. For example, Snowden (2021) demonstrates that species-specific music can elicit measurable emotional responses in nonhuman primates, while others emphasize that shared neurological responses support the notion of communicative overlap. Together, these findings support the view that aspects of our enjoyment of music may arise from its resemblance to animal emotional signals.

## Paper search

Using your research question "Does evidence support the theory that we enjoy music because it mimics animals' emotional cries?", we searched across over 126 million academic papers from the Semantic Scholar corpus. We retrieved the 50 papers most relevant to the query.

## Screening

We screened in papers that met these criteria:

- **Comparative Analysis:** Does the study include direct comparison between animal vocal communication and human music?
- **Emotional Content:** Does the study examine both emotional aspects of animal vocalizations AND emotional responses to human music?
- **Acoustic Analysis:** Does the study analyze the acoustic properties of both human music and animal vocalizations?
- **Evolutionary Framework:** Does the study include analysis of the evolutionary basis of musical perception?
- **Neural Evidence:** Does the study include neuroimaging data comparing responses to music and animal vocalizations?
- **Evidence Synthesis:** Is the study a systematic review or meta-analysis focusing on music perception, animal communication, or evolutionary musicology?
- **Study Focus:** Does the study go beyond purely technical aspects of sound production, music theory, or human speech analysis?
- **Vocalization Context:** Does the study examine animal vocalizations beyond just territory marking or mate attraction contexts?

We considered all screening questions together and made a holistic judgement about whether to screen in each paper.

## Data extraction

We asked a large language model to extract each data column below from each paper. We gave the model the extraction instructions shown below for each column.

- **Type of Study/Theoretical Approach:**

Identify the primary type of study or theoretical approach:

- Theoretical review
- Empirical study
- Conceptual analysis
- Comparative analysis

Provide a brief description of the primary methodological approach used in the study. If multiple approaches are used, list them in order of prominence. Look for explicit statements about methodology in the introduction, methods, or discussion sections.

If the study is primarily theoretical, note the key theoretical frameworks or conceptual arguments being explored.

- **Key Theoretical Mechanisms Explored:**

Extract the primary theoretical mechanisms related to the relationship between animal signals and music:

- Specific hypotheses about emotional contagion
- Proposed evolutionary mechanisms
- Acoustic signal comparisons
- Social coordination theories

Look for explicit statements about how animal emotional signals might relate to human music. Quote key theoretical claims directly if possible. Pay special attention to sections discussing evolutionary origins, emotional communication, or cross-species comparisons.

- **Types of Evidence Examined:**

List the specific types of evidence used to support the theoretical argument:

- Acoustic signal analyses
- Comparative behavioral studies
- Neurological evidence
- Evolutionary biology arguments
- Empirical observations

For each type of evidence, note:

- Source of the evidence
- Key findings
- How the evidence relates to the core hypothesis about music and animal emotional signals

If multiple types of evidence are used, rank them in order of importance to the central argument.

- **Cross-Species Comparisons:**

Identify and extract:

- Species compared
- Specific acoustic or emotional characteristics examined
- Similarities and differences highlighted
- Theoretical significance of these comparisons

Focus on explicit statements about how animal communication relates to human musical experience. Look for detailed descriptions of acoustic structures, emotional signaling, or evolutionary connections between species.

- **Primary Conclusions About Music and Animal Emotional Signals:**

Extract the main conclusions about the relationship between animal emotional signals and human music:

- Direct claims about emotional contagion
- Evolutionary explanations
- Implications for understanding music's origins

Prioritize direct quotes that summarize the core theoretical argument. Note any limitations or areas for future research mentioned by the authors.

If multiple conclusions are presented, list them in order of significance to the original research question.

## Results

### Characteristics of Included Studies

Study	Study Type	Species Examined	Primary Focus	Methodology	Full text retrieved
Altenmüller et al., 2013	Theoretical review	Various nonhuman mammals and humans	Evolution of emotional communication	Literature review and conceptual analysis	Yes
Bannan, 2008	Conceptual analysis with comparative elements	Various species (not specified in detail)	Vocal learning and evolution of human communication	Cross-species comparisons and theoretical analysis	Yes
Bryant, 2013	Theoretical review and comparative analysis	Humans and non-human animals (e.g., cotton-top tamarins)	Animal signals and emotion in music	Literature review and comparative analysis	Yes

Study	Study Type	Species Examined	Primary Focus	Methodology	Full text retrieved
Fitch, 2005	Comparative analysis	Birds, whales, seals, African apes	Evolution of music in comparative perspective	Cross-species comparisons and literature review	Yes
Fitch, 2006	Comparative analysis	Birds (songbirds, parrots, hummingbirds), whales, great apes (chimpanzees, bonobos, gorillas)	Biology and evolution of music	Cross-species comparisons and literature review	Yes
Fritz and Koelsch, 2013	Theoretical review	Humans and African great apes	Emotional contagion in music processing	Literature review and conceptual analysis	No
Oesch, 2019	Theoretical review	Humans, non-human primates (e.g., gibbons, spectral tarsiers), songbirds, other mammals (e.g., elephants, dolphins)	Music and language in social interaction	Comparative approach and literature review	Yes
Panksepp, 2009	Conceptual analysis	Mammalian species in general	Emotional antecedents of music and language evolution	Theoretical exploration and literature review	No
Snowdon et al., 2015	Empirical study	Humans and non-human animals	Music evolution and neuroscience	Literature review and experimental research	Yes
Snowdon, 2021	Empirical study	Humans, cotton-top tamarins, common marmosets	Animal signals, music, and emotional well-being	Experimental research and literature review	Yes

The review included four theoretical reviews, four comparative analyses, two conceptual analyses, and two

empirical studies.

Species examined:

- Humans were the most commonly studied (six studies)
- Non-human primates and birds (three studies each)
- Whales (two studies)
- Seals (one study)
- Mammals in general (three studies)
- One study mentioned various unspecified species

Primary focus:

- Music was the most common focus (eight studies)
- Evolution (six studies)
- Emotional aspects (five studies)
- Other topics included animal signals (two studies), language (two studies), vocal learning, biology, social interaction, and neuroscience (one study each)

Methodology:

- Literature review was the most common method (nine studies)
- Comparative analysis/approach (four studies)
- Cross-species comparisons and theoretical analysis/exploration (three studies each)
- Conceptual analysis and experimental research (two studies each)

Many of the included studies employed multiple methodologies and examined multiple species, which may reflect the interdisciplinary nature of research on the evolution of music and related topics.

## **Thematic Analysis**

### **Evolutionary Mechanisms of Sound-Emotion Connection**

- Emotional Contagion :
  - Fritz and Koelsch (2013) suggest that acoustically mediated emotional contagion is a shared neurological trait between humans and African great apes.
  - Snowdon et al. (2015) argue that music is derived from emotional signals and has adaptive value through emotional contagion.
- Evolutionary Homology :
  - Fitch (2005) suggests a potential homology between human music and certain animal behaviors, such as manual percussion in African apes.
  - Panksepp (2009) links the emotional power of music to the evolution of basic motor and emotional systems.
- Pre-adaptations :
  - Bannan (2008) suggests that human communication has instinctive components that are more music-like than language-like, indicating an evolutionary connection to animal vocalizations.
  - Altenmüller et al. (2013) propose that distinct affective sounds in mammals were important pre-adaptations for the emergence of music in humans.

- **Social Bonding Function :**
  - Oesch (2019) argues that human music and animal emotional signals share a function in social bonding.
  - Bryant (2013) suggests that music may be part of an adaptive social signaling system.

## **Cross-Species Evidence**

**Acoustic Similarities** Snowdon et al. (2015) highlight that similar acoustic structures are found in both human music and nonhuman animal emotional signals. These similarities often relate to features such as pitch, rhythm, and timbre.

**Emotional Expression** Altenmüller et al. (2013) discuss how emotional arousal and valence are communicated through acoustic variations in both animals and humans.

**Neurological Responses** Fritz and Koelsch (2013) discuss the neurological physiology supporting acoustically mediated emotional contagion in both humans and apes.

**Behavioral Responses** Empirical studies, particularly those by Snowdon et al. (2015) and Snowdon (2021), provide evidence of behavioral responses to music-like stimuli in non-human animals. Snowdon (2021) demonstrates that species-specific music can elicit emotional and behavioral responses in tamarins.

## **Social and Functional Aspects**

- **Group Coordination :** Bryant (2013) suggests that music may have evolved as a means to signal coalition strength and collective affect.
- **Emotional Synchronization :** Fritz and Koelsch (2013) argue that the musical capacity in humans may have evolved to synchronize group motivation and emotional experience.
- **Caregiving and Bonding :** Fitch (2005) notes that Trehub's caregiving model receives strong support, suggesting that music may have evolved to support emotional bonding, particularly between caregivers and infants.
- **Cultural Evolution :** While focusing on biological evolution, several studies acknowledge the role of cultural evolution in shaping human music. Fitch (2006) discusses how the complexity of determining music's past functions suggests that current utility may not necessarily reflect ancestral functions.

## **Synthesis of Findings**

### **Convergent Evidence**

- Multiple studies propose shared neurological and psychological mechanisms for processing emotional vocalizations across species.
- The consistent emphasis on social bonding and group coordination as functions of both animal vocalizations and human music provides theoretical support for their evolutionary connection.
- The identification of similar acoustic features in animal calls and human music across multiple studies strengthens the argument for an evolutionary link.

- The recurring theme of emotional contagion as a key mechanism in both animal vocalizations and human music suggests a fundamental connection in how emotions are communicated through sound across species.

### Alternative Explanations

- The studies predominantly focus on biological evolution, potentially underestimating the role of cultural evolution in shaping human music preferences.
- The cognitive abilities required for human music appreciation may be significantly more complex than those involved in animal vocalizations, suggesting potential limitations in direct comparisons.
- As highlighted by Snowden (2021), the effectiveness of species-specific music in eliciting responses from animals suggests that direct parallels between human music and animal vocalizations may be limited.
- The diversity of musical traditions across human cultures raises the possibility that music may have multiple origins or functions, not all necessarily tied to animal vocalizations.
- The predominance of theoretical studies in this review highlights a current limitation in direct experimental evidence supporting the hypothesis.

The reviewed studies present various theoretical arguments and some empirical evidence related to a potential connection between animal emotional signals and human music enjoyment. However, the authors of several studies suggest that more direct experimental research would be beneficial to further explore this hypothesis.

## References

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