Adaptive Functions of Early Figurative Art

Research evidence strongly supports that early figurative art served adaptive functions by both improving survival through communication and strengthening social bonds through shared symbolic practices.

Abstract

Early figurative art appears to have served adaptive functions in two main ways. Several studies argue that art transformed communication into the precursors of language and extended mother–infant bonding into broader ritual practices, thereby enhancing survival. Other papers assert that art fostered social cohesion by generating shared meanings through symbolic expression, group-bonding rituals, and practices that increased social trust and reduced aggression. Archaeological evidence, cross-cultural data, and even experimental findings on ancient engravings support these claims. Nine of ten studies employ theoretical reviews—with three integrating archaeological analysis and one offering cognitive experimental data—to show that early art contributed both to survival mechanisms and to the maintenance of social bonds.

Paper search

Using your research question "Does evidence support the theory that early figurative art had the adaptive function of increased survival or social cohesion?", 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:

- **Time Period**: Does the study examine art created before 3000 BCE?
- **Art Type**: Does the study analyze figurative art (visual representations of recognizable objects, animals, or figures)?
- **Adaptive Functions**: Does the research investigate either survival-related outcomes (e.g., hunting success, knowledge transmission) OR social cohesion outcomes (e.g., group bonding, shared symbolic systems)?
- **Theoretical Framework**: Does the study include a theoretical framework that explicitly links art to evolutionary adaptive functions?
- **Study Type**: Is the study either: (a) an archaeological study, (b) an anthropological study examining cross-cultural practices, or (c) a systematic review/meta-analysis of relevant topics?
- **Modern Context**: Does the study avoid focusing exclusively on modern artistic contexts, contemporary art movements, or purely aesthetic purposes?
- **Theoretical Connection**: Does the research establish clear theoretical connections to survival or social cohesion functions?

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.

- **Study Type and Approach**:

  Identify the primary methodological approach of the study:

- Specify if it is an archaeological analysis, cognitive experiment, theoretical review, or other approach
- Describe the specific research methods used (e.g., experimental design, archaeological analysis, cognitive experiments)
- If multiple methods were used, list all in order of prominence
- If unclear, note "methodology not clearly specified"

- **Archaeological/Artifact Context**:

  Extract detailed information about the archaeological context:

- Specific archaeological sites mentioned
- Geographic location of artifacts
- Time period of artifacts (provide precise date range if possible)
- Type of artifacts analyzed (e.g., engravings, cave art, ochre fragments)
- Preservation and dating methods used

- **Symbolic Behavior Characteristics**:

  Identify and describe the characteristics of symbolic behavior examined:

- Specific features of symbolic artifacts
- Cognitive capabilities suggested by the artifacts
- Evidence of intentionality or cultural transmission
- Any evolutionary interpretations proposed
- Distinguish between decorative, communicative, or symbolic functions

- **Cognitive Experimental Findings**:

  For studies involving cognitive experiments:

- List specific experimental methods
- Describe key experimental findings
- Note any cognitive capabilities or transformations observed
- Extract quantitative results if available
- Highlight any conclusions about symbolic communication or cognitive evolution

- **Evolutionary Interpretation**:

  Extract the study's proposed evolutionary explanation for early symbolic behavior:

- Identify whether art/symbolism is proposed as:
  1. Direct adaptation
  2. Byproduct of other adaptations
  3. Result of cultural group selection
- Summarize key theoretical arguments
- Note any supporting evidence provided

Results

Characteristics of Included Studies

Study	Study Type	Time Period Covered	Geographic Focus	Primary Evidence Type	Full text retrieved
Davidson and Noble, 1989	Theoretical review	Upper Pleistocene	Global, with mentions of Europe and Africa	Archaeological findings, theoretical synthesis	Yes
Davis and Dissanayake, 1990	Theoretical review	Human evolutionary history	Global	Cross-cultural anthropological data, evolutionary theory	No
Dissanayake, 2009	Theoretical review	From 1.7 million years ago	Global	Ethological observations, evolutionary theory	Yes
Junker, 2010	Theoretical review	36,000 years ago to present	Central and Western Europe	Archaeological findings, biological theories	No
Knight et al., 1995	Theoretical review with archaeological analysis	Middle-Upper Palaeolithic transition	Global	Archaeological, ethnographic, and rock art data	Yes
Smedt and Cruz, 2012	Theoretical review	Upper Palaeolithic	Europe (Magdalenian cultural complex)	Theoretical models, anthropological observations, archaeological findings	No
Straffon, 2014	Theoretical review with archaeological analysis	Over 100,000 years ago	Africa and Europe	Archaeological findings, theoretical models	No
Stuart-Fox, 1986	Theoretical review	Middle to Upper Paleolithic transition	Not specified in abstract	Archaeological findings, theoretical arguments	No
Tylén et al., 2020	Cognitive experiment	100,000 to 70,000 years ago	South Africa	Ancient engravings, experimental data	No

Study	Study Type	Time Period Covered	Geographic Focus	Primary Evidence Type	Full text retrieved
Winkelman, 2002	Theoretical review with archaeological analysis	Upper Palaeolithic	Global	Cross-cultural data, archaeological findings	No

Based on our analysis of the included studies:

- Study Types :
  - 9 out of 10 studies were classified as theoretical reviews
  - 3 of these also incorporated archaeological analysis
  - 1 study was described as a cognitive experiment
- Time Periods :
  - The studies covered a wide range of time periods, from as early as 1.7 million years ago to the present
  - 2 studies focused on the Middle-Upper Palaeolithic transition
  - 2 studies focused on the Upper Palaeolithic
  - Other time periods were each covered by a single study
- Geographic Focus :
  - 5 out of 10 studies had a global focus
  - Europe was mentioned in 4 studies
  - Africa was mentioned in 3 studies
  - We didn't find mention of a specified geographic focus in the abstract of Stuart-Fox, 1986
- Primary Evidence Types :
  - Archaeological evidence was the most common, used in 8 out of 10 studies
  - Theoretical approaches were used in 4 studies
  - Other evidence types (evolutionary, anthropological, ethological, biological, ethnographic, rock art, experimental, and cross-cultural) were each used in 1-2 studies

Thematic Analysis

Evolution of Artistic Behavior

Survival-Related Adaptive Functions

Study	Proposed Adaptive Function	Supporting Evidence	Theoretical Framework
Davidson and Noble, 1989	Transformation of communication into language	Archaeological evidence of depictions	Ecological theory of perception, theories of language and mind

Study	Proposed Adaptive Function	Supporting Evidence	Theoretical Framework
Davis and Dissanayake, 1990	Biological necessity for human survival	Cross-cultural universality of art	Evolutionary biology, human ethology
Dissanayake, 2009	Extension of mother-infant bonding mechanisms	Universality of mother-infant interactions	Ethological and evolutionary perspectives
Junker, 2010	Adaptive advantage over Neanderthals	Archaeological evidence of art objects	Biological theories of art
Knight et al., 1995	Facilitation of symbolic communication	Archaeological and ethnographic data	Neo-Darwinian theory
Smedt and Cruz, 2012	Product of cultural group selection	Archaeological findings, theoretical models	Cultural group selection theory
Straffon, 2014	Communication signal for cooperation	Archaeological evidence	Communication and cooperation theories
Stuart-Fox, 1986	Influence on social behavior and reproduction	Body modification evidence	Evolutionary psychology
Tylén et al., 2020	Tool for cultural transmission	Experimental data on engravings	Cognitive evolution theory
Winkelman, 2002	Cognitive and social evolution through shamanism	Cross-cultural presence of shamanism	Psychosociobiological adaptation theory

Our analysis of the proposed adaptive functions for art in the included studies revealed:

- Proposed Functions :
  - Communication-related functions (3 studies)
  - Social bonding functions (3 studies)
  - Cultural evolution functions (3 studies)
  - Survival-related functions (2 studies)
  - Cognitive functions (1 study)
- Supporting Evidence :
  - Archaeological evidence (6 studies)
  - Cross-cultural evidence (3 studies)
  - Ethnographic evidence (1 study)
  - Theoretical evidence (1 study)
  - Experimental evidence (1 study)
- Theoretical Frameworks :
  - Evolutionary approaches were the most common, found in multiple studies
  - Other frameworks included ecological theory, language theories, cultural group selection, and psychosociobiological adaptation

The supporting evidence for these adaptive functions varied across studies. Most studies relied on archaeological findings and theoretical arguments. Tylén et al. (2020) provided experimental data on the evolution of engravings, which offered a different perspective compared to the theoretical reviews.

Social Cohesion Mechanisms

Study	Social Cohesion Mechanism	Evidence	Theoretical Basis
Davidson and Noble, 1989	Shared systems of meanings	Archaeological evidence of depictions	Theories of language and mind
Davis and Dissanayake, 1990	Making socially important activities memorable and pleasurable	Cross-cultural universality of art	Evolutionary biology, human ethology
Dissanayake, 2009	Extension of mother-infant bonding to group rituals	Universality of mother-infant interactions	Ethological and evolutionary perspectives
Junker, 2010	Not specifically mentioned	Not applicable	Not applicable
Knight et al., 1995	Increased social trust and reduced aggression	Archaeological and ethnographic data	Neo-Darwinian theory
Smedt and Cruz, 2012	Cultural group selection	Theoretical models, anthropological observations	Cultural group selection theory
Straffon, 2014	Communication signal for cooperation	Archaeological evidence	Communication and cooperation theories
Stuart-Fox, 1986	Influencing social behavior	Body modification evidence	Evolutionary psychology
Tylén et al., 2020	Expressions of socially transmitted cultural traditions	Experimental data on engravings	Cognitive evolution theory
Winkelman, 2002	Group-bonding rituals	Cross-cultural presence of shamanism	Psychosociobiological adaptation theory

Our analysis of the social cohesion mechanisms proposed in the included studies revealed:

- We found information on social cohesion mechanisms in 9 out of 10 studies
- Each study proposed a different mechanism, including shared meanings, memorable activities, bonding extension, trust and reduced aggression, cultural group selection, communication for cooperation, influencing behavior, cultural traditions, and group-bonding rituals
- Evidence Types :
  - Archaeological evidence (3 studies)
  - Cross-cultural evidence (3 studies)

  - Other evidence types (ethnographic, theoretical models, anthropological, body modification, and experimental) were each found in 1 study

- Theoretical Bases :
  - Evolutionary approaches (including evolutionary biology, psychology, and cognitive evolution) were the most common, found in 4 studies
  - Other theories included language and mind, ethology, neo-Darwinian theory, cultural group selection, communication and cooperation, and psychosociobiological adaptation

The evidence supporting these mechanisms varied across studies. Archaeological findings provided support for the existence of shared symbolic systems and ritual practices. The experimental data from Tylén et al. (2020) offered more direct evidence for the role of engravings in cultural transmission.

Cross-Cultural Patterns

Universal Elements

Study	Universal Elements	Evidence	Theoretical Basis
Davidson and Noble, 1989	Depiction as a precursor to language	Archaeological evidence of depictions	Ecological theory of perception, theories of language and mind
Davis and Dissanayake, 1990	Art as a biological necessity	Cross-cultural universality of art	Evolutionary biology, human ethology
Dissanayake, 2009	Proto-aesthetic elements in mother-infant interaction	Universality of mother-infant interactions	Ethological and evolutionary perspectives
Junker, 2010	Art as a fundamental new characteristic of modern humans	Archaeological evidence of art objects	Biological theories of art
Knight et al., 1995	Symbolic explosion across the globe	Archaeological, ethnographic, and rock art data	Neo-Darwinian theory
Smedt and Cruz, 2012	Not specifically mentioned	Not applicable	Not applicable
Straffon, 2014	Visual art as a communication signal	Archaeological evidence	Communication and cooperation theories
Stuart-Fox, 1986	Intentional use of color and form to attract attention	Body modification evidence	Evolutionary psychology
Tylén et al., 2020	Evolution of engravings to be more salient and memorable	Experimental data on engravings	Cognitive evolution theory
Winkelman, 2002	Universals of shamanism derived from innate modules	Cross-cultural presence of shamanism	Psychosociobiological adaptation theory

Our analysis of the proposed universal elements of art in the included studies revealed:

- We found proposed universal elements in 9 out of 10 studies
- These elements varied widely, including depiction as a precursor to language, art as a biological necessity, proto-aesthetic elements in mother-infant interaction, and visual art as a communication signal
- Evidence Types :
  - Archaeological evidence (4 studies)
  - Cross-cultural evidence (3 studies)
  - Other types of evidence (ethnographic, rock art, body modification, experimental) were each cited in 1 study
- Theoretical Bases :
  - Evolutionary theories were most common (4 studies)
  - Ethological theories (2 studies)
  - Other theories (ecological, language, biological, communication, cooperation, cognitive evolution, psychosociobiological) were each mentioned in 1 study

Most studies proposed unique universal elements, cited different types of evidence, and based their arguments on different theoretical frameworks. This suggests a diverse range of approaches to understanding the origins and universality of art.

The evidence for these universal elements came from various sources. The archaeological evidence provided support for the universality of symbolic representation and the intentional use of visual elements. The cross-cultural data on shamanic practices and the universality of art supported the idea of common cognitive and behavioral patterns across human societies. The experimental data from Tylén et al. (2020) provided evidence for universal cognitive processes related to the perception and memory of engravings.

Cultural Variations

Study	Cultural Context	Artistic Elements	Adaptive Benefits	Social Impact
Davidson and Noble, 1989	Various prehistoric communities	Depictions, engravings	Facilitation of language evolution	Development of shared meanings
Davis and Dissanayake, 1990	Cross-cultural, including "primitive" societies	Various forms of art	Making activities memorable and pleasurable	Integral part of social life
Dissanayake, 2009	Early human societies	Proto-aesthetic elements, ceremonial art	Extension of mother-infant bonding	Facilitation of group rituals
Junker, 2010	Central and Western Europe, 36,000 years ago	Unspecified art objects	Potential advantage over Neanderthals	No mention found
Knight et al., 1995	Global, Upper Palaeolithic	Art, song, dance, ritual	Facilitation of symbolic communication	Increased social trust

Study	Cultural Context	Artistic Elements	Adaptive Benefits	Social Impact
Smedt and Cruz, 2012	Upper Palaeolithic Europe (Magdalenian)	No mention found	Product of cultural group selection	Enhanced group cohesion
Straffon, 2014	African Middle Stone Age, European Early Upper Palaeolithic	Visual art	Communication signal for cooperation	Facilitation of cooperation
Stuart-Fox, 1986	Middle to Upper Paleolithic transition	Body modification	Influence on social behavior	Potential reproductive advantages
Tylén et al., 2020	South Africa, 100,000-70,000 years ago	Engravings on ochre and ostrich eggshell	Cultural transmission	Expression of cultural traditions
Winkelman, 2002	Upper Palaeolithic, cross-cultural	Cave art, shamanic artifacts	Cognitive and social evolution	Group-bonding rituals

Our analysis of cultural variations in early figurative art revealed:

- Cultural Context :
  - The Upper Paleolithic period was the most common context (4 studies)
  - Prehistoric/early human societies and cross-cultural contexts (2 studies each)
  - Middle Stone Age and Middle to Upper Paleolithic transition (1 study each)
- Artistic Elements :
  - Visual art was the most common element (4 studies)
  - Various or unspecified art forms (3 studies)
  - Ceremonial art, body modification, and shamanic artifacts (1 mention each)
- Adaptive Benefits :
  - Language or communication (3 studies)
  - Various other benefits including pleasure, bonding, competitive advantage, group selection, social behavior, cultural transmission, and cognitive/social evolution (1 mention each)
- Social Impact :
  - Diverse impacts including shared meanings, social integration, group rituals, social trust, group cohesion, cooperation, reproductive advantage, cultural expression, and group bonding (1 mention each)

These cultural variations highlight the adaptability of artistic behavior to different environmental and social contexts. The studies suggest some common themes across cultures, such as the use of art for social bonding, communication, and the expression of cultural traditions. This suggests that while the specific forms and contexts of art may vary, its fundamental roles in human societies may have some universal aspects.

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