



Language Evolution WiSe 2023/2024

Lecture 12: Evolutionary Semiotics I (Cave Art)

30/11/2023, Christian Bentz



Overview

Recap

Section 1: Introduction

Section 2: Cave Art in the Middle Paleolithic/MSA

Rising Star Cave

Bruniquel

La Roche-Cotard

Section 3: Cave Art in the Upper Paleolithic

Chauvet

Lascaux

Exercise

Section 3: Geometric Signs in Cave Art

Leroi-Gourhan

Geometric Signs across the World (?)

Summary

References



Recap



How and why did this *uniqueness* evolve?



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Semiotics (Peirce)

“I extend logic to embrace all the necessary principles of semeiotic, and I recognize a logic of **icons**, and a logic of **indices** as well as a logic of **symbols**; [...]

Peirce (2016). Prolegomena to a science of reasoning, p. 86.

Note: In Peirce’s terminology these are all *signs*.



huǒ
火
Fire

Icon: A sign which represents the object by means of **resemblance/similarity**.

Index: A sign which is typically in a **co-occurrence relation** with the object it represents. Note: the

Symbol: A sign with an **arbitrary relation** to an object, **conventionally** used by interpretes to be also understood by other interpretes.

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

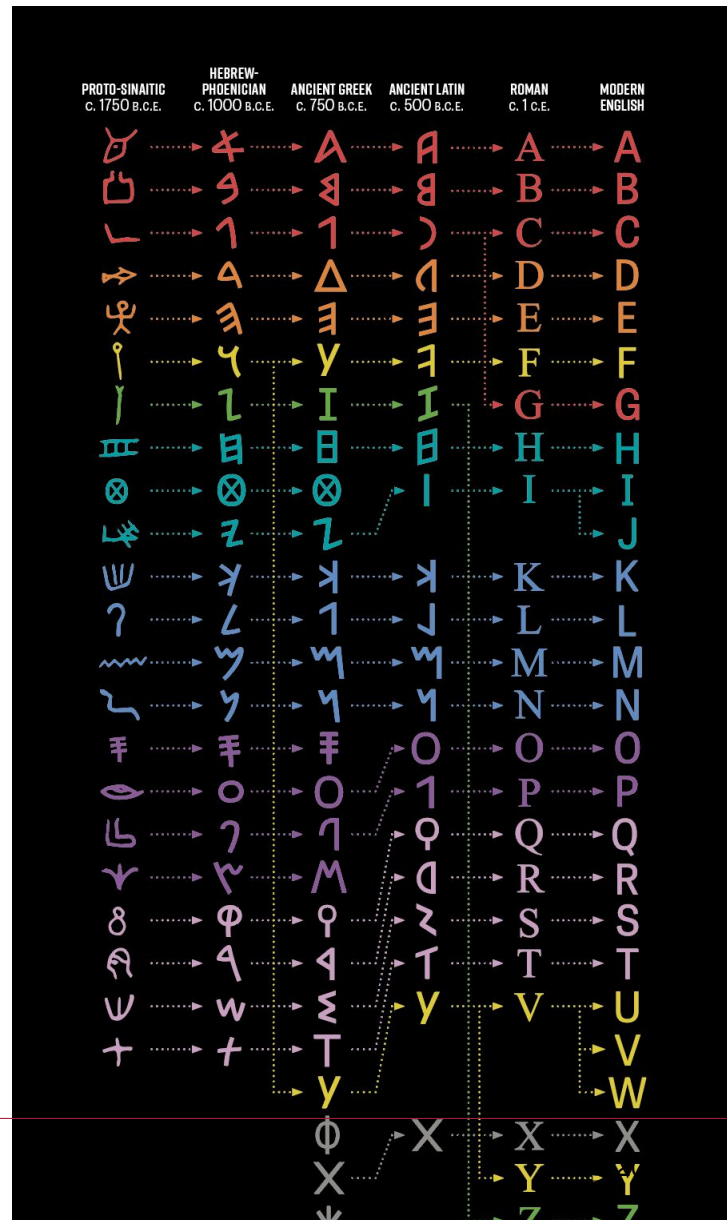
References



Icon → Symbol

It is often assumed that *graphical, auditory, and gestural* signals evolved from **icons**, i.e. depictions of the objects/concepts denoted. Over time, as they were used more often, they became more simplified and abstract, and finally **symbols** with an arbitrary relationship to the objects they signify.

Question: Can we reconstruct how this happened?



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Language Evolution in the Lab

Over the last c. 15 years a paradigm has emerged for testing language evolution models in the lab: **experimental semiotics**. Various experimental designs can be used in this context.

Nölle and Galantucci (2022). Experimental semiotics: past, present, and future.

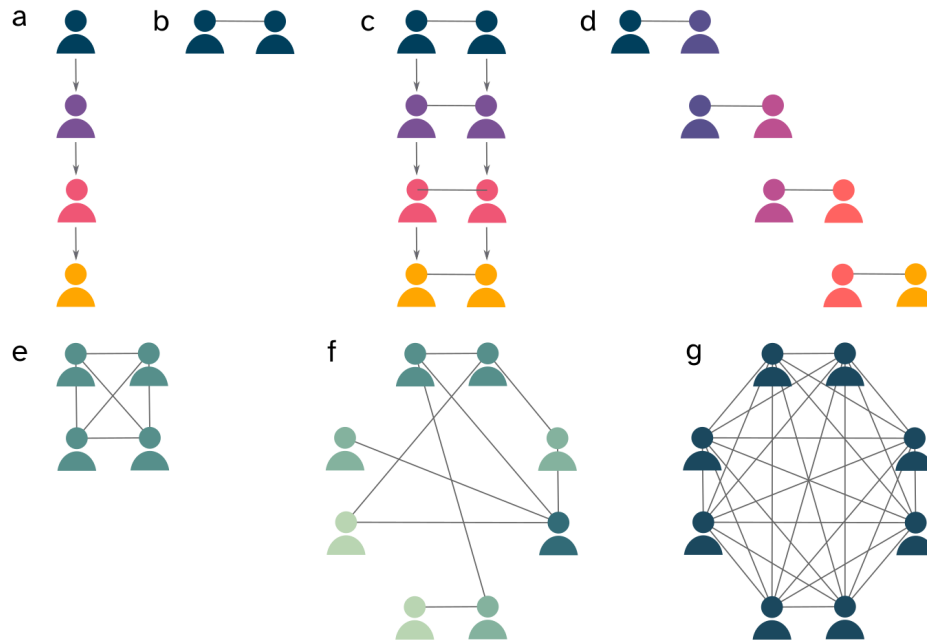


Figure: Experimental designs. Arrows indicate vertical transmission; solid lines indicate horizontal interaction. a) Transmission in an iterated learning chain. b) Pairs of participants (so-called dyads) solve a communication game. c) Transmission and interaction: Dyads interact within an iterated chain, where the output of a dyad becomes the input for the next generation. d) Replacement method: Dyads interact, and after some time one dyad member is replaced with a new participant. e-f) Micro-societies: Participants interact with several members of an artificial 'community' to simulate the spread of variants in a population. Different population sizes (e.g., e vs f) and social network topologies (e.g., fully connected networks in e and g vs a sparse network in f) allow studying the effect of population dynamics on communication systems.

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary







References



Sign ↔ Mind

“On the basis of these results, this article argues that icons evolve into symbols as a consequence of the systematic shift in the **locus of information** from the **sign** to the user’s memory of the sign’s usage supported by an interactive grounding process.”

Garrod (2007), p. 961.

		
Block 1 (CF)	Block 2 (CF)	Block 3 (CF)
		
Block 4 (CF)	Block 5 (CF)	Block 6 (CF)



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Iterated Learning

“We show that languages transmitted culturally evolve in such a way as to maximize their own transmissibility: over time, the languages in our experiments become **easier to learn** and **increasingly structured**. Furthermore, this structure emerges purely as a consequence of the transmission of language over generations [...]”

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

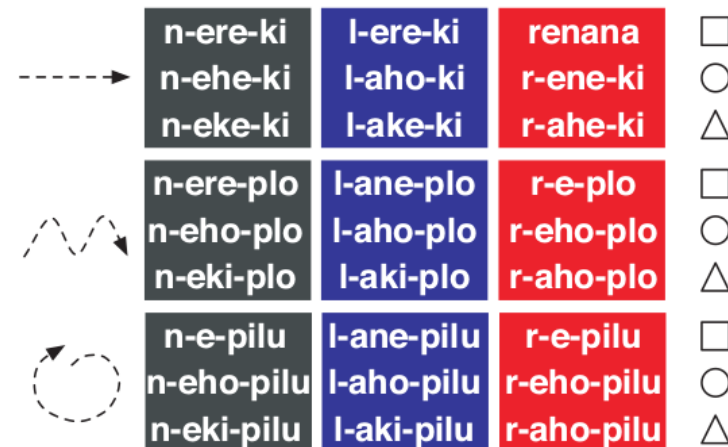
Summary

References

Experiment 1 (Outcome)



Experiment 2 (Outcome)



Kirby et al. (2008). Cumulative cultural evolution in the laboratory: An experimental approach to the origins of structure in human language.



Basic Order of Events

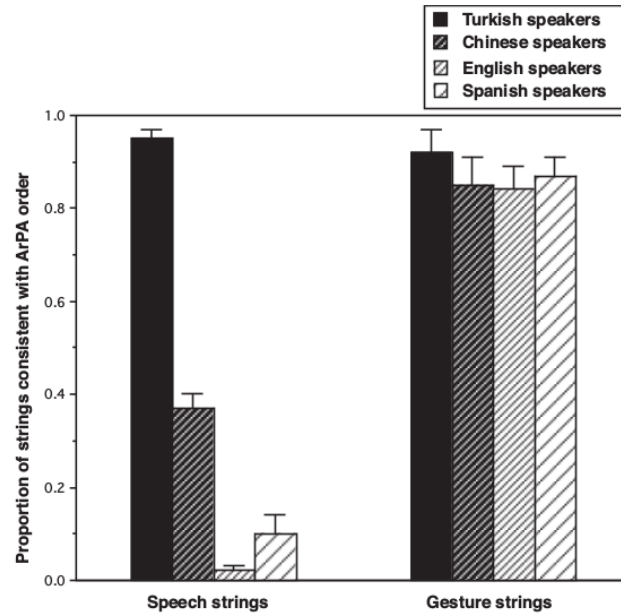


Fig. 2. Proportion of speech (*Left*) and gesture (*Right*) strings produced by speakers of Turkish, Chinese, English, and Spanish to describe transitive actions that were consistent with the ArPA order. Included are both in-place and crossing-space transitive actions.

Note: ArPA order means Actor (Ar)– Patient (P) – Action (A), i.e. SOV in language typology.

Goldin-Meadow et al. (2008). The natural order of events: How speakers of different languages represent events nonverbally.

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



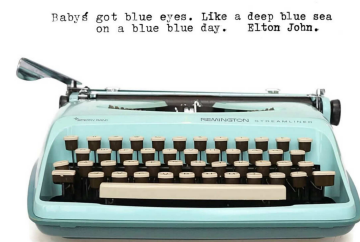
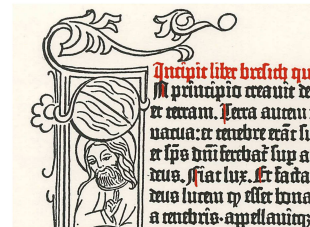
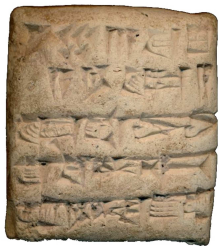
Section 1: Introduction



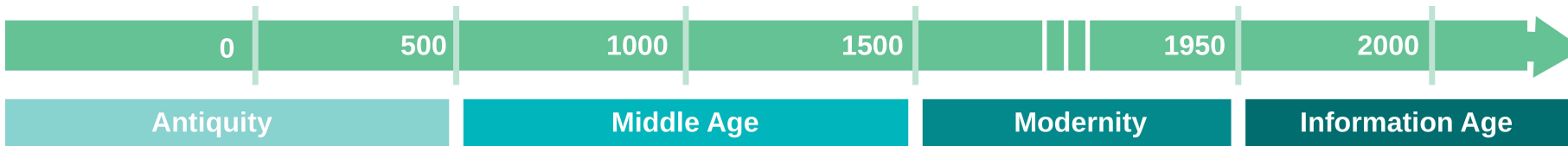
The History of Information Encoding

Recap

Section 1:
Introduction

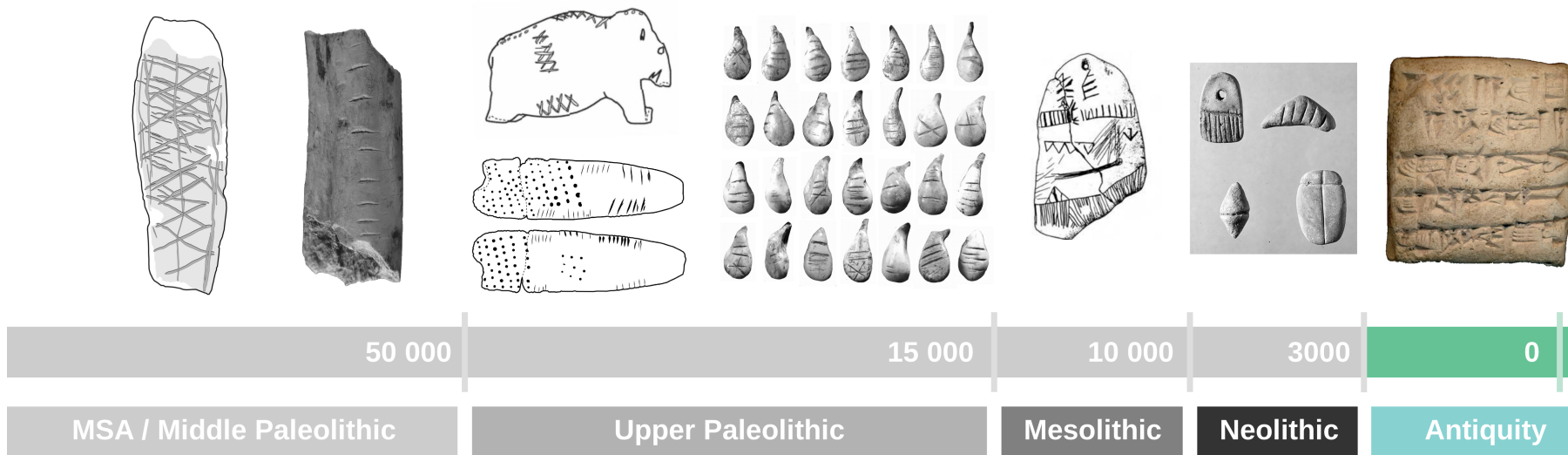


Baby's got blue eyes. Like a deep blue sea
on a blue blue day. Elton John.





The Evolution of Information Encoding





Section 2: Cave Art Middle Paleolithic/MSA



Rising Star Cave, South Africa (near Johannesburg)



Entrance to the rising star cave system with anthropologist Dr. Marina Elliott.

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

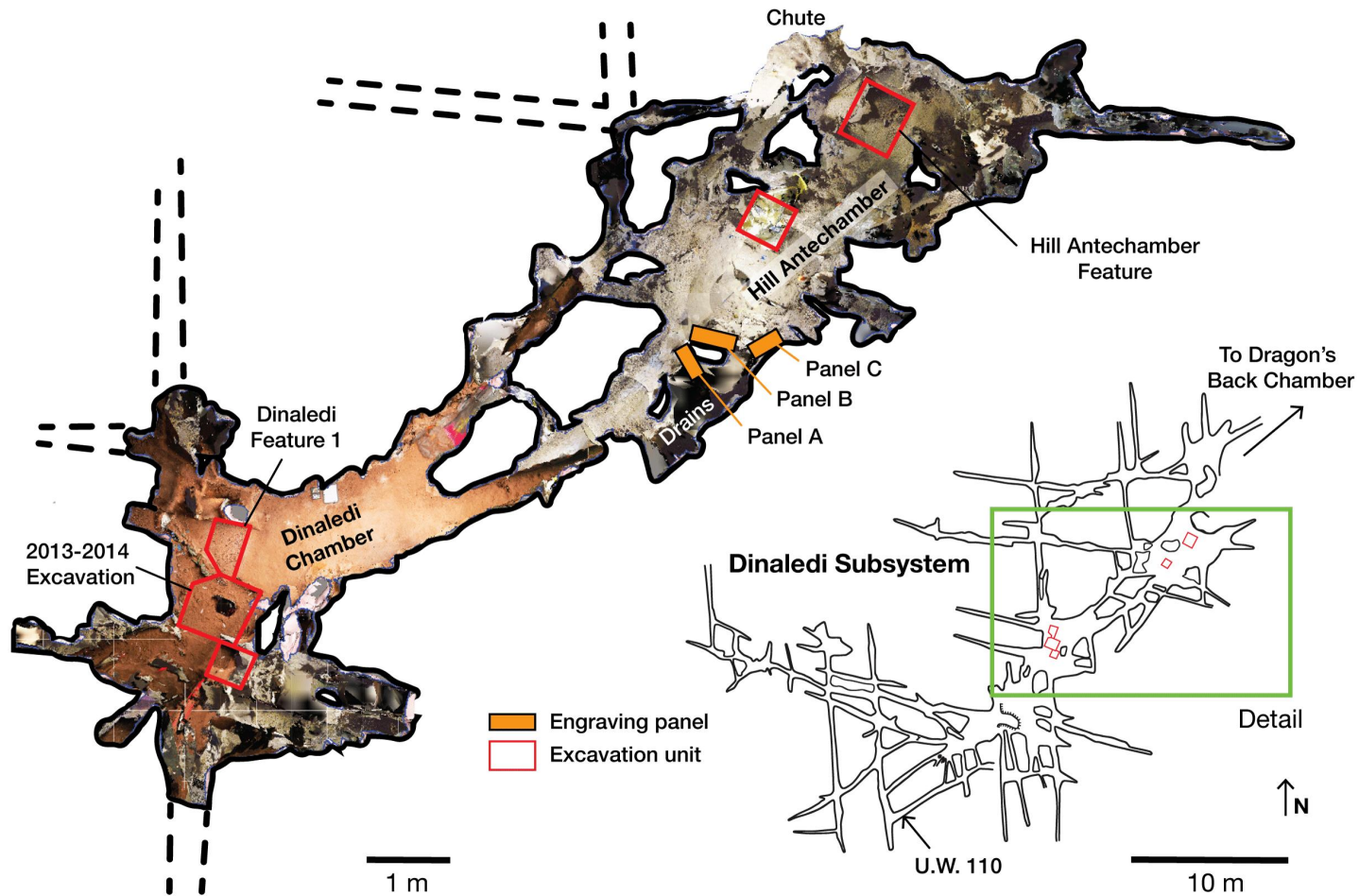
Section 3:
Geometric Signs
in Cave Art

Summary

References



Engraving Locations



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References

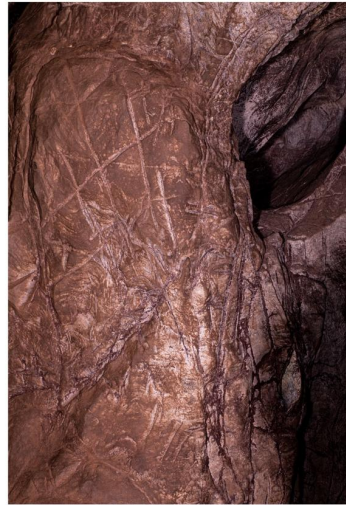


Rising Star Cave

- ▶ **Period:** Middle Stone Age (Africa)
- ▶ **Age:** 241 kya to 335 kya
- ▶ **Maker:** Homo naledi (?)

Berger et al. (2023).

For critique see: Martín-Torres et al. (2023).



A



B



C



D

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Grotte de Bruniquel, France



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

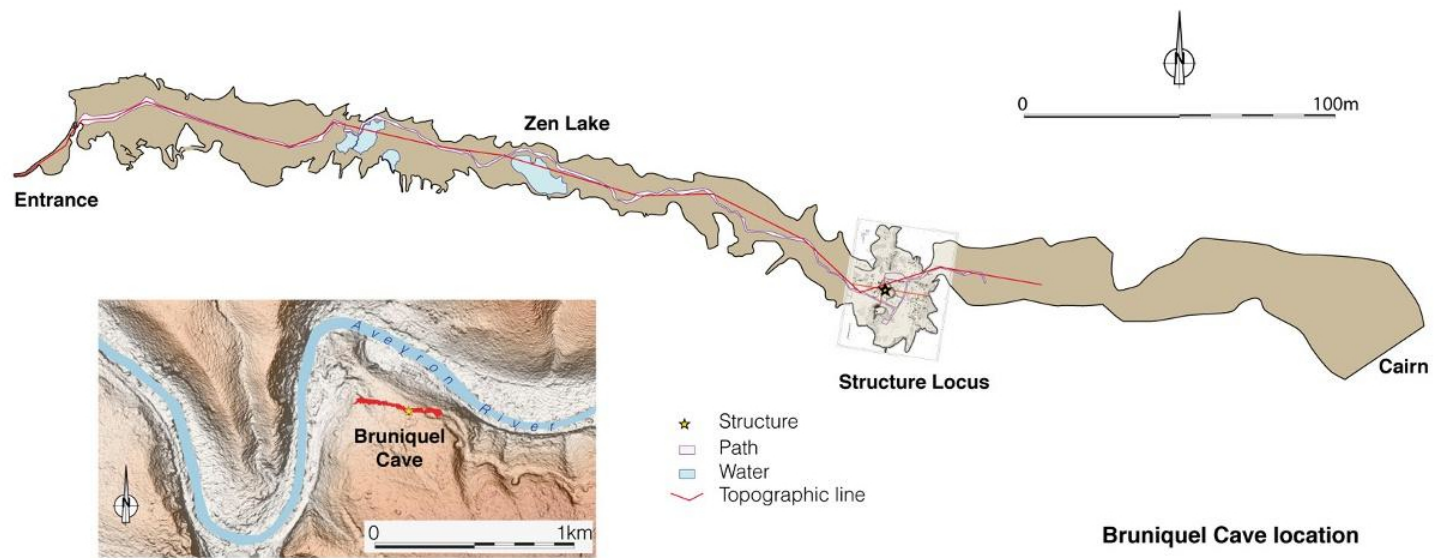
Section 3:
Geometric Signs
in Cave Art

Summary

References



Structure Locations



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Stalactite Structure



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

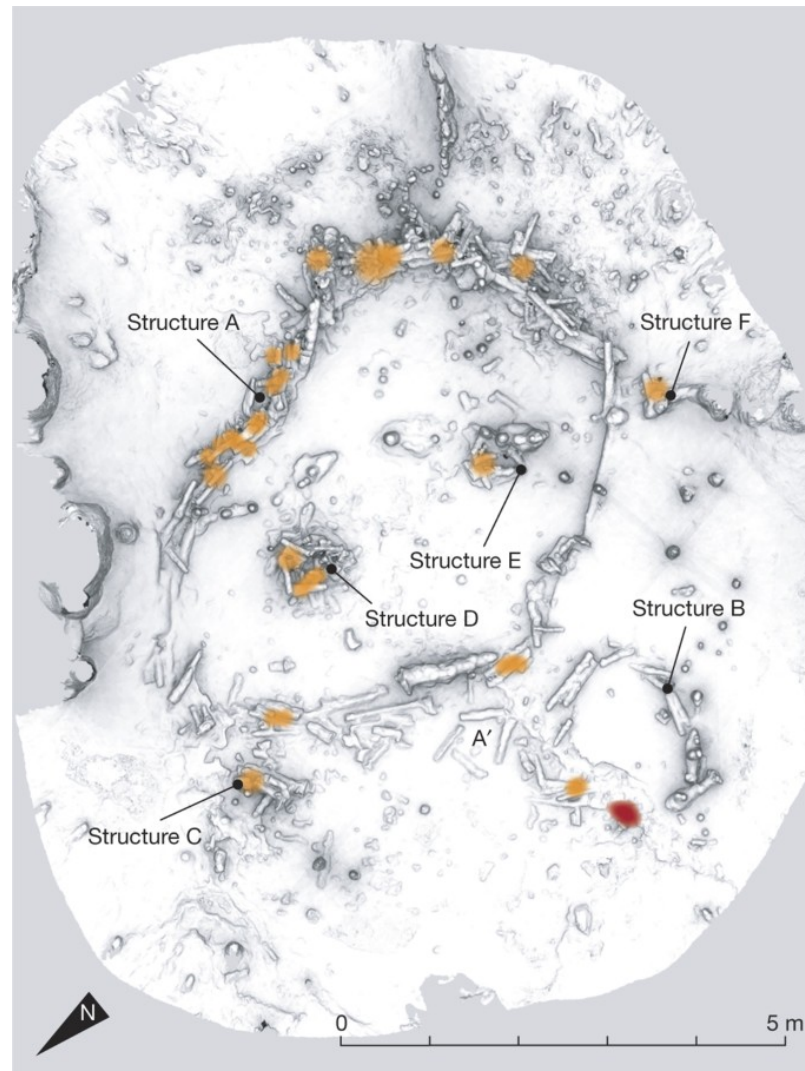
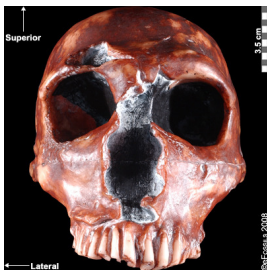
References



Bruniquel

- ▶ **Period:** Middle Paleolithic
- ▶ **Age:** 176.5 kya
- ▶ **Maker:** Homo neanderthalensis

Jaubert et al. (2016). Early Neanderthal constructions deep in Bruniquel Cave in southwestern France.



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



La Roche-Cotard (near Tours), France



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

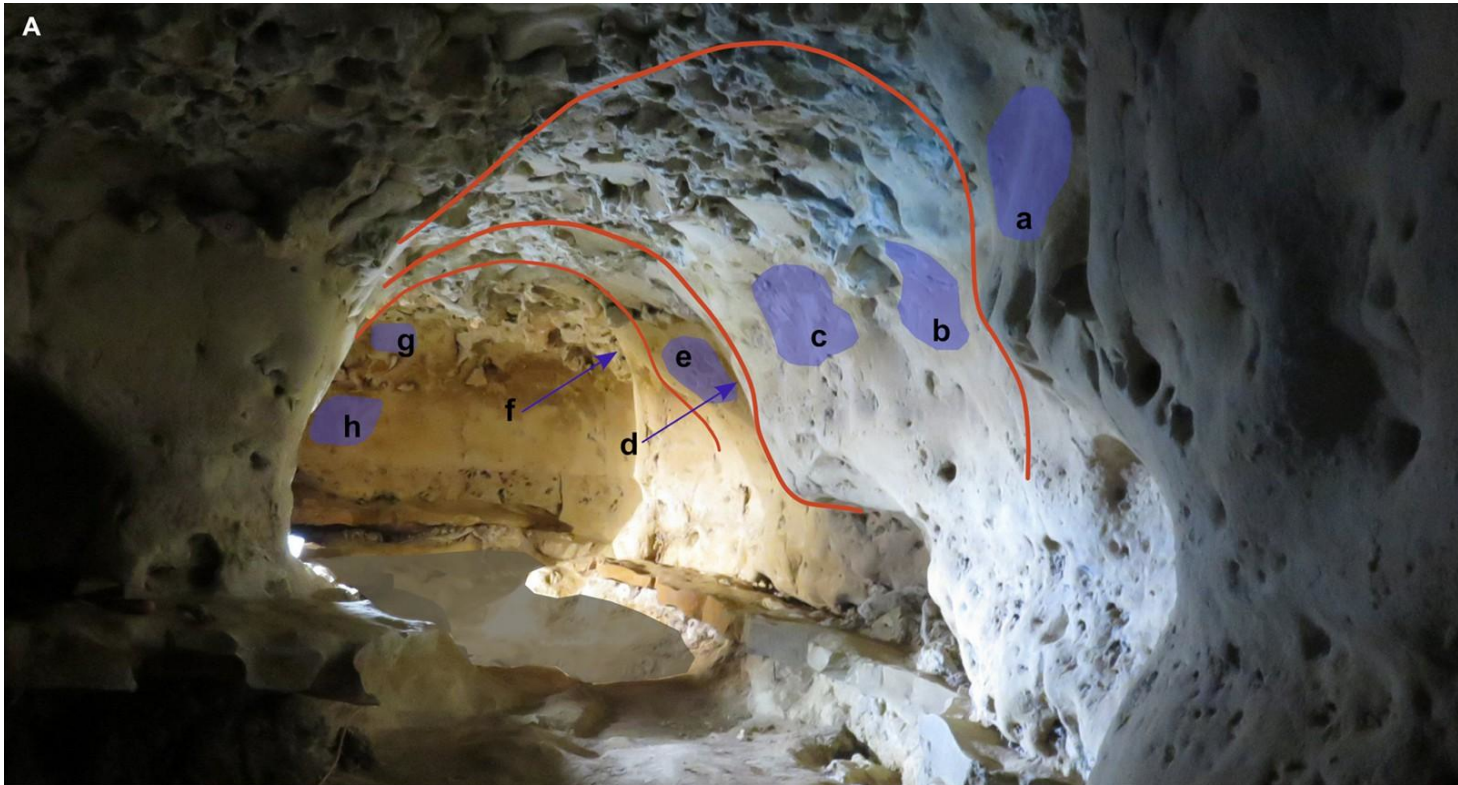
Section 3:
Geometric Signs
in Cave Art

Summary

References



Engraving Locations



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References

See video at: <https://www.arte.tv/en/videos/102285-000-A/neanderthals-humanity-s-first-artists/>

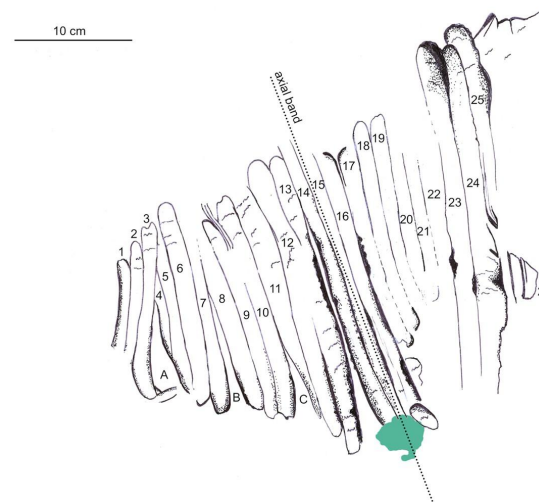
<https://www.arte.tv/en/videos/102285-000-A/neanderthals-humanity-s-first-artists/>



La Roche-Cotard

- ▶ **Period:** Middle Paleolithic (Mousterian)
- ▶ **Age:** > 57 kya
- ▶ **Maker:** Homo neanderthalensis

Marquet et al. (2023). The earliest unambiguous Neanderthal engravings on cave walls: La Roche-Cotard, Loire Valley, France.



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



La Roche-Cotard

- ▶ **Period:** Middle Paleolithic (Mousterian)
- ▶ **Age:** c. 75 kya
- ▶ **Maker:** Homo neanderthalensis

Marquet et al. (2016). New dating of the “mask” of La Roche-Cotard (Langeais, Indre-et-Loire, France).



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References

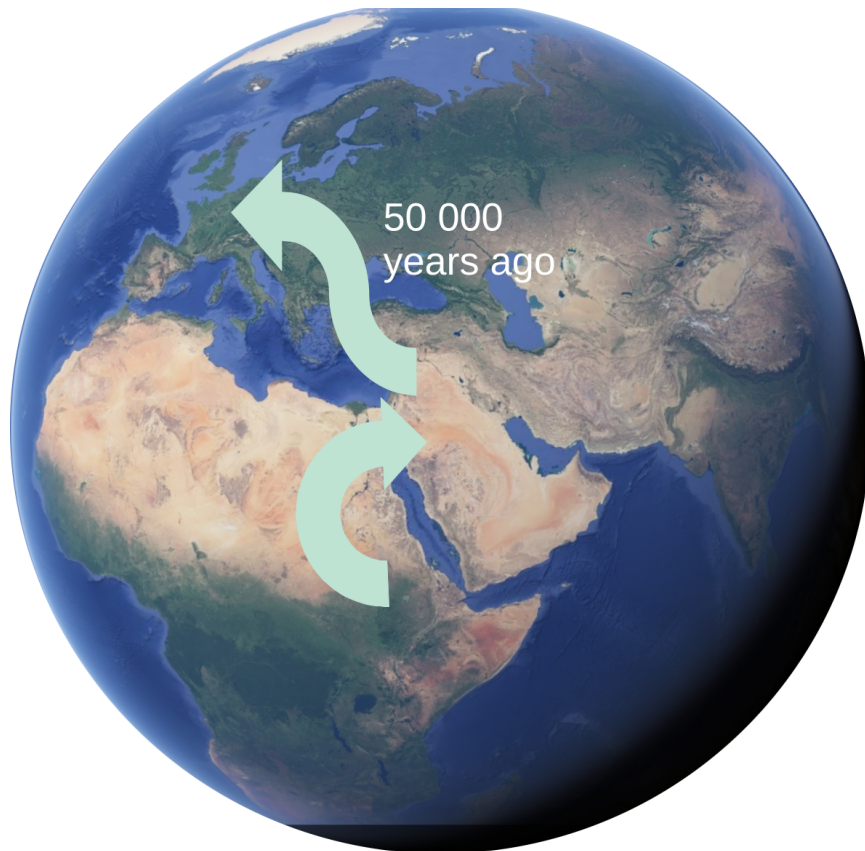


Section 3: Cave Art in the Upper Paleolithic



Upper Paleolithic Eurasia

(c. 50 000 to 15 000 years ago)



© Benoit Clarys

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Timeline

Later Stone Age (in Africa)

- ▶ starting c. 50 kya

Upper Paleolithic

- ▶ Aurignacian (Aurignac), c. 43kya - 35kya BP
- ▶ Gravettian (La Gravette) c. 33kya -22 kya BP
- ▶ Solutrean (Solutré) c. 22kya - 17kya BP
- ▶ Magdalenian (La Madleine) c. 17kya - 12kya BP

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Flora and Fauna



Illustration: Mauricio Anton

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Upper Paleolithic: Timeline

- ▶ Aurignacian (Aurignac), c. 43kya - 35kya BP
- ▶ Gravettian (La Gravette) c. 33kya - 22 kya BP
- ▶ Solutrean (Solutré) c. 22kya - 17kya BP
- ▶ Magdalenian (La Madleine) c. 17kya - 12kya BP

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Grotte Chauvet (Ardèche), France



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References

Setting of the documentary “Cave of forgotten dreams”

<https://www.youtube.com/watch?v=wmMU1NeLApU>



Chauvet



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Grotte Chauvet

- ▶ **Period:** Upper Paleolithic (Aurignacian (?) - Magdalenian)
- ▶ **Age:** 37-28 kya (?)
- ▶ **Maker:** Homo sapiens

Clottes and Azéma (2005).
Quiles et al. (2016). (dating)
Jouve et al. (2020). (criticism of dating)



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Lascaux (Dordogne), France



Discovered in 1940 (first inspection by archaeologist Henri Breuil).



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Lascaux 4 (Replica)



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

**Section 3: Cave
Art in the Upper
Paleolithic**

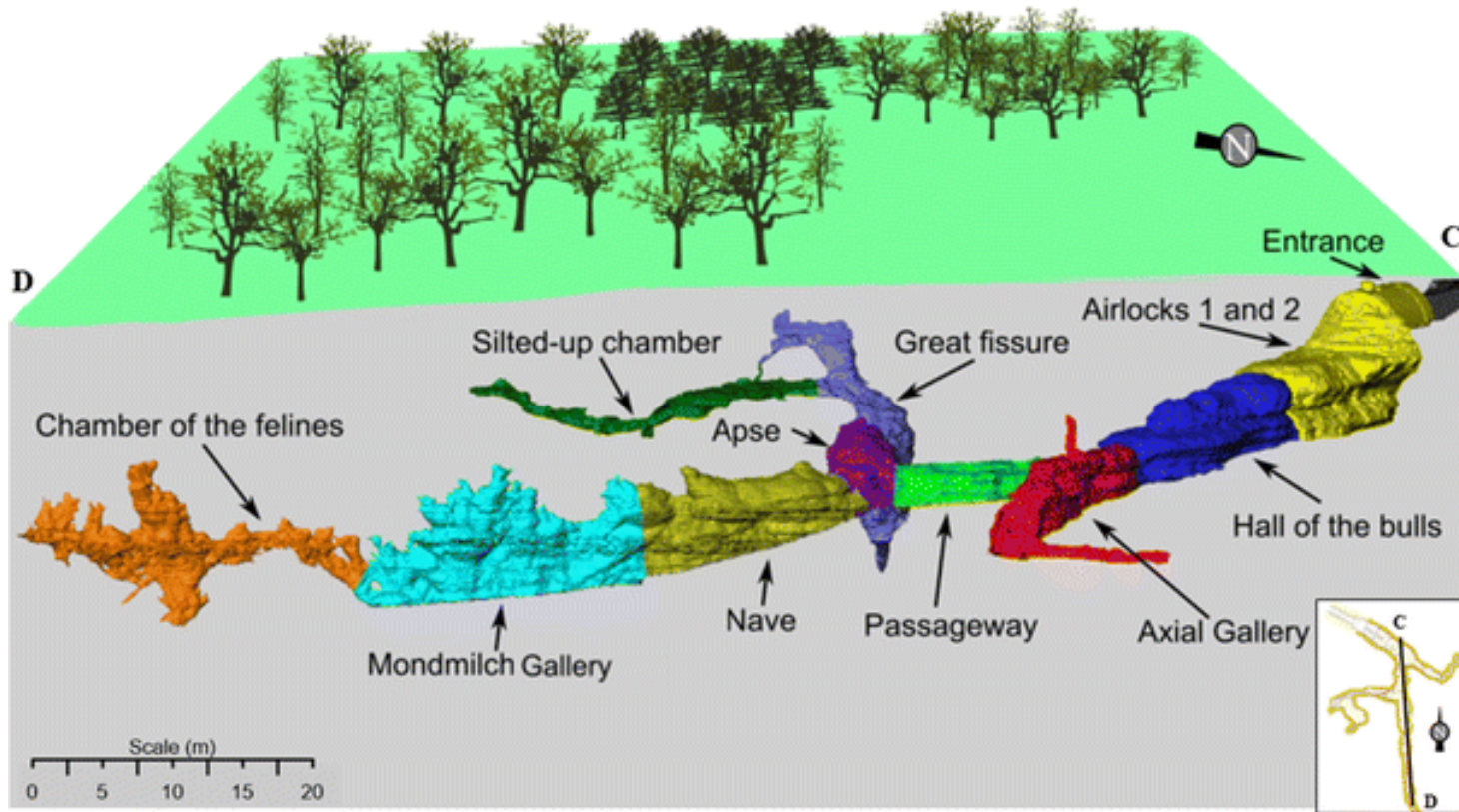
Section 3:
Geometric Signs
in Cave Art

Summary

References



Lascaux 3D Model



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References

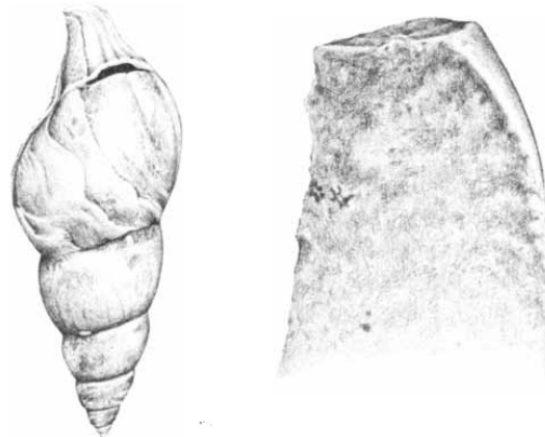
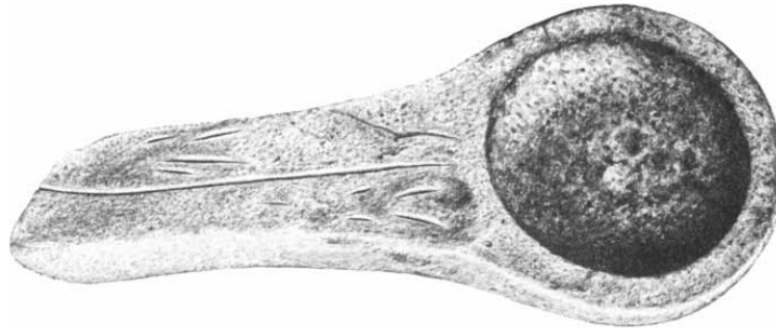
Virtual tour:

<https://archeologie.culture.gouv.fr/lascaux/fr>



Lascaux: Artifacts

Leroi-Gourhan, Arlette (1982).
The archaeology of Lascaux cave.



THREE ARTIFACTS among the many discovered at Lascaux are the carefully worked stone lamp found in the Well (*top*), a seashell stained with ochre and pierced for stringing as a personal ornament (*bottom left*), which was also found in the Well, and the worn, work-polished end of one of the 27 flint engraving tools that have been discovered in the cave (*bottom right*).

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

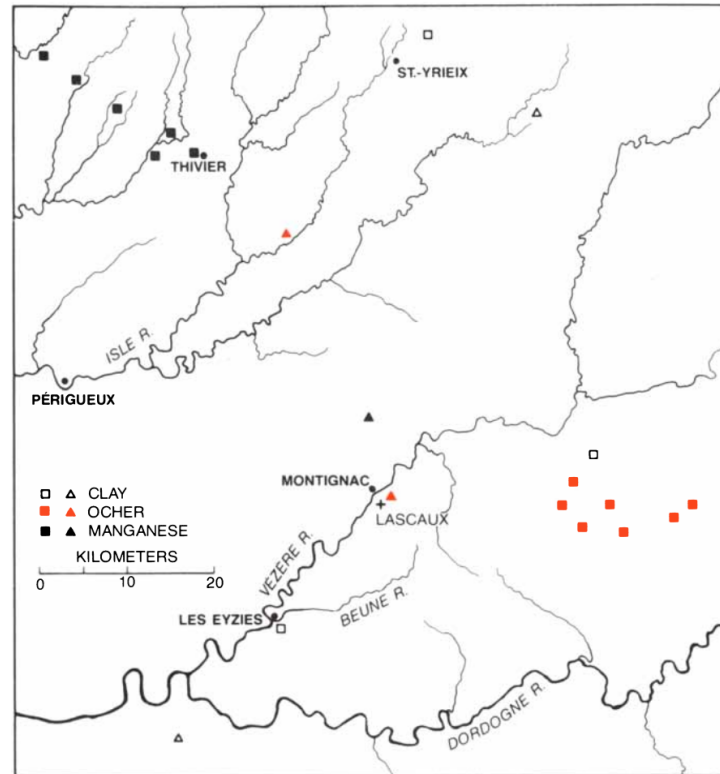
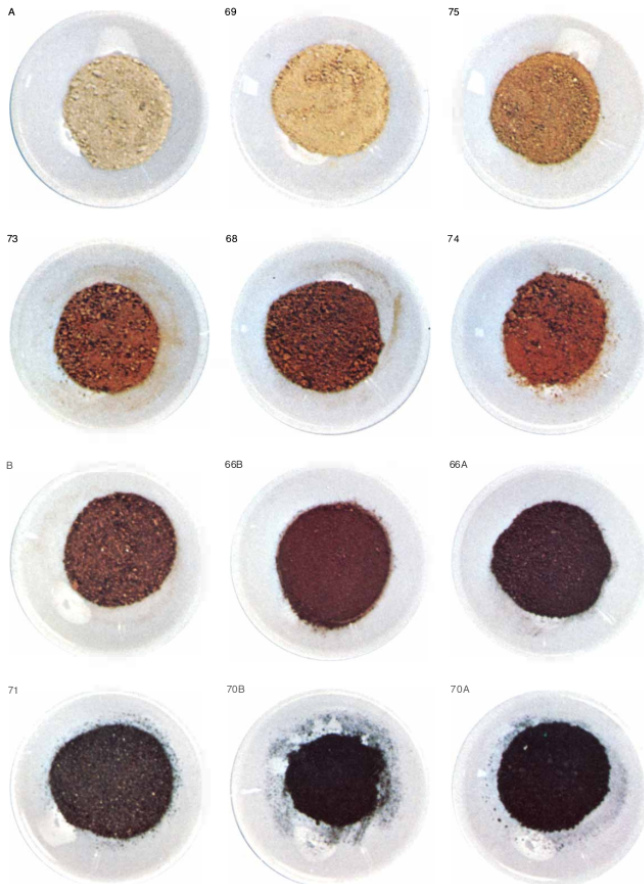
Section 3:
Geometric Signs
in Cave Art

Summary

References



Lascaux: Pigments



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References

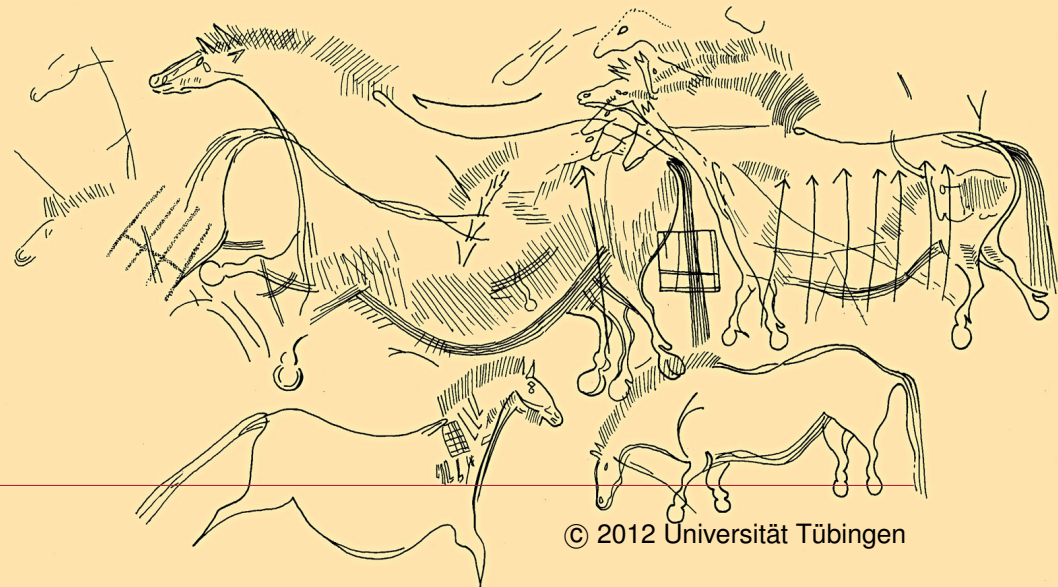
Leroi-Gourhan, Arlette (1982). The archaeology of Lascaux cave.



Lascaux

- ▶ **Period:** Upper Paleolithic (Badegoulian - Lower Magdalenian)
- ▶ **Age:** c. 21 kya
- ▶ **Maker:** Homo sapiens

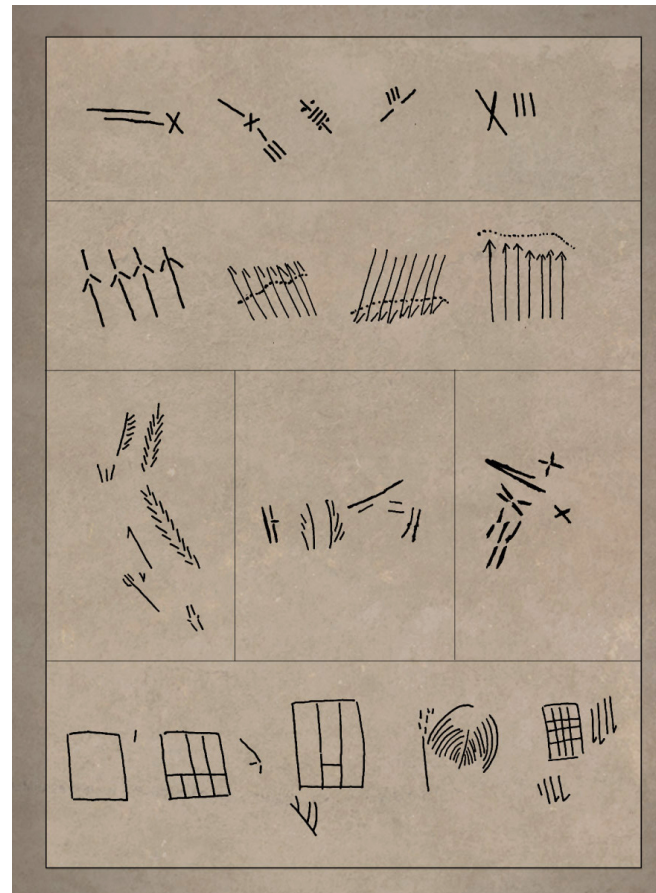
For dating see:
Ducasse and Langlais (2019).
Twenty years on, a new date with
Lascaux.





Lascaux: Geometric Signs

“André Leroi-Gourhan was particularly interested in the study of the geometric figures, signs that allowed him to establish links between the various collections, both of wall art and archaeological objects.”



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References

<https://archeologie.culture.gouv.fr/lascaux/en/andre-leroi-gourhan-1911-1986>



Exercise

Argue for each of the finds below, whether these constitute *signs* in general (according to Peirce), and *indices/icons/symbols* more specifically. Do you see evidence for a transition from icons → symbols, or indices → symbols? Do You see evidence for combinatoriality/compositionality?

Recap

Section 1:
Introduction

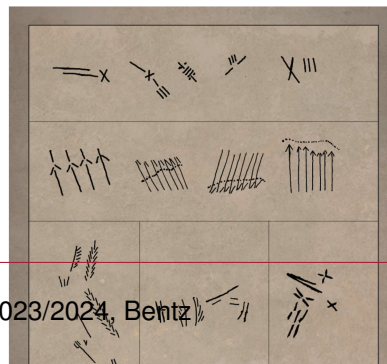
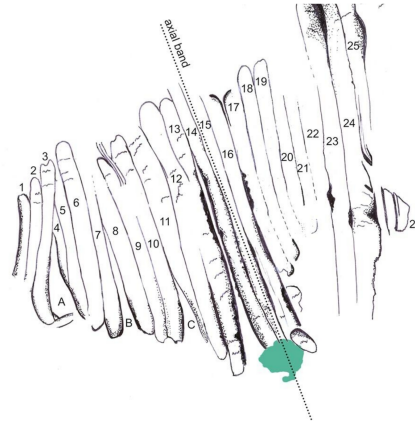
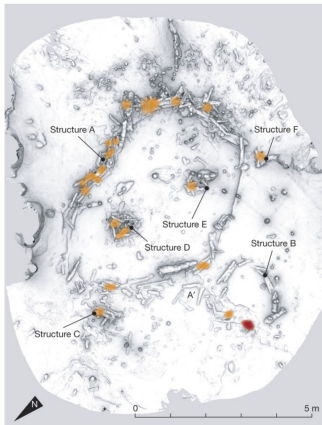
Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References





Solutions

Stalactite structures (Bruniquel): index ✓ of hominin occupation (for us nowadays, but very likely also for other neanderthals), icon ✗ (does not resemble anything else), symbol ✗ (no evidence for conventionalization).

Finger flutings (La Roche Cotard): index ✓ of hominin occupation (for us nowadays, but likely also for other neanderthals), icon ✗ (does not resemble anything else), symbol ✗ (no evidence for conventionalization – though it apparently was at least reproduced more than once in the same cave).

Mask (La Roche Cotard): index ✓ of hominin occupation (for us nowadays, but very likely also for other neanderthals), icon ✓ (resembles a face), symbol ✗ (no evidence for conventionalization).

Shell (Lascaux): index ✓ of hominin occupation (for us nowadays, but very likely also for other Homo sapiens back then), icon ✗ (stands for itself – at least not obviously resembling sth. else), symbol ✓ (conventionalized usage as pendant/on clothing, but arbitrariness is unclear as long as we do not know the exact meaning of these).

Animal panels (Lascaux): index ✓ of hominin occupation (for us nowadays, but very likely also for other Homo sapiens back then), icon ✓ (clear resemblance), symbol ✓ (conventionalized usage, but arbitrariness is unclear as long as we do not know the meanings).

Geometric markings (Lascaux): index ✓ of hominin occupation (for us nowadays, but very likely also for other Homo sapiens back then), icon ✗ (in some cases there is still some potential resemblance with an object, e.g. arrow marks), symbol ✓ (conventionalized usage and arbitrariness).

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Section 3: Geometric Signs in Cave Art



Lascaux: Types of Geometric Signs

1. Signs occurring at the entrance.
2. Signs most frequently occurring before the animal panels.
3. Signs included in the animal panels.
4. Signs at the end of the cave (or parts of the cave).

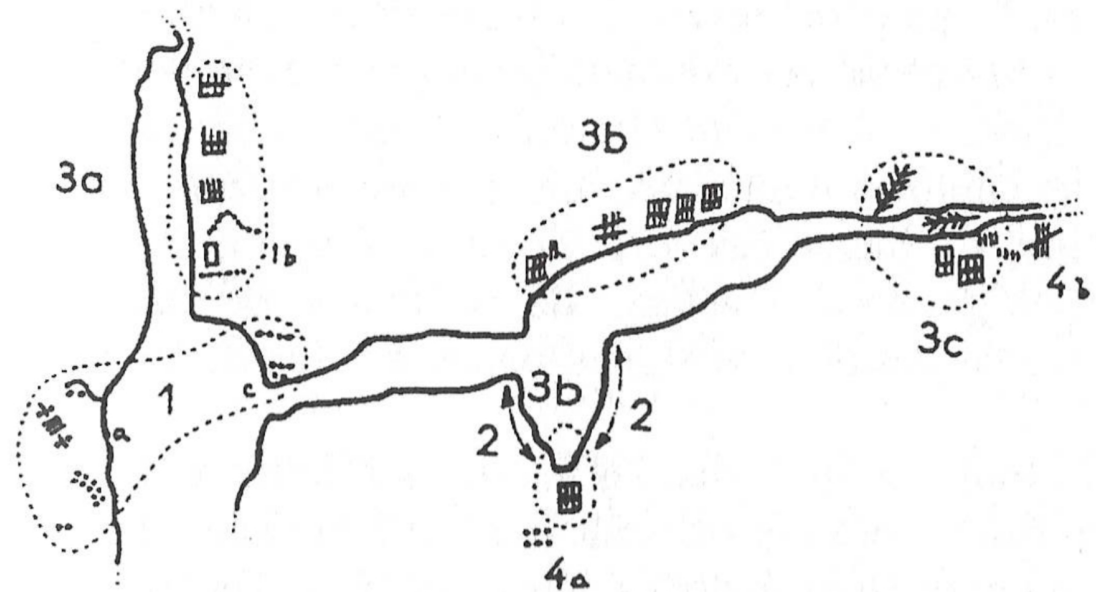


Fig. 7

Grotte de Lascaux (Dordogne). Répartition des signes

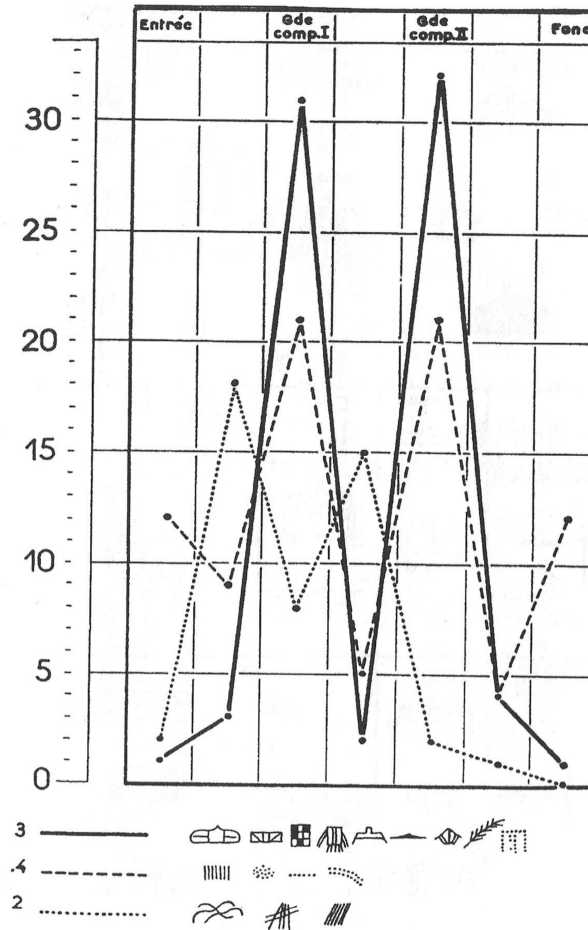
Leroi-Gourhan, André (1992). *L'art pariétal*, p. 127.



Geometric Signs in Upper Paleolithic Caves

1. Signs occurring at the entrance.
2. Signs most frequently occurring before the animal panels.
3. Signs included in the animal panels.
4. Signs at the end of the cave (or parts of the cave).

Leroi-Gourhan, André (1992). *L'art pariétal*, p. 144.



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

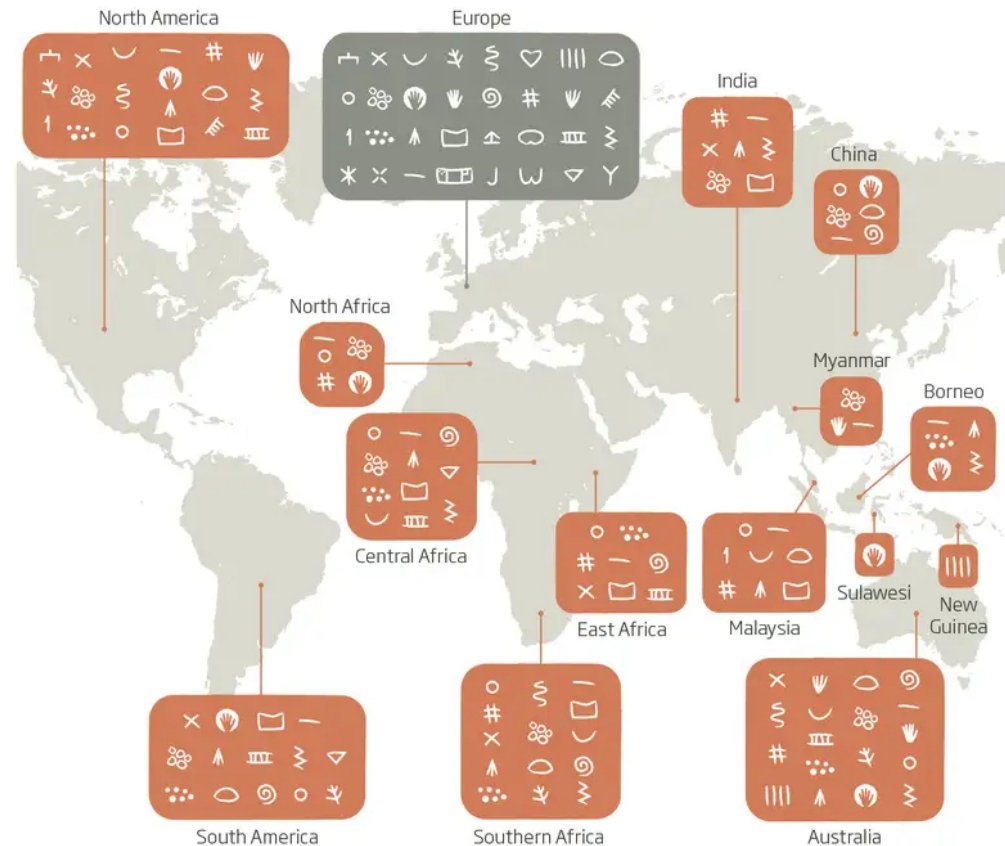
Section 3:
Geometric Signs
in Cave Art

Summary

References



Geometric Signs across the World (?)



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References

Note: This online article makes reference to Von Petzinger (2016), but it is unclear where the information used to produce this figure came from.

<https://www.newscientist.com>



Meaning and Function

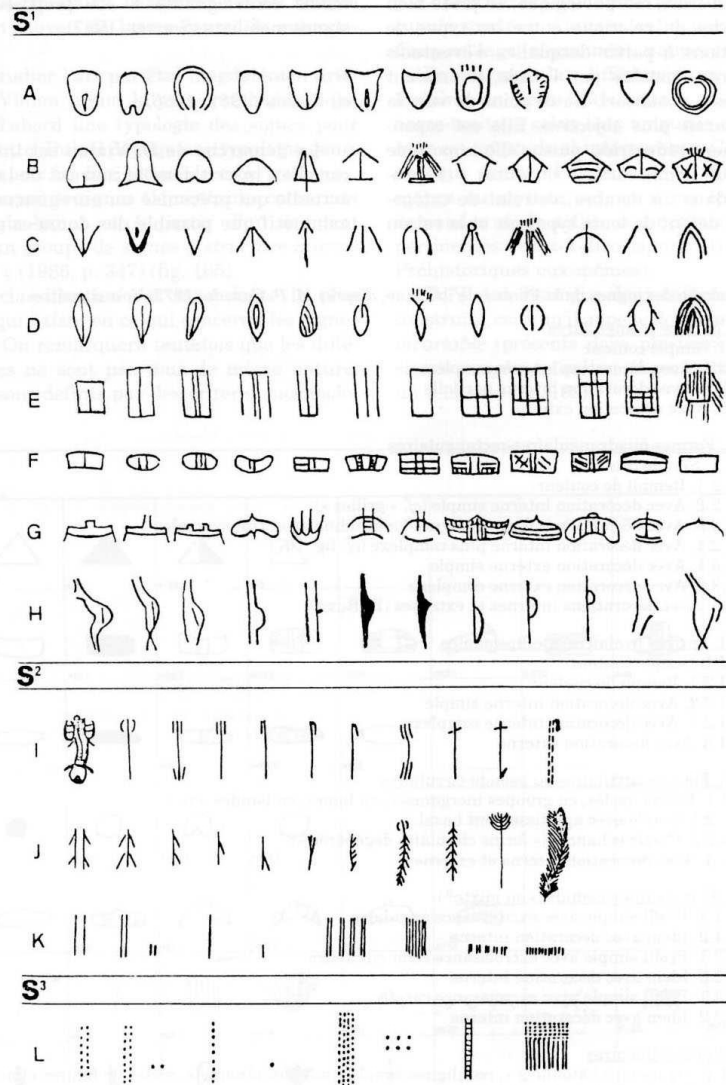


Gender Symbols

Leroi-Gourhan is known for categorizing the symbols into those allegedly representing women, femininity, **female attributes** (also in animals) (S1), and those representing men, masculinity, **male attributes** (S2 and S3).

Note: This is an extreme simplification of Leroi-Gourhan's overall work on geometric signs, which spans several decades, and many publications with a host of ideas and interpretations.

Sauvet (1993), p. 225 citing Leroi-Gourhan (1972).



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Hunting Magic/Group Identity

Further early hypotheses (extending Leroi-Gourhan's classification) include **hunting magic** (e.g. signs for traps applied to animal panels), and the signalling of **group identity**.

Sauvet (1993), p. 228.

See also: Dutkiewicz (2021).

Clés	Espagne	Pyrénées	Dordogne	Autres Régions
Ia Ib				
IIa IIb				
IIIa IIIb IIIc				
IVa IVb IVc				
Va Vb Vc				

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Entoptic Phenomena

In the 1980 and 1990 hypotheses were formulated that geometric signs in rock art might reflect so-called **entoptic phenomena** (halluzinations of shapes) associated with shamanism and drug usage even in some hunter-gatherer populations of today.

Lewis-Williams et al. (1988). The signs of all times: Entoptic phenomena in Upper Palaeolithic Art.

See also: Dutkiewicz (2021).

	ENTOPTIC PHENOMENA		SAN ROCK ART		COSO
	A	B	ENGRAVINGS	PAINTINGS	
			C	D	E
I					
II					
III					
IV					
V					
VI					

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References

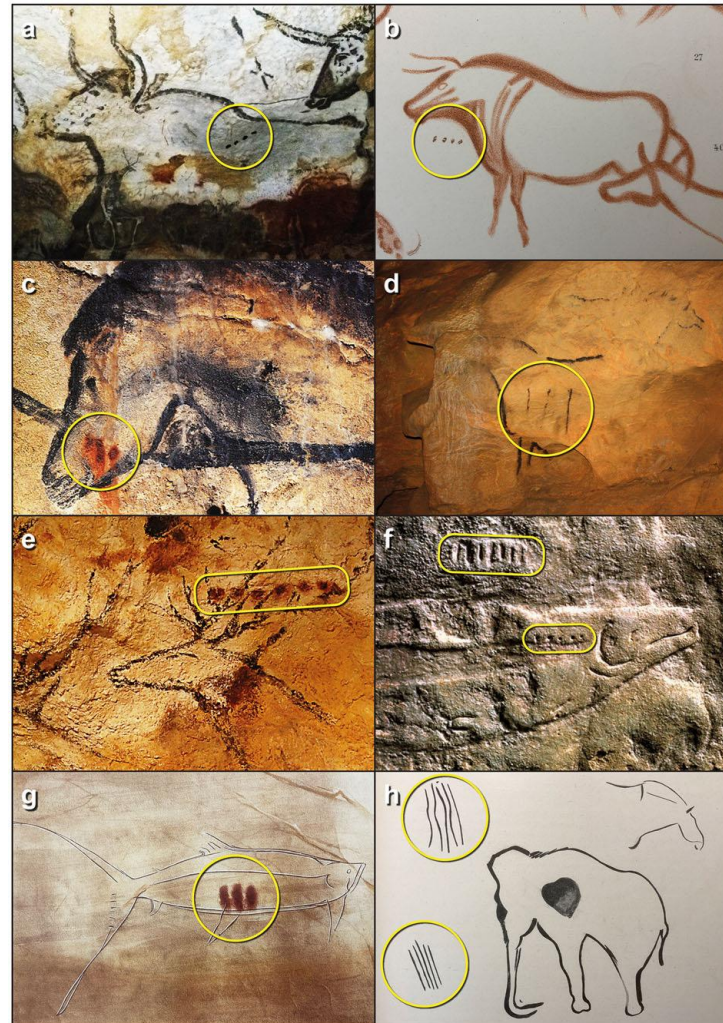


Phenological Calendars

Bacon et al. (2023) interpret *line* and *dot* signs as time measurements in months, and the *Y-sign* as representing “to give birth”. These signs are argued to constitute **phenological calendars** with information about reproduction, birth, and migration of animals.

Bacon et al. (2023). An Upper Paleolithic proto-writing system and phenological calendar.

For critical discussion:
García-Bustos et al. (2023).



Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Summary



Summary

- ▶ Some of the earliest – and highly controversial – “cave art” (engravings) have been found in the Rising Star Cave, dated to c. 300kya, and potentially associated with *Homo naledi*.
- ▶ Some (few) finds in Europe (Bruniquel, La Roche-Cotard) are attributed to **Neanderthals** since they predate c. 50kya.
- ▶ More **extensive production of cave art** seems to co-occur with the arrival of **Homo sapiens** in Europe and the rest of the Old World (Aurignacian c. 43kya at the earliest).
- ▶ **Geometric signs** in cave art are present right from the beginning, and have been investigated more intensively since approx. the 1950s.

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



References



References

Berger, L. R., Hawks, J., Fuentes, A., van Rooyen, D., Tsikoane, M., Ramalepa, M., ... and Molopyane, K. (2023). 241,000 to 335,000 Years Old Rock Engravings Made by *Homo naledi* in the Rising Star Cave system, South Africa. *bioRxiv*.

Clottes, J., and Azéma, M. (2005). Les images de félins de la grotte Chauvet. *Bulletin de la Société préhistorique française*, 173-182.

Ducasse, S., and Langlais, M. (2019). Twenty years on, a new date with Lascaux. Reassessing the chronology of the cave's Paleolithic occupations through new ¹⁴C AMS dating. *PALEO. Revue d'archéologie préhistorique*, (30-1), 130-147.

Dutkiewicz, E. (2021). *Zeichen: Markierungen, Muster und Symbole im Schwäbischen Aurignacien*. Tübingen: Kerns Verlag.

García-Bustos, M., Rivero, O., Sauvet, G., and Bustos, P. G. (2023). Discussion: "An Upper Palaeolithic Proto-writing System and Phenological Calendar" by Bennett Bacon et al.(2023). *Journal of Paleolithic Archaeology*, 6(1), 32.

Leroi-Gourhan, A. (1992). L'art pariétal: langage de la préhistoire. *Editions Jérôme Millon*.

Leroi-Gourhan, A. (1982). The archaeology of Lascaux cave. *Scientific American*, 246(6), 104-113.

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Lewis-Williams, J. D., Dowson, T. A., Bahn, P. G., Bandi, H. G., Bednarik, R. G., Clegg, J., ... and Wylie, A. (1988). The signs of all times: entoptic phenomena in Upper Palaeolithic art. *Current Anthropology*, 29(2), 201-245.

Marquet, J. C., Freiesleben, T. H., Thomsen, K. J., Murray, A. S., Calligaro, M., Macaire, J. J., ... and Jaubert, J. (2023). The earliest unambiguous Neanderthal engravings on cave walls: La Roche-Cotard, Loire Valley, France. *Plos one*, 18(6), e0286568.

Marquet, J. C., Lorblanchet, M., Oberlin, C., Thamo-Bozso, E., and Aubry, T. (2016). New dating of the ‘ mask’ of La Roche-Cotard (Langeais, Indre-et-Loire, France). *PALEO. Revue d’archéologie préhistorique*, (27), 253-263.

Martinón-Torres, M., Garate, D., Herries, A. I., and Petraglia, M. D. (2023). No scientific evidence that Homo naledi buried their dead and produced rock art. *Journal of Human Evolution*, 103464.

Jaubert, J., Verheyden, S., Genty, D., Soulier, M., Cheng, H., Blamart, D., ... and Santos, F. (2016). Early Neanderthal constructions deep in Bruniquel Cave in southwestern France. *Nature*, 534(7605), 111-114.

Jouve, G., Pettitt, P., and Bahn, P. (2020). Chauvet Cave’s art remains undated. *L’Anthropologie*, 124(3), 102765.

Quiles, A., Valladas, H., Bocherens, H., Delqué-Količ, E., Kaltnecker, E., van Der Plicht, J., ... and Geneste, J. M. (2016). A high-precision chronological model for the decorated Upper Paleolithic cave of Chauvet-Pont d’Arc, Ardèche, France. *Proceedings of the National Academy of Sciences*, 113(17), 4670-4675.

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Sauvet, G. (1993). Les signes pariétaux. In: *L'art pariétal paléolithique. Techniques et méthodes d'étude*. Ministère de l'enseignement Supérieur et de la Recherche, 219-234.

Von Petzinger, G. (2017). The first signs: Unlocking the mysteries of the world's oldest symbols. *Simon and Schuster*.

Recap

Section 1:
Introduction

Section 2: Cave
Art in the Middle
Paleolithic/MSA

Section 3: Cave
Art in the Upper
Paleolithic

Section 3:
Geometric Signs
in Cave Art

Summary

References



Thank You.

Contact:

Faculty of Philosophy

General Linguistics

Dr. Christian Bentz

SFS Keplerstraße 2, Room 168

chris@christianbentz.de

Office hours:

During term: Wednesdays 10-11am

Out of term: arrange via e-mail