

# Reconstructing clothing from Multi-Reference Analyses of personal ornaments found in Palaeolithic burials – three case studies and their implications

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## Zusammenfassung

### Rekonstruktion von Bekleidung mittels Multireferenzanalysen von Schmuck aus paläolithischen Gräbern – drei Fallstudien und ihre Aussagekraft

*Kleidung kann durch eine Reihe von Variablen charakterisiert werden – darunter Material, Isolierungsgrad, Herstellungstechniken und Art der Kleidungsstücke, aber auch Farben, Muster, Motive und Accessoires sowie der soziale Kontext des Gebrauchs. Archäologen müssen sehr sorgfältig vorgehen, um prähistorische Kleidung zu rekonstruieren, da diese Variablen nur aus Daten abgeleitet werden können, die meist nur indirekt greifbar sind. Gut erhaltene, geschlossene und ungestörte Primärbestattungen mit noch vorhandenen langlebigen Schmuckgegenständen bieten einige visuelle Eindrücke, die im Zusammenhang mit Kleidung oder Kleidungszubehör entsprechend interpretiert werden können. Auch die Analyse von Gebrauchsspuren auf Schmuckobjekten, die in Gräbern gefunden wurden, kann eine Rekonstruktion der visuellen Eindrücke von Perlarbeiten ermöglichen, die einen integralen Bestandteil der dortigen Kleidungsstücke bilden, oder von anderen Gegenständen, die mit der Bestattung verbunden sind. Dieser Beitrag soll eine Momentaufnahme solcher Wirkungen und Analysen liefern, um zu untersuchen, wie persönlicher Zierrat in Bestattungskontexten zur Rekonstruktion des Aussehens von Kleidung beitragen kann.*

**Schlagwörter** Ästhetik, Gebrauchsspurenanalyse, Perlen, Miniaturisierung, Kinder

## Introduction

Primary closed burials offer crucial opportunities to investigate how personal ornaments were displayed on individuals of a specific age and sex, albeit in the specific context of funerary customs<sup>1</sup>. Most of these personal ornaments can be seen as clothing accessories (cf. e.g. Hansen 2004), i.e. decorative items supplementing an individual's outfit, and their location in the grave may make it possible to associate them with specific body parts and clothing items. Well-preserved primary closed undisturbed burials are, however,

## Summary

*Clothing can be characterised by a number of variables – including material, level of insulation, manufacturing techniques, and items of clothing, but also colours, patterns, motives and accessories, as well as the social context of use. Archaeologists must put a great deal of effort into reconstructing prehistoric clothing as these variables can only be inferred from data that are mostly indirect. Well-preserved, closed and undisturbed primary burials with durable decorative items still in place offer some visual impressions that can be interpreted in regard to clothing or clothing accessories. Also, the analysis of use-wear patterns on personal ornaments found in graves may allow reconstruction of the visual impacts of beadwork forming an integral part of a garment or of other items associated with the burial. This paper aims to provide a snapshot of such impressions and analyses to investigate how personal ornaments in burial contexts can contribute to the reconstruction of the appearance of clothing.*

**Keywords** Aesthetics, use-wear analysis, beads, miniaturisation, children

relatively rare in the Palaeolithic, and for inferring similarities and differences or diachronic and geographic trends, one has to include ornaments found in settlement sites, which are more numerous, more continuous in time and less localised on the Eurasian territory than burials<sup>2</sup>. Also, research on the topic<sup>3</sup> shows that a better understanding of clothing can be reached if multiple variables of clothing are investigated, such as suitable materials providing insulation, manufacturing techniques, clothing items, displayed colours, patterns, motives and accessories, auditory and olfactory properties, and of course the physical and social

1 Cf. e.g. McGregor 1943; Tarlow/Nilsson 2013; Lullo/Wallace 2019; Baysal/Sağlamtimur 2021; Baadsgaard 2024.

2 Cf. e.g. Taborin 1993; Taborin 2004; Vanhaeren/d'Errico 2006; Álvarez/Jörís 2008; Baker et al. 2024.

3 Cf. e.g. Hansen 2004; DeMello 2007; Gilligan 2010, 2023; Grömer/Pomberger 2023; Baadsgaard 2024; Nowell/Cooke 2024; d'Errico 2024.

characteristics of the wearer as well as the social context of use. Mirroring the complexity of factors influencing clothing, the investigation of these variables requires comparative data and information from different kinds of reference collections, including not only archaeological and experimental ones but also ethnographic, human ethological and aesthetical ones. This contribution aims to illustrate how clues for informed impressions of prehistoric outfits can be obtained through such a holistic approach.

### Multiple variables of clothing potentially visible from personal ornaments found in burials

Even though a complete picture of all clothing variables remains out of reach, a preliminary frame of reference may allow for more systematic future investigations.

Most obviously, personal ornaments found in closed undisturbed primary burials can be associated with clothes or clothing accessories worn by an individual of a specific sex and age, i.e. male or female, baby, toddler, child, adolescent, adult, in a funerary context at a specific place in a specific time. If multiple contemporaneous burials of younger and older individuals of both sexes are available, regional or supra-regional recurrences and variability according to age and sex can be investigated.

Ideally, personal ornaments found in closed undisturbed primary burials can also be associated with specific anatomical parts and, from there, potentially to the presence and underscoring of specific segments of clothing.

The natural environment and cultural context of the burial may, in addition, provide clues as to the type of materials and techniques that potentially could and should, in the light of prevailing environmental conditions (cf. e.g. Gilligan 2010; Gilligan 2023), have been used for clothing (e.g. hides, fabric, pigment, quillwork, beading and so on).

Finally, the inherent characteristics of the personal ornaments may offer insights regarding the colours, patterns, and designs that were displayed. Theoretically, these are limited by the available raw materials and techniques and the imbrication of the constituent parts. Given that personal ornaments do not primarily fulfil a utilitarian purpose but, per definition, are meant as means of communication, it can additionally be postulated that their displays aimed to follow the so-called ›principles of art‹ (cf. Arnheim 1954; Collingwood 1958).

### Personal ornaments, beauty, aesthetics, and the ›principles of art‹

Research on aesthetics identifies some principles that are beneficial for the transmission and impact of visual information<sup>4</sup>. These principles, often intertwined and interdependent, play with components, e.g. lines, shapes, colours,

values, forms, textures, and spaces, to create compositions with elements such as novelty and surprise, equilibrium between the parts and the whole (i.e. balance), symmetry, repetition, exaggeration, emphasis, movement, contrast and shared emotions.

›Principles of art‹ are evident in present-day and ethnographically documented ornaments and can also be found, for example, in the c. 75 000-year-old Nassarius shell ornaments from Blombos Cave, Western Cape, South Africa<sup>5</sup>. Even if the specific manifestations of beauty differ according to socio-cultural groups, the use of the ›principles of art‹ and the search for beauty and aesthetics have a universal character (e.g. Herskovits 1947; Brown 1991; Sütterlin et al. 2014) and should therefore be considered in potential reconstructions of past clothing accessories and clothing.

### Examples of Upper Palaeolithic personal ornaments found in burials

#### La Madeleine child burial

The burial of the c. 2–4-year-old (Henry-Gambier et al. 2000) La Madeleine child was discovered in 1926 by D. Peyrony in the La Madeleine site, Dép. Dordogne, located in southwestern France (Peyrony 1926, 1927; Capitan/Peyrony 1928). The child burial was directly dated to 10 190 ± 100 BP (GifA 95457; Henry-Gambier et al. 2000). An old drawing (Capitan/Peyrony 1928, 122) of the burial shows that ornaments were found on the head and around all the child's joints (Fig. 1a). The child has been buried with up to ten different bead types (Taborin 1993; Vanhaeren/d'Errico 2001). Among them are 2 red deer canines, 2 fox canines, 1 perforated phalanx of a rabbit or hare, 1 fish vertebra, 1 *Glycymeris*, 36 *Turitella*, 20 *Tritia neritea*, 160 *Neritina*, and, most spectacular in number, 1314 *Dentalium* shells (cf. Fig. 1b). Unfortunately, specific information on the location of each of these personal types within the grave seem to be lost.

The analysis of the La Madeleine ornaments in the light of several reference collections, including morphometrics of natural shells from present-day and fossil seashores, morphometrics of archaeological shells found in adult burials, breakage patterns due to natural processes and to experimental flexing, sawing and sewing, maximum diameters of archaeological needles from the La Madeleine site, and a small sediment bloc of the burial that preserved 5 *Dentalium* shells in place, provided interesting insights into Late Palaeolithic beadwork practices (Vanhaeren/d'Errico 2001).

Morphometrics show that La Madeleine *Dentalia* are significantly shorter than those from present-day and fossil natural sources. They are also comparatively shorter than those in relative contemporary burials of adults. The La Madeleine *Dentalia* are not only short but also have quite large openings at both ends, indicating that they were broken in order to obtain short and large cylindrical beads. The

4 Cf. e.g. Arnheim 1954; Collingwood 1958; Rentschler et al. 1988; Eibl-Eibesfeldt 1988; Dissanayake 1980; Dissanayake 1992; Dissanayake 2009; Eibl-Eibesfeldt/Sütterlin 2008; Ishiku/

Zeki 2011; Changeux 2012; Conway/Rehding 2012; Bohrn et al. 2013; Sütterlin et al. 2014; Mendoza Straffon 2014; Krentz/Earl 2013; Mouclier et al. 2023 and references therein.

5 Cf. e.g.; Cole 1975; Schoeman 1983; Dubin 1987; Dubin 1999; Sciamia/Eicher 1998; Vanhaeren 2014; Mouclier et al. 2023.

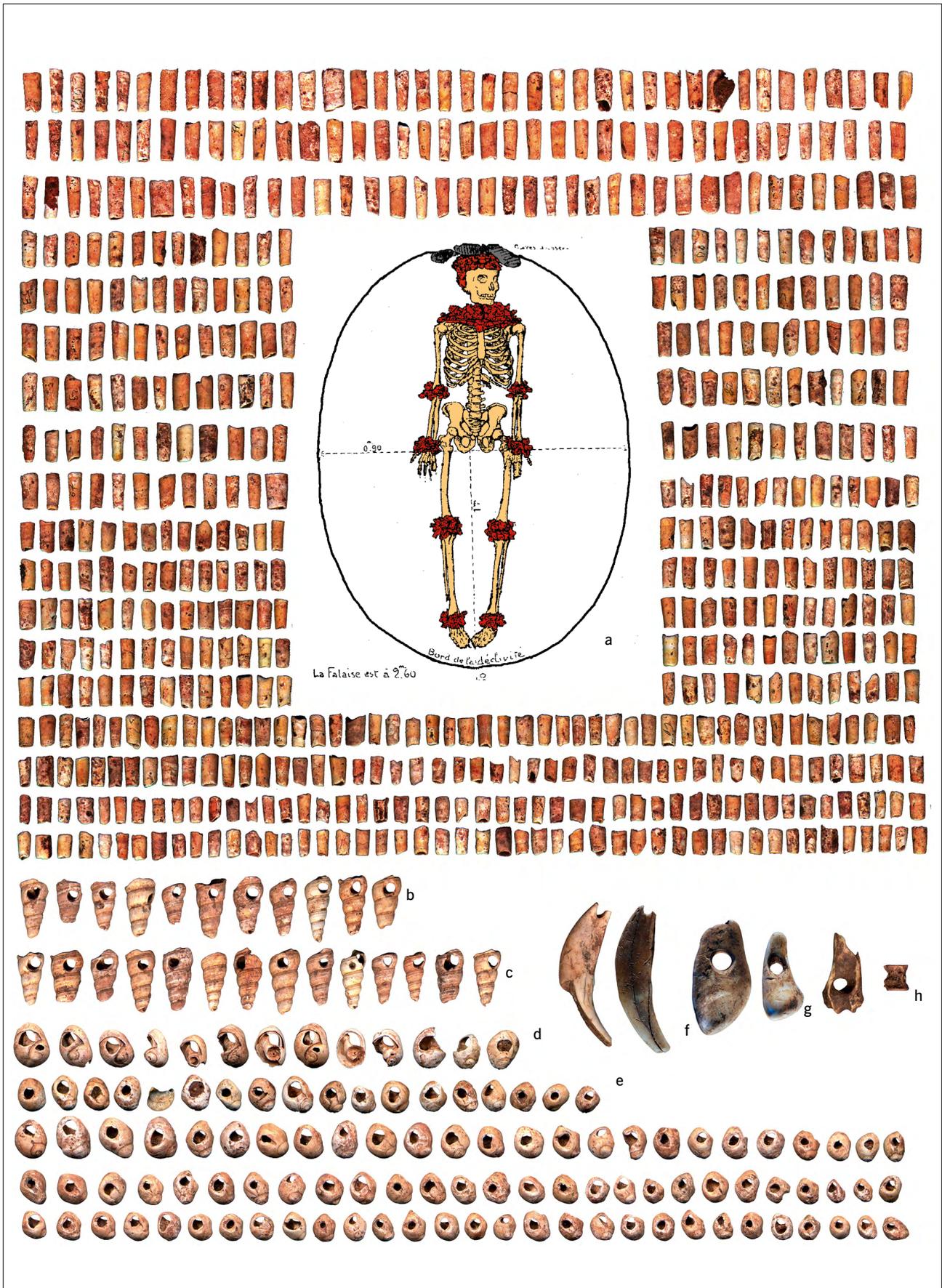


Fig. 1a–f a Sketch of the La Madeleine child burial indicating the arrangement of the personal ornaments; b selection of associated *Dentalia*; c *Turitella* shells; d *Tritia neritea* shells; e *Neritina* shells; f fox canines; g red deer canines; h *Glycymeris* shell. No scale.

Abb. 1a–f a Skizze der Kinderbestattung von La Madeleine mit der Anordnung der zugehörigen Schmuckelemente; b Auswahl von *Dentalia*; c *Turitella*-Gehäuse; d *Tritia neritea*-Gehäuse; e *Neritina*-Gehäuse; f Fuchseckzähne; g Rothirscheckzähne; h *Glycymeris*muschelschale. O. M.

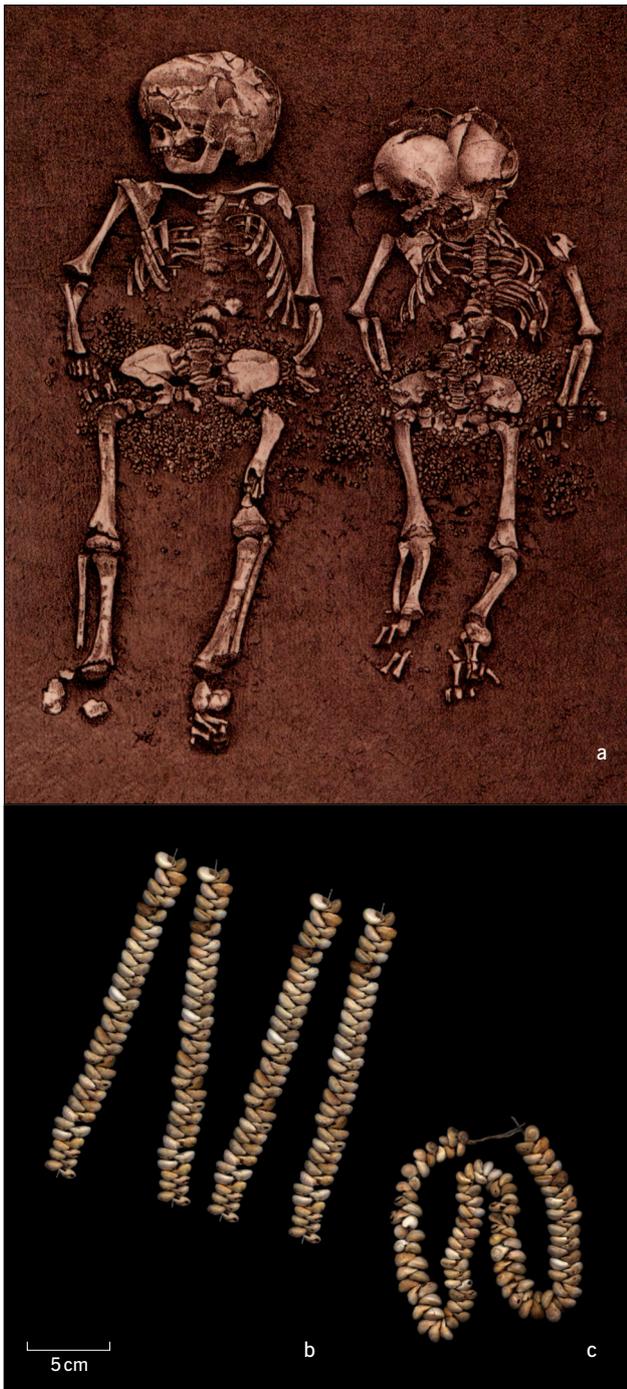


Fig. 2a-c a Grotte des Enfants double child burial with the location of the associated *Tritia neritea* beads. b-c Modern *Tritia neritea* shell beads strung on strings.

Abb. 2a-c a Grotte des Enfants. Doppelkindergrab mit der Lage der zugehörigen Perlen aus *Tritia neritea*-Gehäusen. b-c Rezente *Tritia neritea*-Gehäuse aufgereiht an Schnüren.

analysis of the bead morphologies indicates that the *Dentalium* shells were indeed broken through flexion and sawing and most likely embroidered as indicated by diagnostic breakage patterns on the minimal diameter openings due to forced passage of a needle and the fact that the smallest needles found at the site have a maximum diameter that can pass through the openings of the *Dentalia* found within the child burial. Notches visible on some specimens and the

associated longitudinal flat facets suggest that they were applied to clothes. Notches and facets likely result from friction with thread and cloth respectively. It is probable, given their similar size, that the *Dentalia* were sewn one next to the other as also supported by the sediment bloc that contains 5 *Dentalium* shells still arranged side by side. Undoubtedly, at La Madeleine, people invested a surprising degree of attention, time, and specific skill in collecting, manufacturing and embroidering these small *Dentalium* shells on the child's clothes.

Interestingly, the same trend towards miniaturisation is observed in the other shell beads associated with this child burial. The *Turitella* shells are composed of small specimens only. The *Glycymeris* sp. bivalve shell from the burial is also tiny. Unless taxonomic or environmental reasons underly observed differences in *Tritia neritea* shell size, the same tendency seems also true for the *Tritia neritea* shells at La Madeleine as well as for the *Tritia neritea* shells found in the double burial (GE1 and GE2) of the Grotte des Enfants in Liguria, Italy (Fig. 2a-b), directly dated to c. 11 130 ± 100 BP (GifA 94197; Rivière 1887; Henry-Gambier et al. 2001; Vanhaeren/d'Errico 2003a). Remarkably, at the relative contemporaneous settlement site of Pincevent, red, white and yellow disk-shaped beads come in two clearly distinct sizes: large and small (Vanhaeren 2006a; Vanhaeren 2006b), suggesting what may be a more widespread trend towards the manufacturing of special miniature beadwork for children.

Intriguingly, the experimental reproduction of the *Tritia neritea* found in vertical alignments around the pelvises of the two children in the Grotte des Enfants double burial, discovered in 1874 by E. Rivière (1874; Rivière 1887), produces a tinkling sound (Vanhaeren 2003). The fact that sound may have played a role in the design of beadwork (Shaham/Belfer-Cohen 2017) is also suggested by the experimental reproduction of the moose teeth beadwork from the Mesolithic burial 127 at Yuzhniy Oleniy Ostrov, Karelia Region, Russia (Rainio et al. 2021).

That specific morphological attributes also played a role in beadwork made from animal teeth is also suggested by the fact that the two red deer canines found associated with the La Madeleine child correspond to two left canines, one from a stag and one from a hind, and that the same is true for the fox canines in the burial, which both correspond to left canines, one upper and one lower canine (Vanhaeren/d'Errico 2001).

Tentatively, one could infer from the drawing with the location of beads on the skeleton that the La Madeleine child had clothes with decorated head covering (or hair), neckline (either or both as a necklace or on the neckline and/or epaulettes), and sleeves and legs (either pants, leggings or boots). In this respect, a similarity can be seen with the positioning of ivory beads in the Sungir burials, Vladimir Oblast, Russia (Bader/Lavrushin 1998). The absence of a hemline is worth noting; it may have been absent, not decorated or decorated with perishable materials. Alternatively, the hemline came to the child's knees and was decorated only at these two spots. A phalanx of Lagomorpha may suggest that it was used in connection with the fur of this animal, known to be relatively thin and soft, which are qualities especially sought for in baby clothes (cf. e.g. Hall et al. 1994). Through

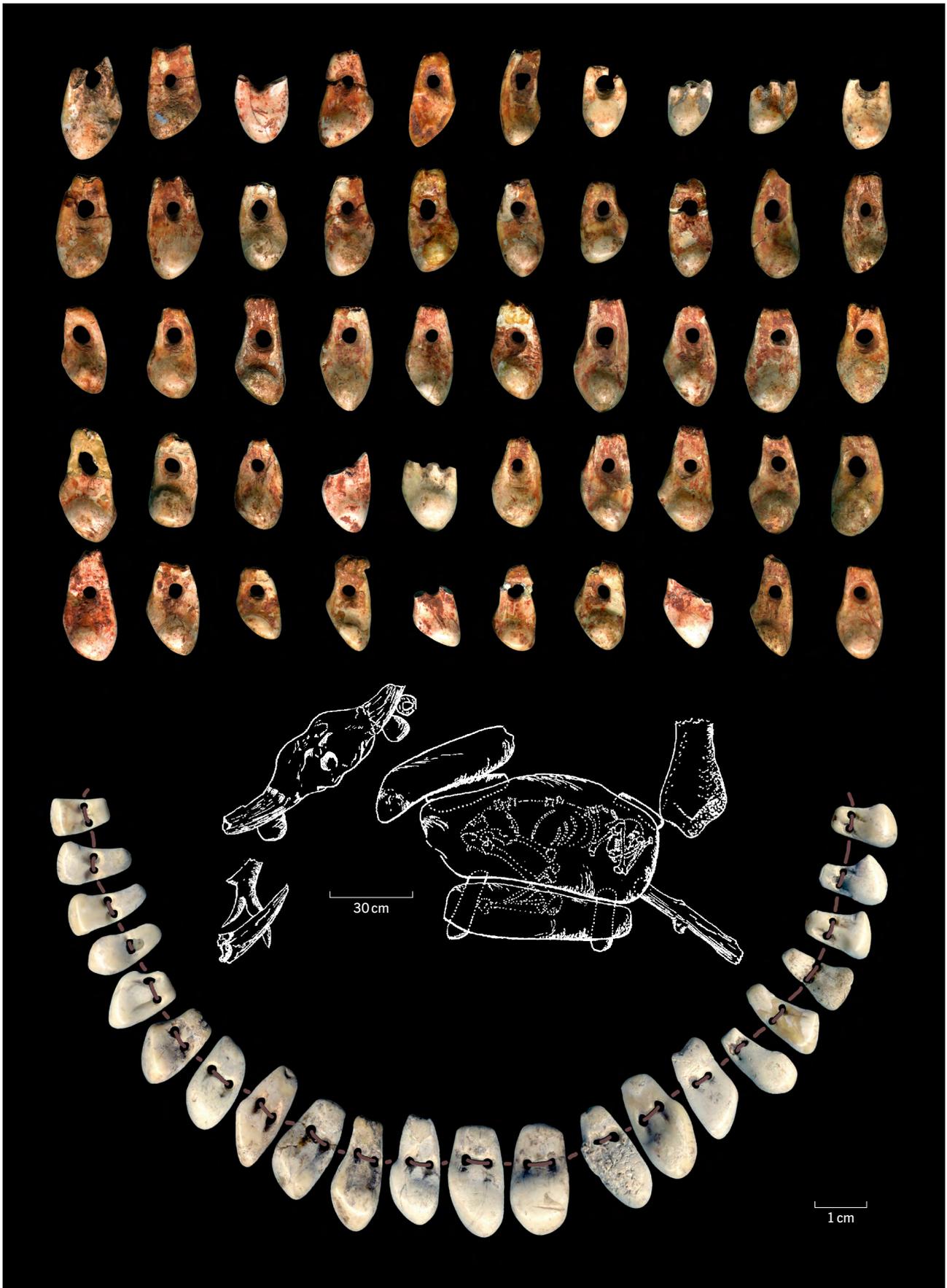


Fig. 3 Plan (centre) of the Saint-Germain-la-Rivière burial and perforated red deer canines associated with the burial (top) and the so-called ›Mirande necklace‹ (bottom).

Abb. 3 Plan (Mitte) der Bestattung von Saint-Germain-la-Rivière und gelochte Rothirschzähne, die im Kontext der Bestattung (oben) und der sogenannten »Mirande-Halskette« (unten) gefunden wurden.



Fig. 4 Symmetrical display of the red deer canines and *Littorina obtusata* shells associated with the Lagar Velho child burial. Scale bar = 1 cm.

Abb. 4 Symmetrisches Arrangement aus Rothirscheckzähnen und Gehäusen der Meeresschnecke *Littorina obtusata* aus der Kinderbestattung von Lagar Velho. Maßstabsleiste = 1 cm.

the combination of results from comparative analyses of personal ornaments found in burials and reference collections, it is possible to infer that personal ornaments were sewn on in a miniaturised version of shells worn by adults and that – at least the *Dentalium* shells – were most likely sewn one next to the other in a vertical position on clothing material. If principles of art were applied, the pattern of vertically juxtaposed *Dentalium* stubs, which are the most numerous, may have been repeated in these various locations, and larger items displayed in central and symmetrical positions. In sum, the impressive, rich ornaments in the grave of the La Madeleine child, which obviously were manufactured in specifically miniaturised ways and thus very different in size than normally seen in adult burials, seem to indicate strong affection, possibly the emotion of parental love and the very high investment in this offspring (cf. e.g. Barba 2021).

#### Lady of Saint-Germain-la-Rivière burial

The burial of the Lady of Saint-Germain-la-Rivière, Dép. Gironde, France (Fig. 3) was discovered in 1934 by R. Blanchard (Blanchard et al. 1972) and is now directly dated to c. 15 780 ± 200 BP (GifA 95456; Henry-Gambier et al. 2002). The Lady had been buried with three bead types, among which were 72 red deer canines found in the chest region (Blanchard et al. 1972; Vanhaeren/d'Errico 2003b).

Natural present-day reference collections allow us to identify stag and hind canines, right and left teeth and teeth originating from the same animal (cf. e.g. d'Errico/Vanhaeren 2002). Comparison with these reference collections shows that the red deer teeth of the Saint-Germain-la-Rivière burial belonged to 66 animals, with very few paired teeth, nevertheless more or less the same number of left and right teeth, and a preference for teeth from stags, which are larger than those from hinds (Vanhaeren/d'Errico 2003b). Discrete use-wear was observed, yet not systematically analysed in the light of diagnostic experimental reference collections. In contrast, use-wear on the red deer teeth composing the so-called ›Mirande necklace‹ (cf. Fig. 3; Garde 1946), named after the excavator who found it at the Saint-

Germain-la-Rivière settlement site, suggests stringing, displaying of the labial side, and a symmetrical composition (Vanhaeren/d'Errico 2003b).

That laterality played a role is also suggested by the fact that the two red deer canines found associated with the La Madeleine child correspond to two left canines. The same principle accounts for the fox canines in the burial, which both correspond to left canines. All red deer canines from the Magdalenian VI horizon of the La Madeleine site are also left teeth.

In the light of the presented reference collections, analysis of the red deer canines from well-preserved primary burials, such as those from the Gravettian, may permit us to reach better visual impressions of prehistoric outfits.

#### Lagar Velho child burial

The Lagar Velho child, Leiria District, Portugal, directly dated to 23 950 ± 150 BP (OxA-43547; Linscott et al. 2025), was discovered in the central region of Portugal at the base of a limestone cliff (Zilhão/Trinkhaus 2002). Excavations (cf. Fig. 3a–b) revealed that terrace works displaced the child's cranium (cf. Fig. 3c) but left its postcranial remains in place (Zilhão/Trinkhaus 2002; Duarte 2002). Two red deer canines were found near the fragments of the cranium, one *Littorina obtusata* shell near the child's cervical vertebra and another *Littorina obtusata* shell in the same square metre as the first shell but a few centimetres above the skeleton (Zilhão/Trinkhaus 2002; Duarte 2002; Vanhaeren/d'Errico 2002).

Application of the model for estimating the age and sex of red deer canines (d'Errico/Vanhaeren 2002) to the red deer canines associated with the Lagar Velho cranium made it possible to identify the four teeth as a right and a left canine of two different old hinds and a right and a left canine of two different stags – one young and one adult individual. Considering the size of the canines, it is striking that, although they do not come from the same animal, the two hind canines, on the one hand and the two stag canines on the other hand, have such surprisingly similar sizes compared to the variability of red deer canines of the same sex

available from other Upper Palaeolithic burials of Europe (Vanhaeren/d'Errico 2002). The other striking feature is that, apparently, the beadmaker has chosen large male canines and small female canines.

Contextual information and the technological, morphometrical, and microscopical analysis of the ornaments (Vanhaeren/d'Errico 2002) suggest that the red deer canines were probably arranged with their crowns downward on the forehead of the Lagar Velho child. This arrangement is almost identical to that observed on the Pagglia woman, Apulia, Italy (Ronchitelli et al. 2014), only here, the crowns of the deer teeth were apparently oriented upward.

The way in which the canines were arranged certainly took into account the aforementioned features, namely 1) the opposite lateralisation of the canines of the same sex, 2) the morphological similarity of the canines of the same sex and 3) the exaggerated size difference between the canines of opposite sex. These ingredients were probably used to create a symmetry that enhanced the visual impact of the beadwork (Fig. 4).

## Discussion, conclusion and perspectives

From the perspective of ethnoarchaeology, highly valuable grave goods like clothes and lavish ornaments allow us to fathom the strong emotions released by the death of a much-loved person. The lyrics of mourning songs from Melanesia and other parts of the world speak of the devastating loss (cf. e.g. Schiefenhövel 2014 and references therein) and allow us to envisage, thousands of years later, the scenes of death and burial. The Upper Palaeolithic personal ornaments examined form an integral part of clothing and surely interacted

to reach the desired visual and social impact. The three case studies show that multiple elements, including size, laterality, and probably also sound, played a role in prehistoric beadwork. The La Madeleine and Lagar Velho case studies suggest that children can wear the same type of ornaments as adults or miniature versions thereof. Analysis of the inherent characteristics of personal ornaments found *in situ* on buried skeletons and consideration of the so-called »principles of art« (cf. e.g. Vanhaeren 2014: search for novelty and surprise, equilibrium between the parts and the whole, symmetry, repetition, exaggeration, colour play, and shared emotions) may help to obtain informed visual impressions of clothing in the prehistoric past. Multiple cross-linked reference collections facilitate a better reconstruction of how these principles were implemented, related to age and sex, social status, relationship to, and care received by family or other members of the social group, and perhaps also the physical appearance of their wearers in time and space.

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## Source of figures

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|---|---|
| <p>1 a after Capitan/Peyrony 1928, 122; b–h Vanhaeren/d'Errico 2001</p> <p>2 a after Rivière 1887; b–c after Vanhaeren 2003</p> | <p>3 centre after Blanchard et al. 1972; top and bottom: after Vanhaeren/d'Errico 2003b</p> <p>4 after Vanhaeren/d'Errico 2002, 155 Fig. 10,1</p> |
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