HOMININ REPRESENTATIONS IN MUSEUM DISPLAYS

Their role in forming public understanding through the non-verbal communication of science

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4

FINISHING TECHNIQUES used on the *Homo sapiens* representations

INTRODUCTION

Hominin representations used by museums and visitor attractions can be mistaken for actual people as shown by the Jorvik example in the previous chapter, where a tourist mistakenly thought that the Viking representations in the reconstructed village were actually actors (C. Warner 2006: pers. comm.). School age visitors were heard to ask if "Mrs Getty"[1]–displayed in a replica of her Saxon coffin at the Corinium Museum in Cirencester, England–was a dead person and another asked if she was real. A toddler was observed at the Dover Museum, Dover, England, who upon seeing the Iron Age Warrior and the Roman museum mannequins, was too scared to enter into the gallery and had to be coaxed by her father to actually enter the gallery. Once there, she kept an eye on the figures, pointed to them, spoke in baby talk a lot and continued to act in an agitated manner. There were other museum mannequins also in the gallery that did not affect her in the same way. She obviously considered those particular representations to be realistic enough to scare her and make her feel threatened[2]. A tourist at Madame Tussauds in London, was observed pretending to be one of the portrait figures and was scaring other visitors by 'coming to life' in front of them indicating that these visitors found it difficult to differentiate between the portrait figures displayed and an actual person. A humorous example can be seen in web–based sites such as CelebrityPix.com.au where they have a slideshow of photographs and they ask the viewers if they can differentiate

[1] Mrs Getty was a facial reconstruction on a body and portrays a wealthy Saxon woman on display at the Corinium Museum in Cirencester, England, in 2006.

[2] The Iron Age Warrior was depicted with a scowl on his face and his body covered in tattoos and the display was placed on a raised platform, all of which may have been intimidating to the child.

between the wax figure and the real star (CelebrityFix 2010). These are just some examples that indicate that many of the human representations observed are extremely lifelike although not all representations are considered to be this realistic[3].

While the anatomical structure of the representation does contribute to this perception, it must be acknowledged that human representations are recognisable as human, even if the representation is not anatomically accurate or correct. Representations of humans vary to a great degree, from simply drawn stick figures to photographs, from Henry Moore sculptures to Madame Tussauds portrait figures, the commonality amongst these representations is that they are all recognisable as humans. This shows that the general appearance of a human figure will be recognisable as such even to young children, as long as it consists of a head, a body, two arms and two legs. While not all human representations found in museums have a head, as shown in the previous chapter, with 7.1% of the sample (n=860) consisting of a body only or a non–cephalic body part, it must be remembered that these representations had other contextual or labelling information identifying them as human. The main variation identified between these human representations was in the techniques used to 'finish' the representations.

It can therefore be hypothesised that *it is the level of finishing and the techniques used that convince the viewer of the representations' realism*. For this reason the focus of this chapter is on identifying the finishing techniques used on the human (*Homo sapiens*) representations in museums as found amongst a sample of life–sized, three–dimensional human representations in museums.

As the identification of the *H. sapiens* representations is not dependent upon the anatomical accuracy of their bodies, they have been separated from the earlier

[3] "Realistic" in the sense that the representation looks to be biologically life–like or legitimate and while it may not necessarily be an accurate portrayal, some of these representations do look as if they could start to breath and walk away. The use of the term realism in this thesis will continue to refer to this particular definition.

hominin taxa that have also been identified in a museum context (e.g., Neandertals, *Homo erectus*, *Homo habilis* and australopithecines). This is attributable to the unfamiliarity that the general public have with recognising these taxa and their anatomical shape, making their identification more difficult for the viewer. Anatomical accuracy of the representations of these earlier hominin taxa in relation to body size and shape as well as finishing techniques will be discussed in Chapter 5, – *"The Overall Finish and Body Proportions of the Earlier Hominin Representations".*

As previously stated, the *H. sapiens* representations are identifiable to us as such even if their anatomical accuracy is of a low quality. Therefore, the anatomical accuracy of the *H. sapiens* representations will not be discussed here. The overall appearance of these representations is influenced by the techniques used to finish the individual representations. It is these finishing techniques that influence the viewer in terms of the representations' perceived realism. Essentially the level and types of finishing techniques used on human representations affect how biologically life–like or legitimate the representation looks within the loose framework of identifying the representation as human.

The finish used on a representation can change the look of it dramatically. An example of this is the comparison that can be made between the Spitalfields Woman on display at the Museum of London, London, and an uncoloured version of her bust that was at Caroline Wilkinson's studio in Dundee, Scotland (Figure 4.1). The exhibited or 'finished' bust has natural colouring with the addition of hair and glass eyes, whereas, the uncoloured version is of an overall terracotta finish. The coloured version at the Museum of London is displayed on a pedestal in a vitrine or glass display case but placed in such a way that the face is slightly obscured by the corner of the vitrine.

FIGURE 4.1 Two versions of Spitalfields Woman: (a) the 'uncoloured' bust in a terracotta finish at Caroline Wilkinson's Studio, Dundee, Scotland; and (b) the exhibited or 'finished' version on display at the Museum of London, London.

TECHNIQUES OF CREATING REPRESENTATIONS

Human representations are not made in total isolation. Even when an artist works alone, they still work within a social and institutional context as well as within their own intellectual context. These various contexts affect the way that an individual constructs their knowledge about any given topic by adding various layers and shading to it[4]. This process is continual throughout a person's life. Intellectual context, essentially an individual's prior knowledge about a topic can influence decisions made about a representation, for example, its sex, hair colour/length, skin colour or even the portrayal of occupation. Experts from various fields may be called in to assist in creating the final product. All of which work within their own intellectual, social and institutional contexts as well.

As mentioned in the previous chapter in the case of King Phillip II of Macedon (Page 131) a team of people from various fields are often responsible for the final look of the representation. These teams may involve the museum curator, artists, historians, anatomists, make–up artists, hairdressers, wig–makers, painters and costume makers. This team effort is not confined to the facial reconstruction type

[4] For more information on constructivism see the review by Phillips (1995).

of representation as the final preparation of museum mannequins is often the result of work of a team made up of painters, wig makers, and makeup artists (Coleman 1995) in addition to the original maker of the mannequin. At the Dover Museum, Dover, England, is an Anglo Saxon male that was made to a specific brief based on an individual (grave 56) from the 1951 excavation of the Buckland Cemetery in Dover (M. Frost 2006: pers. comm.). This brief, contained information detailing the individual's height and age and the associated grave goods, as well as conjectural items such as clothing, scalp[5] hair style and possible facial hair styles.

Casts are another representation type for which a team might be responsible for the final look of the representation. This is especially true for those casts that have been reconditioned due to their age or a reworking of their display. This reconditioning process may also highlight the changes that the cast has undergone during its lifetime with, for example, changes to the skin colour (Coffee 1991). The casts of Australian Aborigines currently on display at the Bangerang Cultural Centre, Shepparton, Victoria (Australia), have even had their poses changed during their reconditioning, altering them from their original 1886 appearance (Russell 2001). They were originally displayed at the Colonial and Indian Exhibition in London afterwards they became part of an exhibition at the National Museum, Melbourne, Australia. During their time at the museum, they were in several different displays. This has meant that the people involved in working with these representations have consisted of: the original maker, the curators and makers of each display that they have been in as well as the artists that were involved in the reconditioning of the representations. This means that the input of the various people over the 'life' of a representation can have a great deal of impact on the final look of a representation.

This is a result of the choices that are made as to the requirements of the finished exhibit and the representation. Anonymous representations are often preferred when displaying costumes, while a more statue–like finish maybe

[5] Scalp hair is used rather than head hair, to differentiate the differences between the various types of head hair which include scalp hair, eyebrows, eyelashes and facial hair.

preferred to indicate that skin, eye and hair colour is unknown or a more realistic representation may be chosen to illustrate a 'type'. The following examples from museums show how anonymity may be achieved in human representations. The Melbourne Museum, Melbourne, Australia, required anonymous standard mannequins for a particular exhibit and had the heads changed to blanks in order to achieve this. A 'blank' is an industry term used when referring to a head on a mannequin that is of an ovoid or oval shape but has no other defining facial features. Other examples are the representations used to depict characters from the song Waltzing Matilda[6] by poet Banjo Paterson on display at the Waltzing Matilda Centre in Winton, Queensland (Australia), these were originally casts made from local people. These casts were then added to and adapted, by using a rough textured finish over the entire representation including their clothes, boots, hair and hats (and in the case of the Squatter[6], his horse) to make them more anonymous. In contrast, at the Qantas Outback Founders Museum, Longreach, Queensland (Australia), anonymity was achieved through repetition of standard mannequins even though they were coloured and had facial details.

Many of the facial reconstructions were finished in a manner similar to statues (i.e., monochromatic finish). The bust of Asru, for example is a facial reconstruction of an Egyptian mummy displayed at the Manchester Museum, Manchester, England. She had a bronze–like finish and was made of a durable material and displayed in a manner that encouraged visitors to handle and touch her. Others are finished in this way in order to demonstrate the lack of information found with the remains or known about an individual, as in the '*Mediziner gegen das Verbrechen*' Exhibition showing '*Kopfrekonstruktion des Celler Schädels*' at the Neanderthal Museum, Mettmann, Germany. This display showed three different artist's versions of facial reconstructions from the same skull. All three showed a monochromatic colour scheme, although, in one manufactured glass or plastic eyes had been inserted into the head. The insertion of these eyes, which replicate the look of actual human eyes, changes the way the head is perceived. The viewer's eyes automatically go to the head

[6] Waltzing Matilda is a famous iconic Australian song that features a swagman (itinerant worker), a squatter (wealthy landowner) and three troopers (policemen). This song is more popular than the Australian national anthem and holds a unique place in Australian arts and culture.

first, due to the eyes (Brooks and Kemp 2007). The realistically coloured eyes lessen the statuary effect meaning that theoretically the viewer reacts differently to these representations than they do to those that do not have the same level of realism in the eyes.

There were also museum mannequins that were finished in a statue–like way at the Natural History Museum in London. They were displayed in the 'Human Biology: An Exhibition of Ourselves' exhibition in a display entitled 'Before and After Puberty'. The museum mannequins are of a monochromatic colour with a slightly textured appearance giving a statue–like appearance. This may be a consequence of the display and the intended purpose of the representations, as the mannequins represent an adult male and female and a prepubescent boy and girl showing how the body changes due to puberty. These anatomically correct mannequins are positioned so that the viewer can compare the mannequins of each sex to each other as well as to those of the other sex. The statue–like appearance helps to minimise the visual impact of these naked mannequins, especially those of the children. The public is accustomed to nakedness in statues of both adults and children, for example Michelangelo's 'David' which is of a naked adult male and his 'Madonna of Bruges' which features a dressed Madonna and a naked boy. At the Cairns Museum in Cairns, Australia, there were standard mannequins in monochromatic colours on display, although these mannequins do not give the impression of statues due to their idealised anatomy and our familiarity with this representational type's alternative use in shops.

Other museums and visitor attractions require their representations to be perceived as more realistic. The most obvious example here is Madame Tussauds in London. If the portrait figures do not look like the celebrity they are supposed to represent then there would be no reason to visit Madame Tussauds. The Corinium Museum in Cirencester, England has many human representations of the more realistic type. Their representations are a mix of facial reconstructions on complete bodies as well as museum mannequins. They are dressed in period costumes (Iron Age, Roman, Medieval, etc.) and have naturalistic skin, hair and eye colouring and tones as well as suitably textured hair (e.g., wigs). Many of the standard mannequins, such as those used in the Queensland Police Museum, Brisbane, Australia, also feature naturalistic colouring and appropriate hair type, and may also have eyelashes and makeup. Several of the standard mannequins at this museum were observed to be bald or to have modelled or painted hair.

The materials used in making the representation will dictate some of the finishing techniques. For example, a hard resin finish prevents the insertion of hairs whereas they are able to be inserted into wax and silicon, that are softer materials. Glass eyes also need to be inserted during the manufacturing process. Blank eyeballs (i.e. without irises or pupils) may be left blank or painted. Carved irises and pupils are also fashioned during the manufacturing process. The decision to make or leave the representation a monochromatic colour may be made early in the manufacturing or planning process depending upon what is required for the finished product.

MATERIALS: HUMAN REPRESENTATIONS

A pilot study was conducted to identify the levels of finish and the types of techniques found in human representations in museum contexts. The materials chosen for this pilot study were a selection of hominin representations that were documented during a research trip to Europe in 2006. These representations were from 27 museums in 10 European countries.

Requirements for this study

The representations were selected to fulfil certain requirements. They were that the representations:

- had been identified as *H. sapiens* in Chapter 3 – *"On this study: museums visited and hominin representations actually used"*;
- were on display in museums or associated institutions only;

- had a head;
- were not medical models as the purpose of these are to illustrate particular anatomical structures or medical pathologies and therefore the finish of the face when it is present is not the focus of this representation type;
- had clear close–up photographs of the representation's face when the face has facial features; and
- were not death masks as there was no artistic input required for the final product.

This meant that the sample size for this pilot study was 170.

Homo sapiens only

The requirements for this sample were chosen for several reasons. Confining the sample to only the anatomically modern human representations meant that the specific types and techniques of artistic finish could be identified in a sample that could be compared with actual people due to our familiarity with and knowledge of the human body. This, however, would not be possible for the other taxa due to our lack of actual knowledge about their external appearance. Therefore the extinct earlier hominin taxa will be studied in relation to anatomical accuracy and finish and will be the subject of Chapter 5. The range of finishing techniques was also expected to be larger in the *H. sapiens* group due to our familiarity with the human body and our ability to recognise it even with a limited amount of information available to viewer as well as the larger range of representation types identified in the *H. sapiens* taxon. *H. sapiens* representations were found in all representation types whereas the other taxa were only identified in the facial reconstruction types and the sculpture type.

Exclusion of Representations in Visitor Attractions

The representations found at the visitor attractions were excluded from this study as firstly the majority of these figures were portrait figures. Meaning that they were created to be a portrait of a particular person, often created while the person they represented was still living, and in many cases the measurements of the actual individual were used in their creation as far as can be ascertained. By being able to compare the portrait figure's face to the person's actual face means that portrait figures are more portraits than representations, thereby including very little if any subjectivity in the representation. This differs from those representations created to be specific individuals or a general member of a specific population where historical and archaeological information such as portraits, statues or death masks were used in their creation. Secondly the familiarity of the recognisable faces was found to influence the viewer's perception of how life–like the face looked, this is known as displacement phenomenon, where the more familiar a face is, the more identifiable it is (Brooks and Kemp 2007). Thirdly, photographs were not able to be taken of the representations at The Oxford Story in Oxford, limiting the visual documentation to the available advertising in the form of postcards and bookmarks, this means that the photographic record of the visitor attractions is not complete. Finally the majority of the visitor attraction representations have a higher level of realism, and therefore a more complete range of details included in their 'finish' which is also shown in some of the museum examples. The focus of this chapter is not about the numbers of representations in each category but rather identifying and defining the types of finishing techniques observed. Therefore removing the representations in the visitor attractions from this section of the study will not impact on the final results due to the repetitive types of finish seen on these types of representations.

Confined to the Face only

There is a more extensive range of finishing found in the face of the representation rather than the body. This is due to several reasons; the variety of features found in the face, the high level of visibility of the face as opposed to the body which when present is often concealed by coverings of some form. The social focus placed on the face as well as the biological importance of the face as discussed in the background chapter. The representations with a head are also immediately distinguishable from the body–only representations like the costume dummies which are used to display costumes and the head is not necessary for this purpose. From a distance, a full body appears more realistic than a head by itself, especially if only glancing at the representation or if it is seen peripherally as the brain fills in the gaps in the visual knowledge (Brooks and Kemp 2007). When the representation is observed from close proximity, the viewer is drawn to the face of the representation in a way similar to that when we communicate with each other[7]. The bodies of the representations were often covered with some form of attire obscuring the majority of their bodies. Therefore the face of the representations is the focus of this section of the study although it must be acknowledged that it is also a Western European cultural bias that the face is considered to be a focal point.

No Medical Models or Death Masks Allowed

The medical models and death masks were also excluded from the sample. The face of medical models when present is not the focal point of this representation type. Death masks were also excluded as the choices made in regard to the finish of the masks were only in relation to the final colour of the representation. This means that there were less decisions/choices made regarding the final appearance of these representations types as their value is in the fact that they are cast from an individual's face and who the individual was rather than the details of their external appearance.

MATERIALS: PHOTOGRAPHS

Photographs of the face of each representation were used in order to minimise the variables/extraneous information. The use of photographs for this type of study enabled representations from various museums in different countries to be

[7] Note that this is from a European/Australian point of view which differs to that of those cultures that do not have a focus on the face of an individual when communicating.

compared to each other as well as those representations within the one museum that were in different galleries or on different floors. The size of the face photographs used was A4 as this is similar to life–size and to get the full impact of the individual faces. Full face photographs were used where possible. In some instances close–up photographs were not able to be taken due to factors such as distance and the positioning of the representation within the exhibition space. Those photographs that lacked detail precluded those representations from being used in this study.

Each photograph had a label on the back, recording the representation's name, the museum it was from and an arbitrary identification number given to each representation. For the European sample this identification number was prefixed with the letter E in order to differentiate between the European sample and the Australian sample whose numbers had the prefix of A. Photographs of each representation meant that there was visual documentation which could be referred to at a later date and in order to assist with the recollection of each representation.

The photographs used in this study were taken using a hand held Canon PowerShot A540, 6.0 mega pixel digital camera. This meant that the photographs were enlarged to assist with discerning details of the finish of the face. However, it did not allow for detailed close–up photographs of those representations that were separated from the viewer due to distance or barrier displays or if the face of the representation was obscured due to its costume or its position within the exhibit in relation to the viewer. As the camera was hand held this meant that the photographs replicated views that would normally be seen by a museum visitor. This also meant that the use of a flash was not always possible due to the types of artefacts associated with the representation in its exhibit and in the surrounding gallery.

METHODS AND FINDINGS

For this section of the project, the sample was assessed in several ways.

1. To determine which of the representations looked the most life–like and realistic and which looked the least, and the range of variation in between these two extremes.
2. To identify the range of finishes and morphological characteristics found in the facial features of the representations.
3. To assess what characteristics were the most important in the differences between the representations based on the results from the first section of the project to the morphological characteristics identified.
4. Based on the previous findings, a range of morphological characteristics were then chosen as the most influential as to the final look of the representations, based on the finishing techniques used.

The Range of Variation

In order to assess how life–like or realistic the representations looked in the sample, a semantic differential scale was used to quantify this information. Semantic scales allow an entire sample to be placed along a scale between the two predetermined extremes of the area being assessed[8]. In this study the predetermined extremes were those that existed within the sample i.e., the most unrealistic representation and the most realistic representation. Once the two extremes are determined all of the other representations can be placed along a linear continuum between the two extremes.

Each representation was positioned along the semantic scale in order of realism, from the lowest level to the highest level within the sample. The lowest level being those representations that consisted of head 'blanks', that is an approximated human head shape without facial features. The highest level consisted of the most lifelike looking reconstruction.

[8] For further information see Snider and Osgood (1969).

Once the lowest extreme was determined from amongst the sample photographs, the rest of the sample were then positioned along an imaginary line on the floor in order to obtain rough groupings of the photographs. When these smaller, more manageable groups had been determined, the photographs were then taken one by one and judged in relation to the previous photograph as to whether or not it was more realistic and life–like. Photographs were then moved along the scale depending upon whether the photograph currently being judged was more or less realistic than the photographs that had already been judged. These photographs were placed in rows on the floor in a large area to allow for movement along the semantic differential scale. Once the entire sample had been placed along the scale, each photograph was labelled with a number from 1 to 148 and prefixed with the letters FR (facial realism) (Appendix E). The blanks at the lowest extreme were designated 1, so that the larger the FR number the more realistic the representation was found to be. The highest number does not correlate with the sample size as some representations were judged to be at an equal level along the scale with other representations.

Note that the cultural practices depicted and the decisions made about specific details such as specific hair and eye colours, body modifications and specific natural skin tones, are not due to the finishing techniques, but rather the choices made by the makers of the representations and the museum staff are not assessed in this study. That type of information will be covered in Chapter 7 on the supplementary information that is embedded in hominin representations.

Findings and Preliminary Discussion

The sample was then categorised as belonging to three finish types along the semantic scale, blanks (n=15), basic faces (n=73) and detailed faces (n=82) (Tables 4.1 and 4.2, Figure 4.2). Blanks were those representations that had oval shaped heads with no facial features, artificial skin colours and may have scalp hair, in the form of a wig. Basic faces have realistically shaped heads with facial features with some missing details, artificial colouring and hair. Detailed faces have facial features with details such as eyelashes or shine on their eyes, naturalistic colouring and hair.

The sample was then assessed as to the changes in the finish of the faces as the FR number becomes higher and as the representations changed from blanks to basic faces to detailed faces. These changes consisted of changes to the overall colour scheme, skin colour, types of hair present in the forms of scalp hair, facial hair, eyebrows and eyelashes, hair colour and details about the eyes and mouth.

TABLE 4.1 A summary of the identified features in each finish type within this sample.

Blanks	Basic faces	Detailed faces
1		148
Example	Example	Example
▪ egg or ovoid shaped head; ▪ artificial skin colouring; ▪ may have a wig; and ▪ no facial features are present.	▪ has a realistically shaped head; ▪ artificial skin colouring; ▪ may have artificial looking scalp and facial hair; ▪ may have artificial coloured hair; and ▪ may have lower levels of detail in facial features, for example, eyes may not show iris or pupil.	▪ has a realistically shaped head; ▪ natural skin colours; ▪ may have natural looking scalp and facial hair; ▪ natural hair colours; and ▪ has facial features such as eyelashes, natural looking eyes.

TABLE 4.2 The three finish types identified in this sample, with the amount in representations in each category and shown as a percentage of the total sample.

Finish type	n=	%
Blanks	15	8.8
Basic	72	42.9
Detailed	83	48.2
Total	170	100.0

FIGURE 4.2 An example of faces along the semantic differential scale, from the least realistic to the most: (a) a blank[9] face; (b and c) basic faces; and (d and e) detailed faces.

Finishes and Morphological Characteristics

The first major difference noticed between the faces was the presence or absence of facial details which lead to the identification of the three finish types. The other major differences noted were the overall colour scheme, the skin tones and then the presence/absence of particular details and their colouring (Table 4.3). It is these differences that were used to place the faces along the semantic differential scale and are the basis of the study.

The morphological characteristics chosen for further study were: the colour scheme, the skin colour, scalp and facial hair, the eyes, eyebrows and lashes and the mouth. The sampled faces were studied and the morphological characteristics for each were recorded.

[9] The representations are from: (a) Museon, Den Haag, Netherlands; (b) Manchester Museum, Manchester, England; (c) Museum of London, London; (d) Haus der Natur, Salzberg, Austria; and (e) Manchester Museum, Manchester.

TABLE 4.3 A summary of the morphological characteristics studied.

Colour Scheme	▪ Colouring
Skin Colouring	Mouth
Scalp Hair	▪ Types
▪ Type	Lips
▪ Colour	▪ Finishes
Eyebrow	▪ Colouring
▪ Types	▪ Shine
▪ Colours	Mouths Open or Closed
Eyelash	Oral Cavity
▪ Types	▪ Finish
▪ Colouring	▪ Colouring
Eye	Teeth
▪ Types	o Colour
▪ Details	o Shine
▪ Colouring	Tongue
Facial Hair	▪ Presence/absence
▪ By sex and age	▪ Colouring
▪ Type	

Findings and preliminary discussion

COLOUR SCHEME

The overall colouring of the three finish types had a lot of impact on the general look of the representation's faces. There were four colour schemes that were identified: 1. monochromatic (one hue/colour which may include tints or shades[10]); 2. bicolour (two colours); 3. monochromatic with natural eyes; and 4. naturalistic colours (Table 4.4 and Figure 4.3).

- The blanks were either monochromatic (60.0%) or bicolour (40.0%).
- The basic faces were monochromatic (95.9%), bicolour (1.4%) or consisted of monochromatic colours with natural eyes (2.7%).
- The only faces that were of naturalistic colouring were the detailed faces and 100.0% of the detailed faces had that colouring.

[10] A tint is white added to the hue or colour and a shade is when black is added.

TABLE 4.4 The overall colour schemes identified in the sample shown as a percentage for the three categories.

Finish type	n=	Monochromatic	Bicolour	Monochromatic natural eyes	Natural	Total %
Blank	15	60.0	40.0			100.0
Basic	73	95.9	1.4	2.7		100.0
Detailed	82				100.0	100.0
Total Sample	170	46.5	4.1	1.2	48.2	100.0

The difference between the colouring of the blanks was in the form of scalp hair. Those blanks that were monochromatic, had no scalp hair whereas those that were bicolour blanks had scalp hair in the form of wigs which were of different colours. The monochromatic basic faces had the details of their faces (such as hair, eyes etc.) of the same colour as their skin colour or in tones of the same colour. The bicolour basic face was a representation that had a wig of a different colour to the rest of the head. Whereas, the two representations of monochromatic colours with natural eyes had all other details of their faces the same as those in the monochromatic type except for the eyes which were detailed and had natural colouring. These two representations stood out in this finish type due to their eyes as the detail and colouring was unexpected in the monochromatic face.

The use of blanks suggests that the designer of the exhibit required anonymous representations with a focus solely on the clothing that they are wearing. This is supported by anecdotal information from museum curators (S. Eather 2008 :pers. comm.; K. Palmer 2008: pers. comm.). This would also suggest that the representation would be in group or solo displays on order to display clothing whereas they were actually in incomplete context displays. This then leads to the question why use blank faces in these types of contextual displays where many details about the individuals are known (e.g., skin colour, hair styles)? The only conclusion is economical reasons, the blank representations are possibly cheaper to acquire or they are reusing representations that they already have. Many of the basic faces were facial reconstructions and the artificial colour schemes were a conscious choice for the representation. The artificial colours are meant to show that the colouring of particular features is unknown.

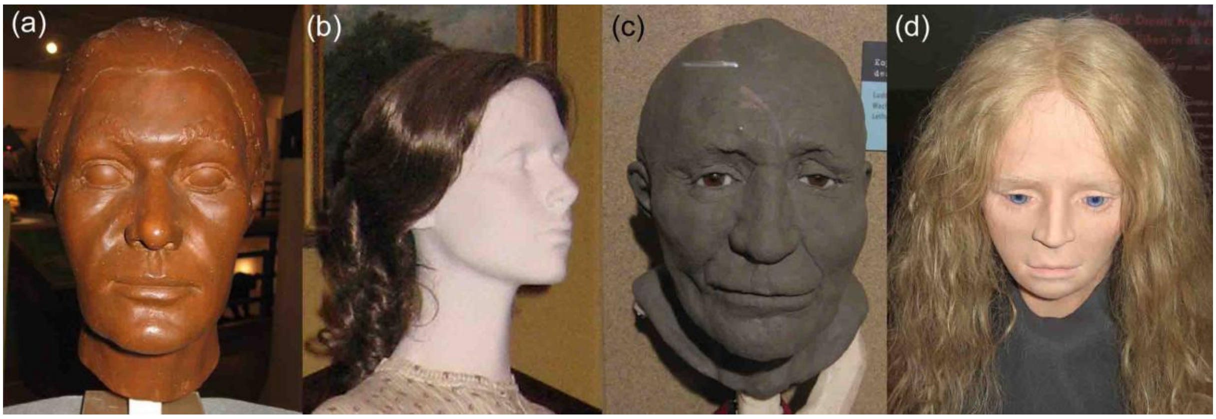

FIGURE 4.3 Colour scheme categories identified in the sample: (a) monochromatic;[11] (b) bicolour; (c) monochromatic with natural eyes; and (d) naturalistic.

SKIN COLOURING

The majority of the colour in the representation is due to the skin colour. Nine skin colourings were identified in the sample: white, terracotta, metallic, grey, black, brown, wood grain, mottled (grey/white) as well as a range of natural skin colours (Table 4.5 and Figure 4.4). The blank representations had three skin tones, grey (46.7%), black (6.7%) or wood grain (46.7%). The basic faces had the largest range of colours; white (39.7%), terracotta (23.3%), metallic (15.1%), grey (9.6%), brown (6.8%), wood grain (1.4%) and mottled (grey/white) (4.1%). The detailed faces were only in naturalistic colours. The identified skin colours were then separated into two groups, those that had artificial colours and those that had natural colours (Table 4.6). The artificial skin colouring was only found in the blanks (100.0%) and basic finish types (100.0%) while the naturalistic colouring was only found in the detailed faces (100.0%).

[11] The representations are from: (a) Magyar Természettudományi Múzeum, Budapest: (b) Hollytrees Museum, Colchester, England; (c) Neanderthal Museum, Mettmann, Germany; and (d) Drents Museum, Assen, Netherlands.

Brown, black and white are classified as being artificial colours in this study even though they are commonly used terms to describe human skin colouring. This is due to the way the colours are used as a monochromatic theme throughout the facial features of the representation. This means that the eyes, hair, skin etc., are all the same colour and the face looks artificial. Metallic is a single category as the bronze and copper metallic finishes are similar in tone.

TABLE 4.5 The skin colouring of the representations consisted of nine colour categories; eight artificial colours and a naturalistic colour category. These colours are shown as a percentage for each finish type (blanks n=15, basic n=73 and detailed n=82).

Finish type	White	Terra–cotta	Metallic	Grey	Black	Brown	Wood grain	Mottled	Natural	Total %
Blank				46.7	6.7		46.7			100.0
Basic	39.7	23.3	15.1	9.6		6.8	1.4	4.1		100.0
Detailed									100.0	100.0

TABLE 4.6 The skin colouring of the representations was identified as being artificial or natural colours, the percentage of each is shown for the three categories of representations

Finish type	n=	Artificial colouring	Natural	Total %
Blank	15	100.0		100.0
Basic	73	100.0		100.0
Detailed	82		100.0	100.0
Total	170	51.8	48.2	100.0

SCALP HAIR TYPE

Scalp hair is the hair present on the scalp section of the representation's head. This excludes other types of head hair, such as eyebrows, eye lashes and facial hair which will be discussed individually. Scalp hair is either absent or present on a representation. The absence of scalp hair on a representation means that it is either intentionally bald or it is left artificially blank. When it is intentional it may be due to archaeological/historical information or the choice of the curator. Artificial baldness, especially on the facial approximation type of facial reconstruction (as discussed on Page 171 in the previous chapter) is when there is

FIGURE 4.4 The skin colouring consisted of 8 artificial colours and a natural colouring category. The artifical colours consisted of: (a) white;[12] (b) terracotta; (c) metallic; (d) grey; (e) black; (f) brown; (g) mottled (grey/white); and (h) wood grain; as well as (i) an example of the natural colouring.

[12] The representations are from: (a) Neanderthal Museum, Mettmann, Germany; (b) Magyar Természettudományi Múzeum, Budapest; (c) British Museum of Natural History, London; (d) Museon, Den Haag, Netherlands; (e) Haus der Natur, Salzberg; (f) Musee de L'homme, Paris; (g) Colchester Castle Museum, Colchester, England; (h) Museon, Den Haag; and (i) Corinium Museum, Cirencester, England.

limited or no information available as in forensic cases. When present, there are several ways to indicate scalp hair on a representation. These range from painting the hair on or modelling the hair in the same material as the face to adding a wig or inserting individual hairs into the head. Each of these hair treatments has different levels of realism.

The scalp hair finish types identified in this sample consisted of no hair, moulded hair, moulded and painted hair, individual hairs. Sometimes hair was not visible due to the headwear worn by the representation (Table 4.7 and Figure 4.5). A distinction is made in this study between a representation having no hair and a representation being bald. Having no hair is a finish type whereas bald is a choice made by the maker either due to historical, archaeological or associated evidence or conscious choice and as such, will be covered in the chapter on supplementary information embedded in hominin representations (Chapter 7). All three categories of representations had representations that had no hair, individual hairs or hair that was not visible due to the headwear worn. The blanks had the highest proportion of no hair at 46.7% of the sample, basic faces had 30.1% and the detailed faces only had 1.2% of their representations with no hair. The detailed faces had 85.4% of representations with natural hair made up of individual hairs (either a wig or inserted hairs), 40.0% of the blanks had wigs while only 5.5% of the basic faces had a wig. Representations with moulded hair (56.2%) were only found in the basic faces category, while moulded and painted hair were found in both basic (5.5%) and detailed (4.9%) faces. In all three finish types there were representations who had no hair visible due to headwear worn; blanks 13.3%, basic faces 2.7% and detailed faces 8.5%.

TABLE 4.7 The hair types found in the three finish types shown as a percentage of the entire sample (blanks n=15, basic n=73 and detailed n=82).

Finish type	No hair	Moulded hair	Moulded and painted hair	Individual hairs	Not visible*	Total %
Blank	46.7			40.0†	13.3	100.0
Basic	30.1	56.2	5.5	5.5†	2.7	100.0
Detailed	1.2		4.9	85.4	8.5	100.0

***The not visible category is when the head wear worn by the representation obscures any view of scalp hair.**
†Wigs only.

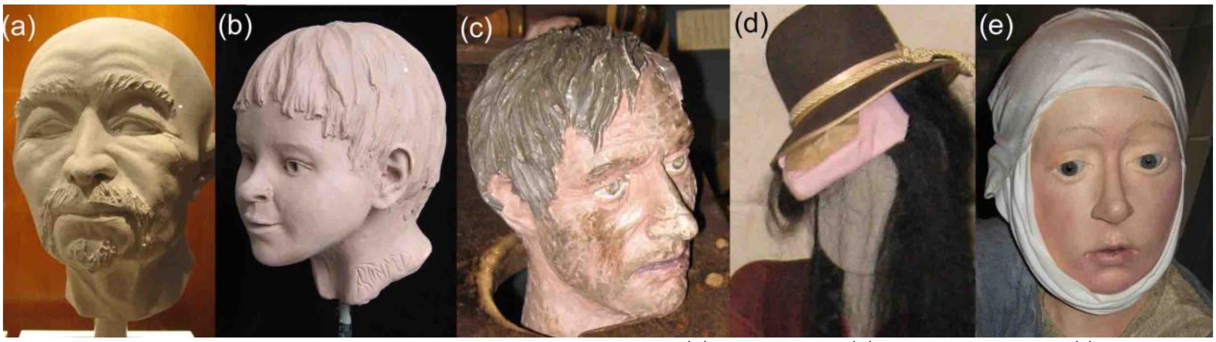

FIGURE 4.5 Scalp hair types identified in the sample: (a) no hair;[13] (b) moulded hair; (c) moulded and painted hair; (d) individual hairs; and (e) not visible.

SCALP HAIR COLOUR

The hair colour on the representations, also consisted of artificial or natural colours, although there were representations that had no hair or their hair was not visible due to the headwear worn by the representations (Table 4.8 and Figure 4.6). The blanks were found to have no hair (46.7%), natural coloured hair in the form of a wig (40.0%) or no hair visible (13.3%) due to the head wear worn. The basic faces had hair in white (28.8%), terracotta (17.8%), metallic (13.7%), brown (1.4%), mottled (grey/white) (4.1%) and in natural (1.4%) colours. 30.1% of the basic finish type had no hair and in the remaining 2.7% no scalp hair was visible due to the headwear worn by the representation. In total 65.8% of basic faces had artificially coloured hair (Table 4.9). In the detailed finish type the majority had natural coloured hair (89.0%) or their hair was obscured by their head wear (8.5%). Only one (1.2%) of the detailed faces had artificially coloured (white) hair, while another 1.2% had no hair.

TABLE 4.8 The range of scalp hair colours found in the finish types shown as a percentage of the entire sample (blanks n=15, basic n=73 and detailed n=82).

Finish type	White	Terra–cotta	Metallic	Brown	Mottled	Natural	No hair	Not visible*	Total %
Blank						40.0	46.7	13.3	100.0
Basic	28.8	17.8	13.7	1.4	4.1	1.4	30.1	2.7	100.0
Detailed	1.2					89.0	1.2	8.5	100.0

***Those representations that the scalp hair was not visible was due to the head wear worn by the representation.**

[13] The representations are from: (a) Magyar Természettudományi Múzeum, Budapest; (b) C Wilkinson's Studio, Dundee, Scotland; (c) Colchester Castle Museum, Colchester, England; (d) Museon, Den Haag, Netherlands; and (e) the Colchester Castle Museum.

FIGURE 4.6 Scalp hair colours observed in the sample: (a) white;[14] (b) terracotta; (c) metallic; (d) brown; (e) mottled (grey/white); and (f) natural colours; as well as the (g) no hair; and (h) not visible categories.

The one (1.2%) detailed representation that had artificial hair was due to a cultural practice of the people that the representation was portraying (Figure 4.7). All of the representation's hair was artificially coloured. Another representation also had culturally artificially coloured hair, although, in this case there were also patches of natural coloured hair, this meant that this representation was placed in the natural hair coloured category rather than the artificial hair category, as the viewer could see that the hair had been coloured due to a cultural practice.

Three of the artificial colours identified as skin colours, grey, black and wood grain were not found as scalp hair colours. This was probably due to a conscious decision made by the exhibit designers. The grey blanks either had no hair or had wigs in naturalistic colours. The black and wood grain blank representations had no scalp hair. This, if anything helped to increase the anonymity of these representations. The wood grain basic representation, even though it had no

[14] The representations are from: (a, b, g) Magyar Természettudományi Múzeum, Budapest; (c) Cardiff National Museum, Cardiff; (d) Musee de L'homme, Paris; (e, h) Colchester Castle Museum, Colchester, England; and (f) National Antiquites Museum, Leiden, Netherlands.

scalp hair had facial hair, indicating the lack of scalp hair was a conscious decision by its creator.

TABLE 4.9 The scalp hair was identified as being in either artificial or natural colours when present and shown as a percentage of the each finish type.

Finish type	n=	Artificial	Natural	No hair/not visible*	Total %
Blank	15		40.0	60.0	100.0
Basic	73	65.8	1.4	32.9	100.0
Detailed	82	1.2	89.0	9.8	100.0

***The not visible category is when the head wear worn by the representation obscures any view of scalp hair.**

No other features were found on the blank head finish type they were then removed from the sample as no further information concerning realism was able to be obtained. The remaining features will be shown and discussed only in relation to the basic and detailed faces finish types.

FIGURE 4.7 Culturally artifically coloured hair on: (a) a museum mannequin, portraying a Roman Age Celt at the Colchester Castle Museum, Colchester, England; and (b) a museum manninquin, portraying a male of the Iron Age Dobunni tribe Corinium Museum, Cirencester, England.

EYEBROW TYPES

Eyebrows were present in the basic and detailed faces (Table 4.10 and Figure 4.8). 71.2% of the basic faces had eyebrows and 97.6% of the detailed faces had them. This meant that 27.4% of the basic faces had no eyebrows and in the remaining 1.4% of the basic faces the eyebrows were not visible. In the detailed faces only 1.2% had no eyebrows and 1.2% had eyebrows that were not visible. Those representations that were in the not visible category all had headwear that covered that area of the representation's head.

TABLE 4.10 The number of representations with and without eyebrows as well as those with no brows visible, shown as a percentage of each finish type.

Finish type	n=	Absent	Present	Not visible*	Total
Blank	15	100.0			100.0
Basic	73	27.4	71.2	1.4	100.0
Detailed	82	1.2	97.6	1.2	100.0

***Due to the head wear on the representation.**

Those representations that had eyebrows had them in a range of finishes (Table 4.11). Of the basic faces that have eyebrows, all 71.2% had moulded or carved brows. Whereas, the detailed faces had a diverse range of eyebrows, 74.4% of which were painted eyebrows. The remaining brows of this finish type were individual hairs inserted into the head (15.9%), painted and moulded (2.4%), moulded/carved (1.2%) or individual hairs stuck in place (3.6%).

TABLE 4.11 The different types of eyebrows found in the sample, shown as a percentage of each of the finish types (blanks n=15, basic n=73 and detailed n=82).

Finish type	Moulded/ carved	Painted/ moulded	Painted	Individual hairs stuck on	Inserted	Absent or not visible*	Total %
Blank						100.0	100.0
Basic	71.2					28.8	100.0
Detailed	1.2	2.4	74.4	3.6	15.9	2.4	100.0

***Due to the head wear on the representation.**

FIGURE 4.8 Eyebrow types: (a) moulded/carved;[15] (b) painted/moulded; (c) painted; (d) individual hairs stuck on; and (e) individual hairs inserted; as well as (f) absent; and (g) not visible categories.

EYEBROW COLOURS

The eyebrows were also of a range of colours (Table 4.12 and Figure 4.9). These colours consisted of white, terracotta, metallic, grey, brown, mottled (grey/white), wood grain, skin colour and naturalistic colours. The basic faces had eyebrows in a range of the artificial colours which made the eyebrows match the rest of the representation. The most common colours in this finish type were those that

[15] The representations are from the following museums: (a) Magyar Természettudományi Múzeum, Budapest; (b and g) Haus der Natur, Salzberg, Austria; (c) Dover Museum, Dover, England; (d) Geology Museum, Lisbon, Portugal; (e) Neanderthal Museum, Mettmann, Germany; and (f) Natural History Museum, London.

were white (27.4%), terracotta (20.5%) and metallic (13.7%). The remaining eyebrow colours in the basic faces were a mottled (grey/white) (4.1%), grey (2.7%), brown (1.4%) and wood grain (1.4%). The detailed faces had eyebrows in either natural colours (96.3%) or skin colour (1.2%).

Table 4.12 The eyebrow colours found in the basic and detailed faces, with quantities shown as a percentage of each finish type (blanks n=15, basic n=73 and detailed n=82).

Finish type	White	Terra–cotta	Metallic	Grey	Brown	Mottled	Wood grain	Skin colour	Natural	Absent or not visible*	Total %
Blank										100.0	100.0
Basic	27.4	20.5	13.7	2.7	1.4	4.1	1.4			28.8	100.0
Detailed								1.2	96.3	2.4	100.0

*Due to the head wear on the representation.

EYELASHES

Eyelashes were another feature that assists in making the representations look realistic. In the sample, representations either had eyelashes or they did not (Table 4.13). The majority of representations, 100.0% of blanks and basic faces and 72.0% of detailed faces had no eyelashes at all. Of the remaining detailed faces, 28% had lashes present.

TABLE 4.13 Eyelashes were either present, absent or not visible on the basic and detailed faces in the sample, the amounts in each category are shown as a percentage of each finish type.

Finish type	n=	No lashes at all	Lashes present	Total %
Blank	15	100.0		100.0
Basic	73	100.0		100.0
Detailed	82	72.0	28.0	100.0

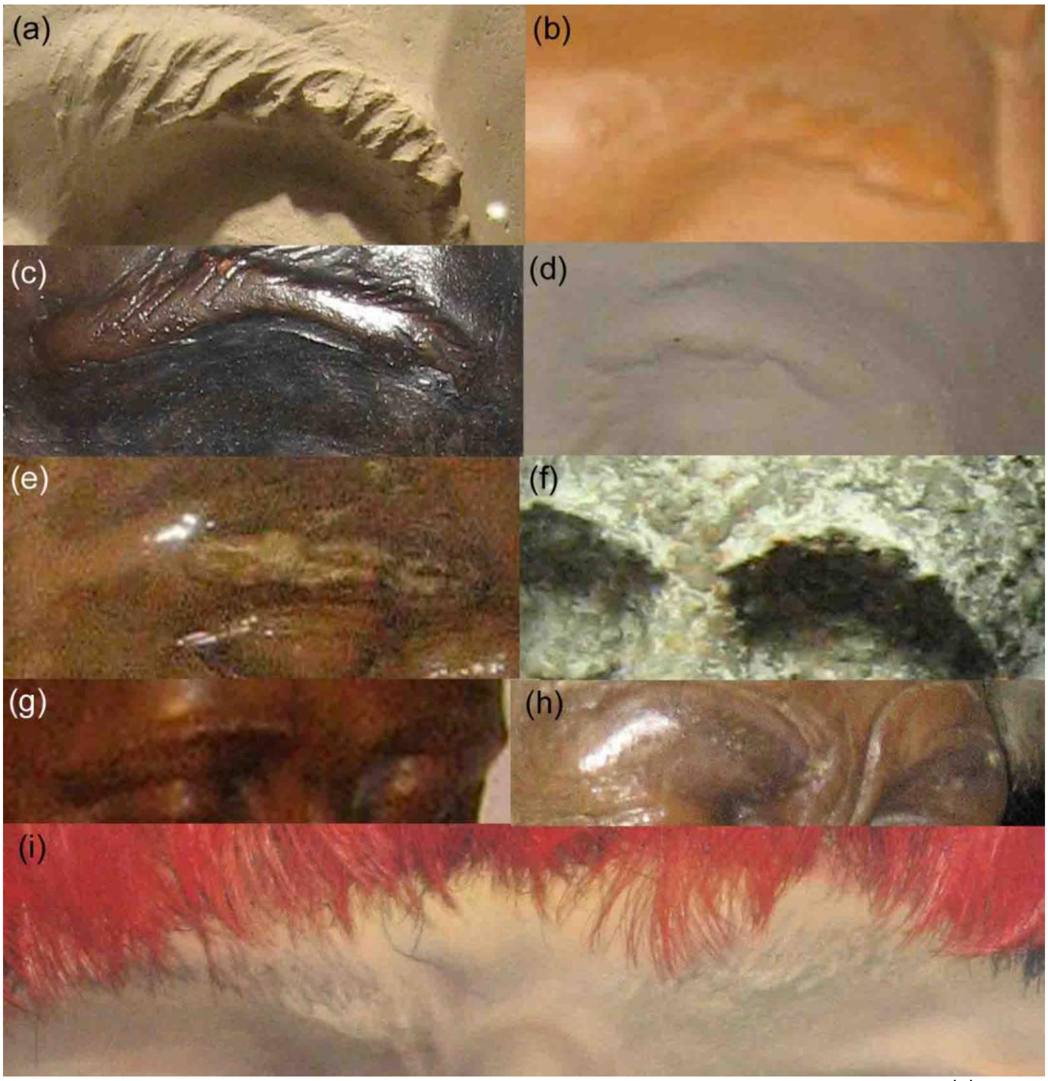

FIGURE 4.9 Eyebrow colours in the sample were found in a range of colours: (a) white;[16] (b) terracotta; (c) metallic; (d) grey; (e) brown; (f) mottled; (g) wood grain; (h) skin colour; and (i) natural colours or the eyebrows were; (j) absent; or not visible.

The 28% of detailed representations that had eyelashes did not necessarily have both upper and lower lashes present (Table 4.14). Only 14.6% of the detailed faces had both upper and lower eyelashes, this means that 13.4% had only one set of lashes. The upper eyelashes were the most common at 25.6% of the detailed faces while the lower lashes were found in 17.1% of the detailed faces.

[16] The representations are from the following museums: (a and b) Magyar Természettudományi Múzeum, Budapest; (c and d) Manchester Museum, Manchester, England; (e) Musee de L'homme, Paris; (f) Colchester Castle Museum, Colchester, England; (f) Museum of Natural Sciences, Brussels; and (h and i) Haus der Natur, Salzberg, Austria.

TABLE 4.14 The lashes that were present or absent in the blanks (n=15), basic (n=73) and detailed (n=82) faces shown as a percentage of each finish type.

Finish type	Lower lashes			Upper lashes		Both lashes	Only one set
	Not visible*	Absent	Present	Absent	Present		
Blank		100.0		100.0			
Basic		100.0		100.0			
Detailed	1.2	81.7	17.1	74.4	25.6	14.6	13.4

*Not visible as the representation's eyes were closed and the lower lashes were not discernable from the upper lashes.

EYELASH TYPES

Eyelashes were either painted or a variety of individual hair forms (Table 4.15 and Figure 4.10). Of the 28% of detailed faces that had eyelashes, 16% consisted of false eyelashes, 4.9% were painted and 3.7% were individual hairs that were inserted and the remaining 3.7% were individual hairs that were unable to be determined whether they were individually inserted hairs or attached false lashes. This is due to factors preventing close–up photographs taken of the representations: the position of the representation within the display or behind a barrier or viewing the representation from a people mover.

EYELASH COLOURING

All 28% of the detailed faces that had eyelashes had lashes of natural colours (Table 4.16). These ranged from light to dark natural colours as shown in Figure 4.10.

TABLE 4.15 The types of eyelash hair forms found in the blanks (n=15), basic (n=73) and detailed (n=82) faces shown as a percentage of each finish type.

Finish type	Painted	Undetermined individual hairs*	Individual hairs inserted	False eyelashes attached	No lashes	Tota l %
Blank					100.0	100.0
Basic					100.0	100.0
Detailed	4.9	3.7	3.7	16.0	72.0	100.0

*These are the lashes that are individual hairs but whether they are inserted hairs or fake eyelashes is not able to be determined.

TABLE 4.16 The colouring of the eyelashes found in the basic and detailed faces shown as a percentage of each finish type.

Finish type	n=	Natural colour	No lashes	Total %
Blank	15		100.0	100.0
Basic	73		100.0	100.0
Detailed	82	28.0	72.0	100.0

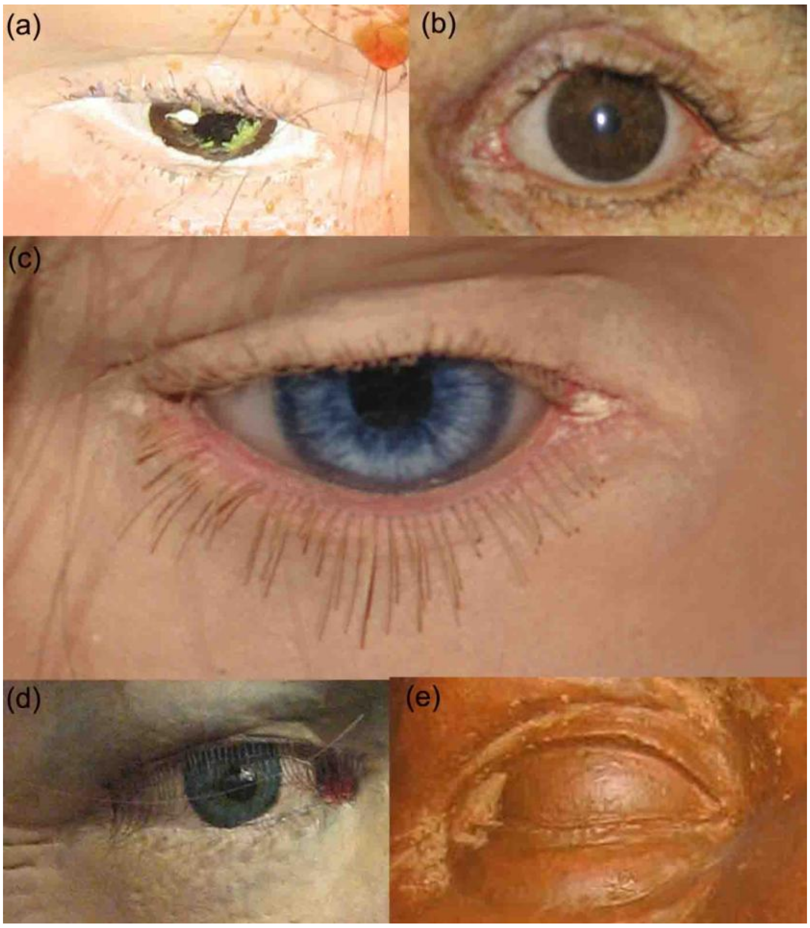

FIGURE 4.10 Eyelash types consist of: (a) painted;[17] (b) undetermined individual hairs; (c) inserted individual hairs; (d) fake eyelashes; or (e) no eyelashes.

[17] The representations are from the following museums: (a and e) Magyar Természettudományi Múzeum, Budapest; (b) Manchester Museum, Manchester, England; (c) Drents Museum, Assen, Netherlands; (d) Dover Museum, Dover, England.

EYE TYPES

The orbital region can be separated into several anatomical structures; eye lids, eyes consisting of eyeballs, irises and pupils, and eye lashes. This section is only concerned with the actual eyeball, the pupil and iris. A variety of eyes were observed in the sample, these ranged from the eyes being absent in the case of the blanks to inserted eyes (Table 4.17 and Figure 4.11). Inserted eyes are purposely made eyes, often of glass or plastic which are inserted into the eye socket from the inside. These eyes have a sheen to them that mimics that seen due to the moisture of an actual eye. They also reflect light in a way that the other eye types do not due to this sheen.

- The blank heads were the only ones in this sample that had no eyes at all.
- The moulded eyes were only found in the basic face category and consisted of 95.9% of that finish type. There was one representation that had moulded eyes with a paint wash over them, as this differed from the other moulded eyes–they were of the same colour as the rest of the head–it was placed in its own category.
- The painted eyes were only found in 29.3% of the detailed faces.
- The inserted eyes were generally found in the detailed faces (52.4%), however, 2.7% were found in the basic faces.
- One detailed representation (1.2%) had inserted eyes which were broken, these appeared to have been pushed back into the representation's head.
- 4.9% of the detailed representations had both eyes closed.
- 12.2% of the detailed faces were unable to be placed in either the painted eye category or the inserted eye category as their photographs lacked sufficient detail. This means that there were factors preventing close–up photographs taken of the representations: the position of the representation within the display or behind a barrier or viewing the representation from a people mover.

FIGURE 4.11 Eye types found in the sample: (a) moulded only;[18] (b) moulded with a paint wash; (c) painted; (d) inserted; (e) inserted eyes that were broken; and (f) eyes closed; as well as (g) not present; and (h) undetermined categories.

TABLE 4.17 The range of eye finishes in the three categories of representations, shown as a percentage of each finish type (blank n=15, basic n=73 and detailed n=82).

Finish type	Moulded only	Moulded, paint wash	Painted	Inserted eyes	Inserted eyes currently broken	Eyes closed	Not present	Undeter – mined	Total %
Blank							100.0		100.0
Basic	95.9	1.4		2.7					100.0
Detailed			29.3	52.4	1.2	4.9		12.2	100.0

[18] The representations are from the following museums: (a) Magyar Természettudományi Múzeum, Budapest; (b) Musee de L'homme, Paris; (c) Haus der Natur, Salzberg, Austria; (d) Neanderthal Museum, Mettmann; (e) Naturhistorisches Museum, Vienna; (f and h) Colchester Castle Museum, Colchester, England; and (g) Museon, Den Haag, Netherlands.

Only the detailed faces were found to have closed eyes. Only one of which had the added detail of eyelashes. All four of these were displayed in complete contexts in displays were it was appropriate for the representations to have closed eyes; two were shown as they would have looked like when placed in their grave, one was asleep and the fourth was on the toilet.

Only the detailed faces are made in such a way as to have broken eyes without having other parts of the representation's head also broken. The inserted eyes can be pushed inwards into the head, making it difficult to repair as the head may need to be removed or a section of the head under the scalp.

The amount of detail in the eye also varied as some eyes only had sclera visible, others the iris and/or the pupil (Table 4.18 and Figure 4.12). The majority of the basic faces 87.7% had the sclera visible, in 12.4% the sclera was absent. In the detailed faces the sclera, iris and pupil were present in 93.9% of representations, that is in all of the representations that had whole eyes visible. The 12.4% of the basic faces that have no sclera are eight representations from the Flanders Field Museum, in Ypres, Belgium, and one from the Manchester Museum, Manchester, England, that had suggested eyes, that is indentations only where the eyes are, although no details are discernable.

TABLE 4.18 The number of representations in each finish type in which the sclera, iris and pupil were absent or present, in the representations eyes as well as the number that were absent or not visible (Shown as a percentage).

Finish type	n=	Eyes closed or broken	Sclera		Iris		Pupil	
			absent	present	absent	present	absent	present
Blank	15		100.0		100.0		100.0	
Basic	73		12.4	87.7	63.0	37.0	74.0	26.0
Detailed	82	6.1		93.9		93.9		93.9

The main differences in the eyes were in the basic face category as these representations did not always have sclera, iris and pupils.

- 63.0% of the basic faces had no iris, while 37.0% of them did.
- While only 26.0% of the basic faces had pupils present and they were absent in 74.0%.

EYE COLOURING

The eyes were in the majority of the same colours as identified originally in the skin colours. These were white, terracotta, metallic, grey, brown, wood grain, (grey/white) and natural colours (Table 4.19). The basic faces were found in all of the colour categories in this section. The majority of the eyes in the basic faces were found to be white (39.8%), terracotta (21.9%) or metallic (15.1%). The remaining 25% were grey (8.2%), brown (6.8%), wood grain (1.4%), (grey/white) (4.1%) and natural colours (2.7%). Only 1.4% of the basic faces had eyes that were not visible. 93.9% of the detailed faces had natural coloured eyes, of the remaining representations, 4.9% had closed eyes and 1.2% had broken eyes, this meant that in all cases where the eyes were visible, they were natural–looking eyes.

TABLE 4.19 The eyes in the sample were found to come in a range of colours in the basic faces and only in natural colours in the detailed faces, some of the representations eyes were also found to be closed or not present. The eye colours are shown as a percentage of each finish type (basic n=73 and detailed n=82).

Type	White	Terra–cotta	Metallic	Grey	Brown	Wood grain	Mottled	Natural	Eyes closed, not present or broken	Total %
Blank									100.0	100.0
Basic	39.8	21.9	15.1	8.2	6.8	1.4	4.1	2.7		100.0
Detailed								93.9	6.1	100.0

This means that 97.3% of the eyes in the basic faces were of artificial colours and 93.9% of the eyes in the detailed faces were of natural colours (Table 4.20).

There are differences in the percentages in the not visible section when comparing the information in this section to the previous section. This is due to the different requirements in these morphological characteristics. The Ötzi example (E022) with the broken eyes has been placed in the not visible category in this section as the eyes were not visible, even though the assumption could be made that he had natural coloured eyes this is still an assumption. Those representations with the detailed faces in the undetermined eye type category were able to be placed within a colour category. All of which were placed in the natural eye colour category.

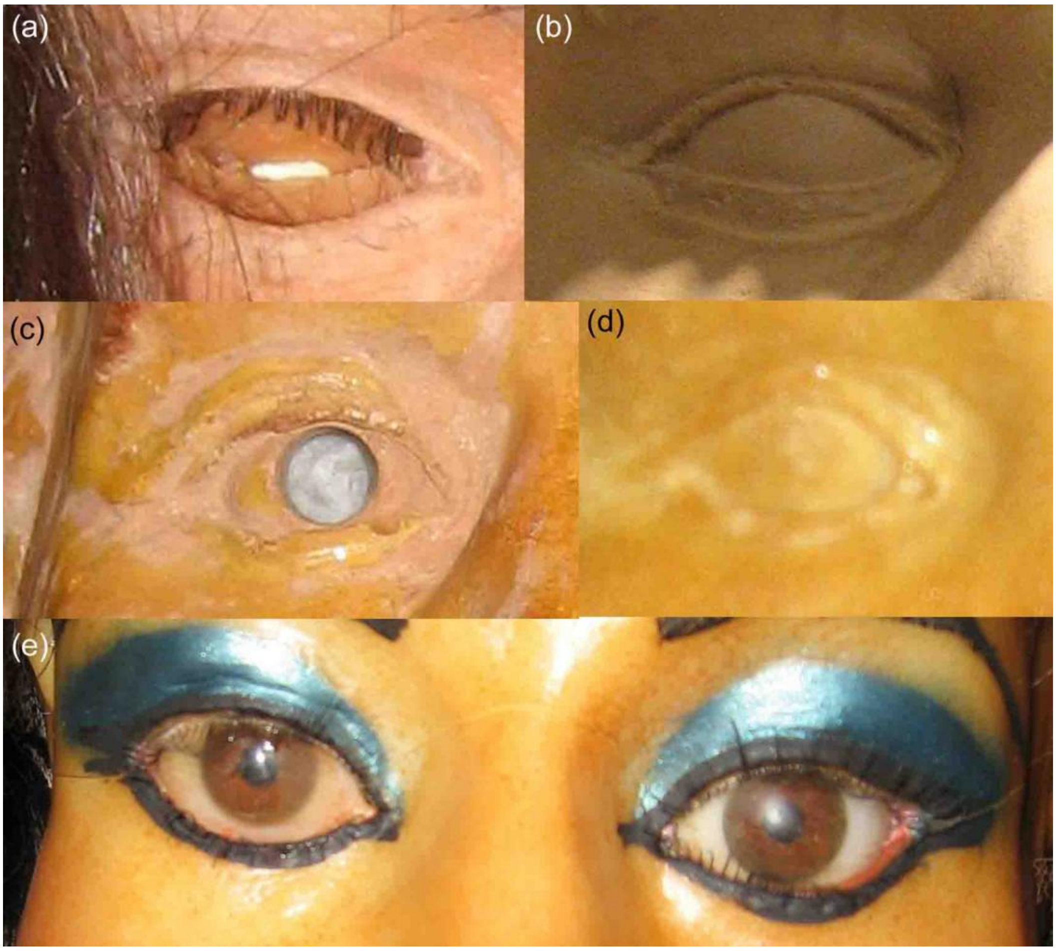

FIGURE 4.12 Eyes had sclera, iris and pupil which were either absent or present. Examples of the categories were: (a) broken eyes;[19] (b) sclera present; (c) sclera and iris present; (d) sclera, and pupil present; and (e) eyes with sclera, iris and pupil present.

[19] The representations are from the following museums: (a) Naturhistorisches Museum, Vienna; (b) Magyar Természettudományi Múzeum, Budapest; and (c, d and e) Manchester Museum, Manchester, England.

There were also 2.7% of the basic faces that were identified with natural coloured eyes. While, these representations had previously been identified as monochromatic/natural eyes in the colour scheme section, they are the only basic faces that have a feature that is not of a colour consistent with the rest of the colouring of the face.

TABLE 4.20 The eye colour in the sample was found to be of either artificial or natural colours, the remainder of the eyes were either closed or not visible. Each category is shown as a percentage of each finish type.

Type	n=	Artificial colouring	Natural	Eyes closed	Not visible*	Not present	Total %
Blank	15					100.0	100.0
Basic	73	97.3	2.7				100.0
Detailed	82		93.9	4.9	1.2		100.0

***As the eyes were broken.**

FACIAL HAIR

Facial hair in this study is defined as the hair that grows on the cheeks, chin and upper lip areas of the face. As facial hair is a sexual characteristic, it is essential to first separate the sample into male and female, then into adult and child in order to understand the results fully. In this sample facial hair was either present or absent in the faces studied (Table 4.21). Unlike scalp hair, facial hair was only found in the basic and detailed faces as it was absent from the blanks in the sample. The sample consisted of a mix of males and females as well as adults and children. In the basic finish type, 63% were adult males, of which only 28.8% had facial hair. The remaining 71.2% of the basic representations that did not have facial hair consisted of adult males (34.2%), male children (4.1%), adult females (28.8%) and 4.1% of adult representations whose sex was uncertain due to a lack of visual clues and museum information. The detailed representations had a higher proportion of adult males with facial hair (40.2%), while those without facial hair, adults and children, consisted of similar numbers of males (29.2%) and females (30.4%).

TABLE 4.21 Facial hair was found to be present in the adult male category and absent in the other sex and age group in two of the finish types, shown as a percentage of each finish type.

Finish type	Sex	Age group	Total	Facial hair	
				absent	present
Blank	male	adult			
(n=15)		child			
	undetermined	adult	80.0	80.0	
		child	20.0	20.0	
	female	adult			
		child			
			100.0	100.0	
Basic	male	adult	63.0	34.2	28.8
(n=73)		child	4.1	4.1	
	undetermined	adult	4.1	4.1	
		child			
	female	adult	28.8	28.8	
		child			
			100.0	71.2	28.8
Detailed	male	adult	64.6	24.4	40.2
(n=82)		child	4.9	4.9	
	undetermined	adult			
		child			
	female	adult	26.8	26.8	
		child	3.7	3.7	
			100.0	59.8	40.2

These results indicate that adult male representations in the basic finish type are less likely to have facial hair than the adult males in the detailed finish type. There is also more difficulty in assessing sex in basic faces than the detailed faces, this issue will be expanded upon in the chapter on the supplementary information embedded in the hominin representations (Chapter 7). Initially the larger numbers of both the basic and detailed finish types that did not have facial hair was thought to be due to there being an equal number of males and females in each finish type. However, these numbers indicate that there are more males than females in the sample, another issue to be discussed in a later chapter (Chapter 7).

FACIAL HAIR TYPE

The facial hair observed in the adult male representations was found to be in a range of different finishes in both the basic and detailed finish types (Table 4.22 and Figure 4.13). Facial hair in the basic faces was moulded (21.9%), moulded/painted (5.5%) or carved (1.4%), while in the detailed faces it was found to be individual hairs (28.0%), painted (11.0%) or a combination of both individual hairs and paint (1.2%).

TABLE 4.22 The range of facial hair finishes for both the basic and detailed finish types, shown as a percentage of each finish type (basic n=73 and detailed n=82).

Finish type	Moulded	Moulded/ painted	Carved	Painted only	Individual hairs	Individual hairs/ painted	Absent	Total %
Blank							100.0	100.0
Basic	21.9	5.5	1.4				71.2	100.0
Detailed				11.0	28.0	1.2	59.8	100.0

FACIAL HAIR COLOURING

The facial hair colouring was similar to the range of colours previously identified (Table 4.23). The facial hair on the basic faces was found in the following colours, white (11.0%), terracotta (5.5%), metallic (5.5%), brown (1.4%), wood grain (1.4%) and mottled (grey/white) (4.1%). The detailed faces were only found to have facial hair in natural colours (40.2%).

FIGURE 4.13 Several facial hair types were found in the sample, these consisted of: (a) moulded;[20] (b) moulded and painted; (c) individual hairs; (d) painted only; (e) carved; (f) individual hairs and painted; or (g) the facial hair was absent.

[20] The representations are from the following museums: (a) Magyar Természettudományi Múzeum, Budapest; (b and g) Colchester Castle Museum, Colchester, England; (c) Museum of Natural Sciences, Brussels; (d and e) Corinium Museum, Cirencester, England; and (f) Haus der Natur, Salzberg.

TABLE 4.23 The assorted colours found in the facial hair in the basic and detailed adult males shown as a percentage of each of the finish types (blank n=15, basic n=73 and detailed n=82).

Finish type	White	Terra–cotta	Metallic	Brown	Wood grain	Mottled	Natural	Absent	Total %
Blank								100.0	100.0
Basic	11.0	5.5	5.5	1.4	1.4	4.1		71.2	100.0
Detailed							40.2	59.8	100.0

This means that of the 28.8% of basic faces that had facial hair, all 28.8% were in artificial colours, while all 40.2% of detailed faces with facial hair were in natural colours (Table 4.24).

TABLE 4.24 The facial hair when present in the adult males in the sample, it was found to be in either artificial or natural colours, shown here as a percentage of each finish type.

Finish type	n=	Artificial	Natural	Absent	Total %
Blank	15			100.0	100.0
Basic	73	28.8		71.2	100.0
Detailed	82		40.2	59.8	100.0

MOUTH

The mouth is another feature which is absent in the blanks and present in both the basic and detailed faces. In those representations that have mouths there are several features that were recorded in this study; the types of mouths visible, the lip finish type and colouring, whether the mouth was open or closed and what features were visible when the mouth was open.

MOUTH CATEGORIES

There were four mouth categories in those representations that had this feature: 1. suggested; 2. anatomical; 3. obscured; and 4 absent (Table 4.25). In the basic faces, they were found to have suggested mouths (11.0%) or anatomical mouths (with lips) (84.9%), while the remaining 4.1% had no mouths. The majority of detailed faces had mouths (98.8%) with only one (1.2%) representation that had an obscured mouth.

TABLE 4.25 The mouth categories found in the three representation types (shown as a percentage).

Finish type	n =	Obscured	Suggested	Anatomical	Absent	Total %
Blank	15				100.0	100.0
Basic	73		11.0	84.9	4.1	100.0
Detailed	82	1.2		98.8		100.0

MOUTH TYPES

Of those representations that had a mouth, there were three finish types; moulded only, carved and painted (Table 4.26). The moulded only mouths were mainly found in the basic finish type (83.6%) as only 1.2% of the detailed faces were found in this type. The carved mouth (1.4%) was only found in the basic faces while the painted mouths (97.6%) were only found in the detailed faces.

TABLE 4.26 The mouth types identified in the basic and detailed faces (shown as a percentage).

Finish type	n =	Moulded only	Carved	Painted	Obscured or suggested only	Absent	Total %
Blank	15					100.0	100.0
Basic	73	83.6	1.4		11.0	4.1	100.0
Detailed	82	1.2		97.6	1.2		100.0

LIP COLOURING

The lip colours consisted of all the monochromatic finishes of the basic faces, excepting black plus skin colour, natural lip colours, lipstick or paint (Table 4.27 and Figure 4.14). The basic faces had the most variety in lip colours with 39.7%

in white, 23.3% in terracotta, 15.1% in metallic colours, 4.1% in grey, 1.4% in brown and in a wood grain. This means that (84.9%) of the lips in the basic faces were of artificial colours (Table 4.28). Not all of the detailed faces had lips in natural colours (92.7%), with lips also in skin colour (1.2%) and colours indicating the use of lipstick or paint (4.9%) on the lips of the representations. In 15.1% of basic faces the lips were suggested and 1.2% of detailed faces the lips were obscured. All of the blanks were lacking in all facial features.

TABLE 4.27 The lip colours identified in both the basic and detailed faces, shown as a percentage of each finish type (blank n=15, basic n=73 and detailed n=82).

Finish type	White	Terracotta	Metallic	Grey	brown	Wood grain	Skin colour	Natural	Cultural	Suggested, Obscured or absent	Total %
Blank										100.0	100.0
Basic	39.7	23.3	15.1	4.1	1.4	1.4				15.1	100.0
Detailed							1.2	92.7	4.9	1.2	100.0

TABLE 4.28 The lip colours identified were artificial, natural or cultural in both the basic and detailed faces, shown as a percentage of each finish type (blank n=15, basic n=73 and detailed n=82).

Finish type	Artificial	Natural	Suggested, obscured or absent	Indication of lipstick or paint	Total %
Blank			100.0		100.0
Basic	84.9		15.1		100.0
Detailed	1.2	92.7	1.2	4.9	100.0

LIP SHINE

Lip shine was only found in the detailed faces and only on 11.0% of them (Table 4.29 and Figure 4.15).

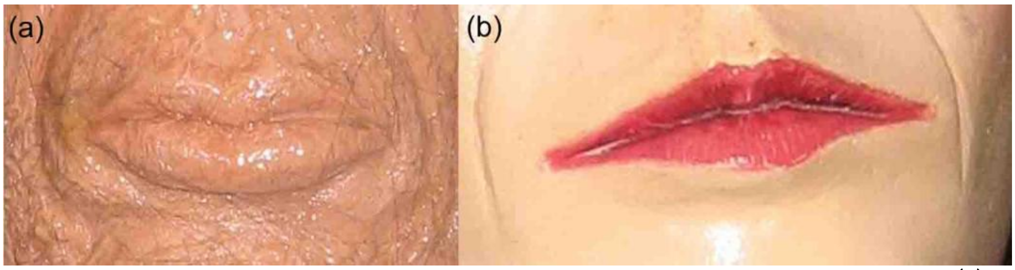

FIGURE 4.14 **The lip colours that differed to the previously identified colours were;[21] (a) skin colour; and (b) cultural.**

TABLE 4.29 **Shine on the lips was identified in the detailed faces, and is shown as a percentage of this finish type.**

Finish type	n =	Shine on lips	No shine	Obscured mouth	Mouth absent	Total %
Blank	15				100.0	100.0
Basic	73		84.9	11.0	4.1	100.0
Detailed	83	11.0	87.8	1.2		100.0

FIGURE 4.15 **Lip shine was only found of some of the lips, this meant that the categories for lip shine consisted of: (a) no shine;[22] (b) shine on lips; (c) the mouth was obscured; or (d) absent.**

[21] The representations are from the following museums: (a) Geology Museum, Lisbon, Portugal; and (b) the Museon, Den Haag, Netherlands.

[22] The representations are from the following museums: (a and b) the Manchester Museum, Manchester, England; (c) Jorvik Viking Centre, York, England; and (d) the Mueson, Den Haag, Netherlands.

MOUTHS OPEN OR CLOSED

Mouths can be open or closed when they are present on the representation (Table 4.30 and Figure 4.16). While the closed mouths had their lips visible, open mouths show more features such as teeth, tongue and interior of the oral cavity. The majority of representations had closed mouths in both the basic (71.2%) and detailed faces (58.5%). The percentage of open mouths was found to be 13.7% in the basic faces and 37.8% in the detailed faces. In addition to the suggested mouths (11.0%) in the basic faces and the obscured (1.2%) mouths in the detailed faces, the absent mouths in the blanks (100.0%) and basic faces (4.1%), an additional category was identified. This was where the mouth of the representation was partially obscured and a determination of open or closed could not be made. The mouths of two (2.4%) of the detailed faces were partially obscured, one due to shadow and the second due to a long moustache.

TABLE 4.30 Mouths were found to be open, closed or partially/fully obscured in the basic and detailed faces, and is shown as a percentage of these finish types (blank n=15, basic n=73 and detailed n=82).

Finish type	Partially obscured*	Open	Closed	Suggested or obscured	Absent	Total %
Blank					100.0	100.0
Basic		13.7	71.2	11.0	4.1	100.0
Detailed	2.4	37.8	58.5	1.2		100.0

*** Due to moustache or shadow.**

TEETH

The teeth are not always visible when the mouth is open (Table 4.31 and Figure 4.17). As identified previously the mouth was open in 13.7% of basic faces and 37.8% of detailed faces. In the basic faces, teeth were present in only 2.7% of open mouthed representations, in the other 11.0% the teeth were not visible. Whereas, with the detailed faces, the majority (29.3%) of the open mouthed representations had teeth, while the remaining 8.5% had no teeth visible. The majority of representations in each finish type, 86.3% of basic faces and 62.2% of detailed faces either had their mouths closed or not visible. All 100.0% of the blanks had no mouths at all.

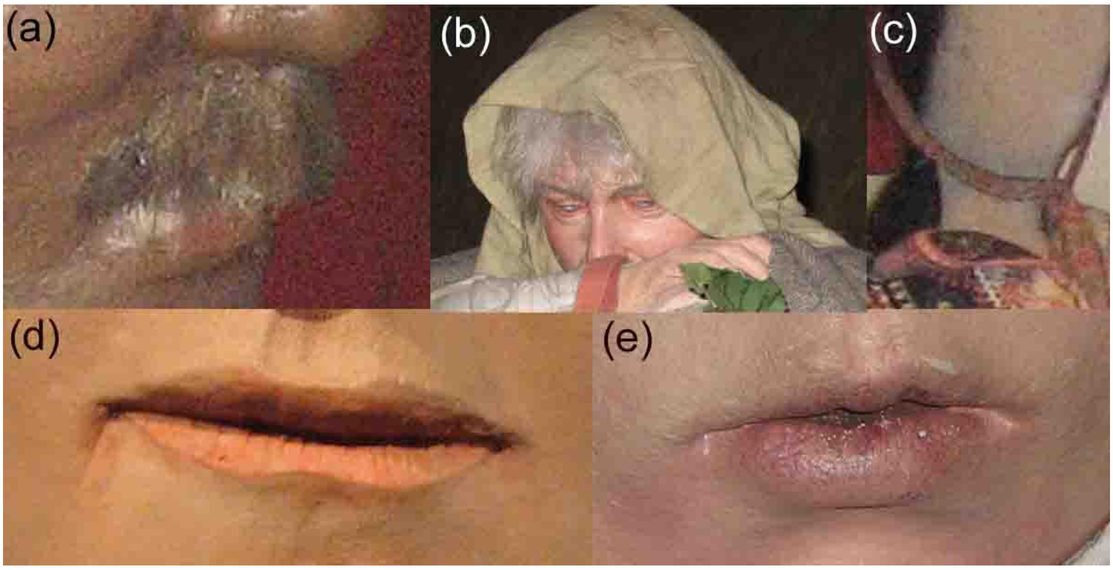

FIGURE 4.16 Representations showing examples of mouths : (a) partially obscured;[23] (b) obscured; (c) absent; (d) closed; and (e) open.

TABLE 4.31 The teeth were either present or absent in the representations with open mouths, the remaining representations had mouths that were closed or not visible, shown as a percentage of each finish type (blanks n=15, basic n=73 and detailed n=82).

Finish type	Mouth open, teeth		Mouth absent, closed or not visible	Total %
	present	absent		
Blanks			100.0	100.0
Basic	2.7	11.0	86.3	100.0
Detailed	29.3	8.5	62.2	100.0

TOOTH COLOUR

The teeth of the representations were observed to be several colours; white, maroon, grey, pale pink/white and natural (Table 4.32 and Figure 4.18). The

[23] The representations are from the following museums: (a) Haus Der Natur, Salzburg; (b) Jorvik Viking Centre, York, England; (c) Museon, Den Haag; (d) Corinium Museum, Cirencester, England; and (e) Colchester Castle Museum, Colchester, England.

teeth in the basic faces were only found to be in white (1.4%) and grey (1.4%). Detailed faces had teeth in maroon (2.4%), pale pink/white (1.2%) or natural colours (25.6%). In the remaining representations in all three finish types, the teeth were not visible (basic 11.0%, detailed 8.5%), the mouths were closed or not visible/absent (blanks 100.0%, basic 86.3% and detailed 62.2%). This meant that combined, artificial tooth colours were in 2.7% of the basic and 3.7% of the detailed faces (Table 4.33).

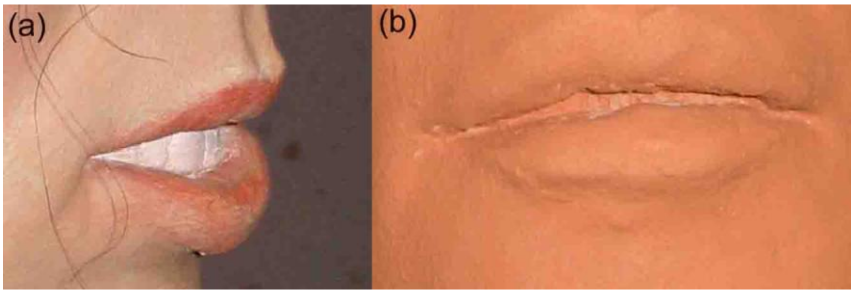

FIGURE 4.17 Examples of teeth either: (a) present;[24] or (b) absent in an open mouth.

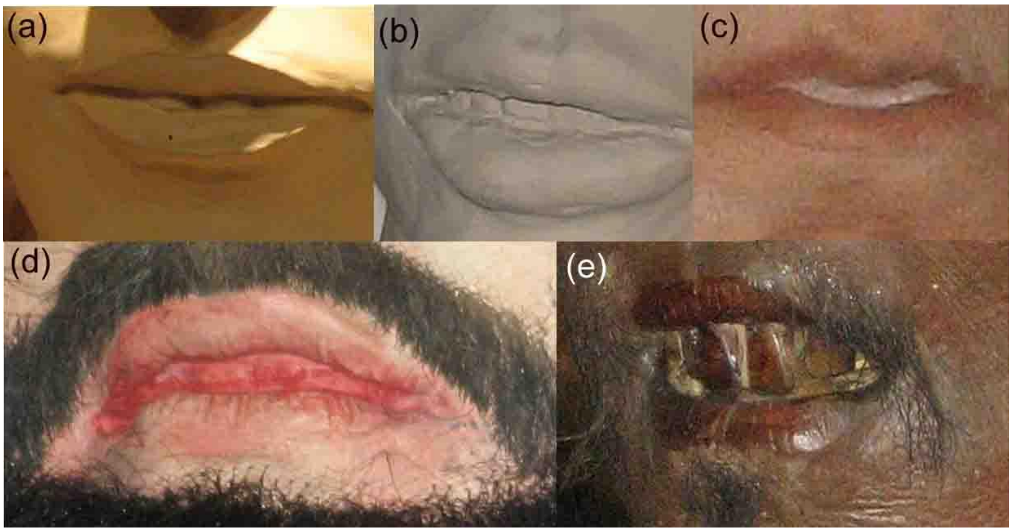

FIGURE 4.18 Examples of tooth colour; (a) white;[25] (b) grey; (c) natural colour; (d) pale pink/white; and (e) maroon.

[24] The representations are from the following museums: (a) Corinium Museum, Cirencester, England; and (b) Manchester Museum, Manchester, England.

[25] The representations are from the following museums: (a) Magyar Természettudományi Múzeum, Budapest; (b) Manchester Museum, Manchester; (c) Corinium Museum, Cirencester; (d) Jorvik Viking Centre, York, England; and (e) Haus Der Natur, Salzburg.

TABLE 4.32 Several colours were observed in the teeth of the representations, in the remaining representations the teeth were not visible, mouths were closed or not visible, shown as a percentage of each finish type (blanks n=15, basic n=73 and detailed n=82).

Finish type	Tooth Colour					Teeth not visible	Mouth absent, closed or not visible	Total %
	White	Grey	Maroon	Pale pink/white	Natural			
Blanks							100.0	100.0
Basic	1.4	1.4				11.0	86.3	100.0
Detailed			2.4	1.2	25.6	8.5	62.2	100.0

TABLE 4.33 The tooth colours were either artificial or natural colours while in the remaining representations the teeth were not visible, mouths were closed or not visible, shown as a percentage of each finish type (blanks n=15, basic n=73 and detailed n=82).

Finish type	Artificial	Natural	Teeth not visible	Mouth absent, closed or not visible	Total %
Blanks				100.0	100.0
Basic	2.7		11.0	86.3	100.0
Detailed	3.7	25.6	8.5	62.2	100.0

TEETH WITH SHINE

Not all visible teeth in the representations had shine on them. The shine indicates moisture in the mouth due to saliva in a living individual. This shine was only observed in 4.9% of the detailed faces with visible teeth (Table 4.34 and Figure 4.19). This meant that there was no shine on the 2.7% of the basic faces or 24.4% of detailed faces that also had visible teeth. The remaining representations either had no teeth visible (basic 11.0% and detailed 8.5%), their mouths were closed, not visible or absent (blanks 100.0%, basic 86.3%, detailed 62.2%).

ORAL CAVITY

The oral cavity was only observed under certain conditions (Table 4.35 and Figure 4.20). In the 13.7% of basic faces that have open mouths the oral cavity was not visible due to the way the open mouth was made or the teeth obscured the view. In the detailed faces the cavity was visible in 9.8%, suggested in 11.0% and not visible in the remaining 17.1% of the representations that had open mouths.

TABLE 4.34 Shine was observed on some of the teeth of representations, shown as a percentage of each finish type (basic n=73 and detailed n=82).

Finish type	Teeth visible		Not visible	Mouth absent, closed or not visible	Total %
	with shine	without shine			
Blanks				100.0	100.0
Basic		2.7	11.0	86.3	100.0
Detailed	4.9	24.4	8.5	62.2	100.0

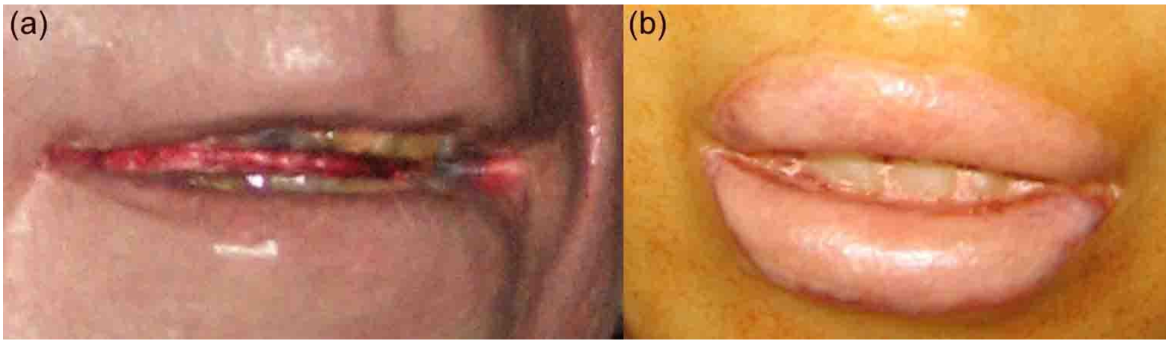

FIGURE 4.19 Examples of teeth with; (a) shine;[26] and (b) without shine.

The colouring of the oral cavity was not always able to be determined as it is a cavity within the representation's head (Table 4.36 and Figure 4.21). Detailed faces were the only finish type to have visible oral cavities. The majority of these were in natural colours (12.2%), 3.7% were in white, a further 3.7% were in shadow and 1.2% did not actually have an oral cavity but rather just a space behind the representation's external mouth and row of visible teeth. The remaining 17.1% of the representations with open mouths had no visible oral cavity as it was either obscured by the teeth or no cavity was present. In the

[26] The representations are from the following museums: (a) Jorvik Viking Centre, York, England; and (b) Manchester Museum, Manchester, England.

remainder of the sample the mouth was absent (blanks 100.0%), closed, suggested or obscured (basic 86.3% and detailed 62.2%).

TABLE 4.35 When the mouth was open the oral cavity was present, suggested or not visible in the basic and detailed faces, and are shown as a percentage of each finish type (blanks n=15, basic n=73 and detailed n=82).

Finish type	Present	Suggested	Not visible*	Mouth closed, suggested or obscured	Total %
Blank				100.0	100.0
Basic			13.7	86.3	100.0
Detailed	9.8	11.0	17.1	62.2	100.0

*Due to teeth closed or the way the mouth has been manufactured.

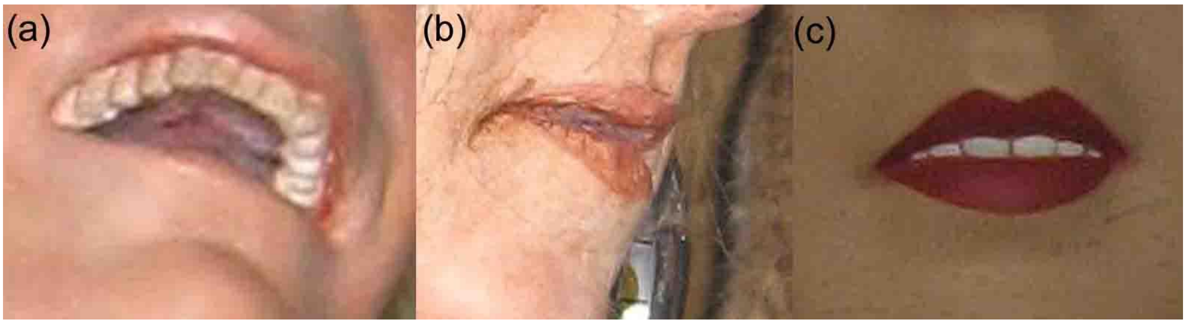

FIGURE 4.20 Examples of the different types of oral cavities: (a) present;[27] (b) suggested; or (c) not visible.

TABLE 4.36 When the mouth was open the oral cavity was in white, natural colours, in shadow, just a space behind the representation's mouth or not visible, and are shown as a percentage of each finish type (blanks n=15, basic n=73 and detailed n=82).

Finish type	White	Natural	In shadow	Space only	Not visible	Mouth absent, closed or obscured	Total %
Blank						100.0	100.0
Basic					13.7	86.3	100.0
Detailed	3.7	12.2	3.7	1.2	17.1	62.2	100.0

[27] The representations are from the following museums: (a and b) Jorvik Viking Centre, York, England; and (c) Haus Der Natur, Salzburg.

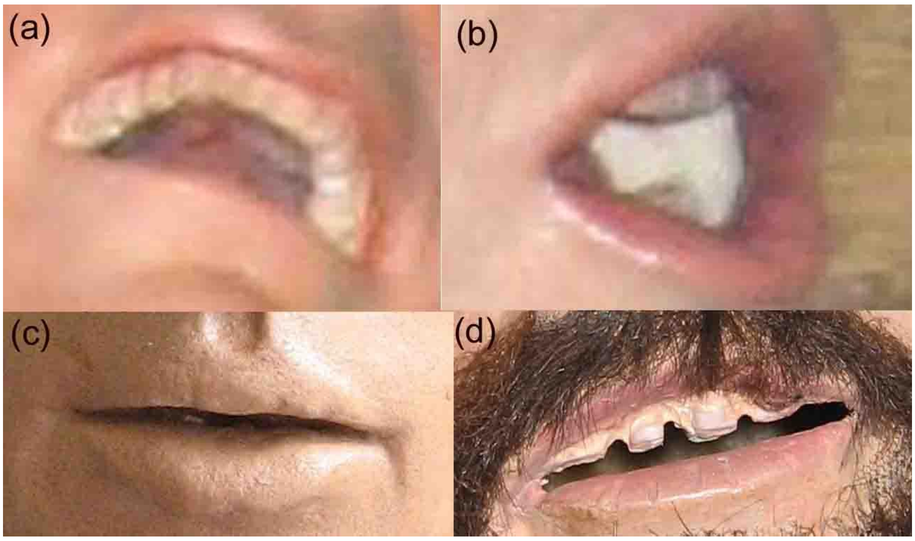

FIGURE 4.21 Examples of colours identified in the oral cavities in the representations in the sample: (a) natural colours;[28] (b) white; (c) in shadow; and (d) space only.

TONGUE

The tongue was only visible in a small number of representations where the mouth was open wide enough to view the tongue, the teeth were open, there was an oral cavity and the representation was positioned in such a way that the tongue was visible (Table 4.37 and Figure 4.22). This occurred in 3.7% of the detailed representations. In the remaining representations with open mouths, 17.1% of detailed faces had no tongue, 13.7% of the basic faces and a further 17.1% of detailed faces it was not visible as the teeth were closed or there was no oral cavity. All 3.7% of the detailed representations that had a tongue present had them in natural colours.

[28] The representations are from the following institutions: (a and b) Jorvik Viking Centre, York, England; (c) Caroline Wilkinson's Studio, Dundee, Scotland; and (d) Australian National Maritime Museum, Sydney, this is the same representation that was viewed at the Archaeology Museum, Frankfurt, Germany, but photographs of it could not be taken at the Frankfurt museum.

TABLE 4.37 The tongue was present, absent or not visible the representations with open mouths and are shown as a percentage of each finish type (blanks n=15, basic n=73 and detailed n=82).

Finish type	Present	Absent	Not visible	Mouth closed, suggested or obscured	Total %
Blank				100.0	100.0
Basic			13.7	86.3	100.0
Detailed	3.7	17.1	17.1	62.2	100.0

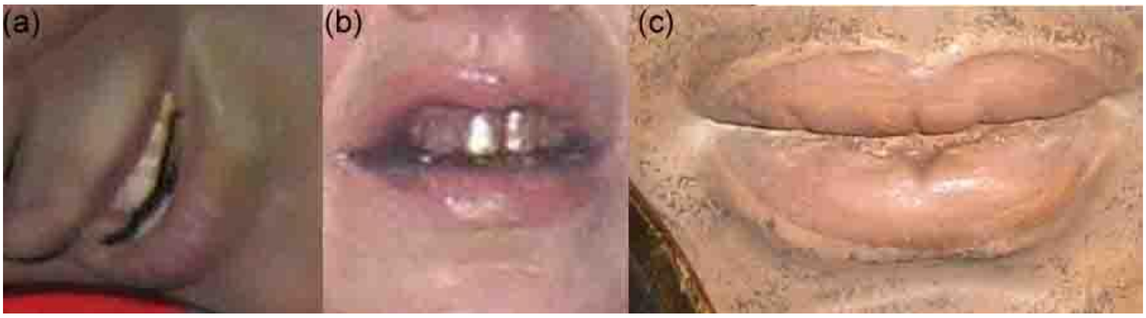

FIGURE 4.22 The tongue was either found to be: (a) present;[29] (b) absent; or (c) not visible in those representations that had open mouths in the sample.

Comparison of Morphology to Facial Realism

In order to assess which morphological characteristics were important in the terms of realistic faces on human representations, the average facial realism (FR) number is calculated for representations grouped into categories of specific characteristics. This was done by using the results of the differential semantic scale that was used to determine the range of variation in the sample. This resulted in each representation being given a ranking within the sample which was an ordinal number prefixed with the letters FR for facial realism. These numbers were recorded for each representation. Once the finish types and morphological characteristics had been identified and the variation within these characteristic for each representation had been recorded, the FR number for each category in each morphological characteristic was recorded. Then the average of these FR numbers, as well as the minimum and maximum scores were calculated

[29] The representations are from the following museums: (a) Haus Der Natur, Salzburg; (b) Jorvik Viking Centre, York, England; and (c) Hunterian Museum, Glasgow.

for each category within each morphological characteristic. This resulted in a FR average score for each category as well as a minimum and maximum score range. The facial realism range was between 1 and 148 inclusive. Although, the total sample was 170, the highest FR number assigned was 148 due to several of the representations being assigned the same number as each other, due to repetition of representations within the sample or a high degree of similarity of representations resulting in them being judged at the same level of facial realism (see Appendix E for examples).

Findings and preliminary discussion

FINISH TYPES

The FR average and minimum and maximum scores were found for each of the three finish types that were identified (Figure 4.23). For the blanks the average was FR2 with a minimum of FR1 and a maximum of FR3. The average for the basic faces was FR33 with a minimum of FR4 and a maximum of FR68 and for the detailed faces the average was FR106, with the minimum of FR10 and maximum of FR148. This meant that the blanks were consistently ranked very low, basic faces had widely varying rankings from low to above the mid–range, while the detailed faces had an even wider scope of variability as well as accounting for all of the representations with a score above FR68.

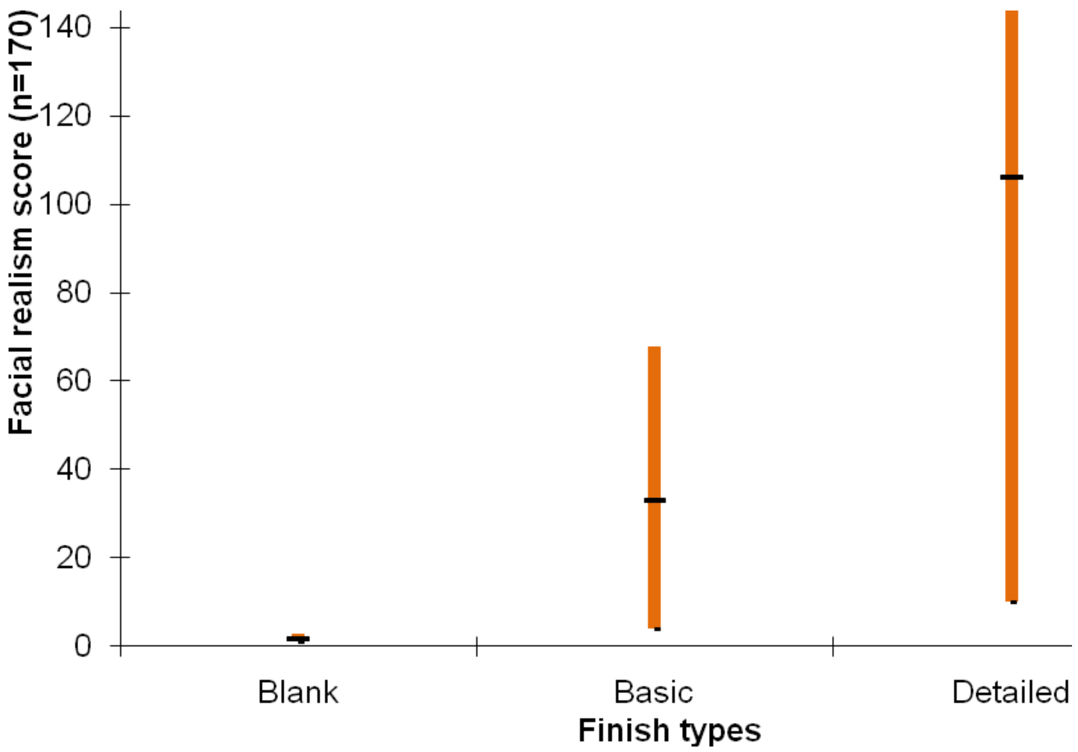

FIGURE 4.23 A graph showing the facial realism average scores within the three finish type categories identified with the vertical lines representing the range from minimum to maximum scores where applicable for each of the finish types.

Basic and detailed representations are always considered to be more realistic than the blank representations. The detailed representations are not always necessarily considered to be more realistic than blank representation, however. If a detailed representation is finished with a low level of skill it will be perceived as less realistic than a highly skilled basic representation. In this sample, there were only two detailed representations that were considered to be of a low realism level, E006 (FR10) and E317 (FR19) (Figure 4.24). All other detailed representations were judged to be of a higher level of realism than the basic representations.

The differences between the three finish types that were perceived visually were the absence of features in the blank representations and the application of natural colours in the detailed representations.

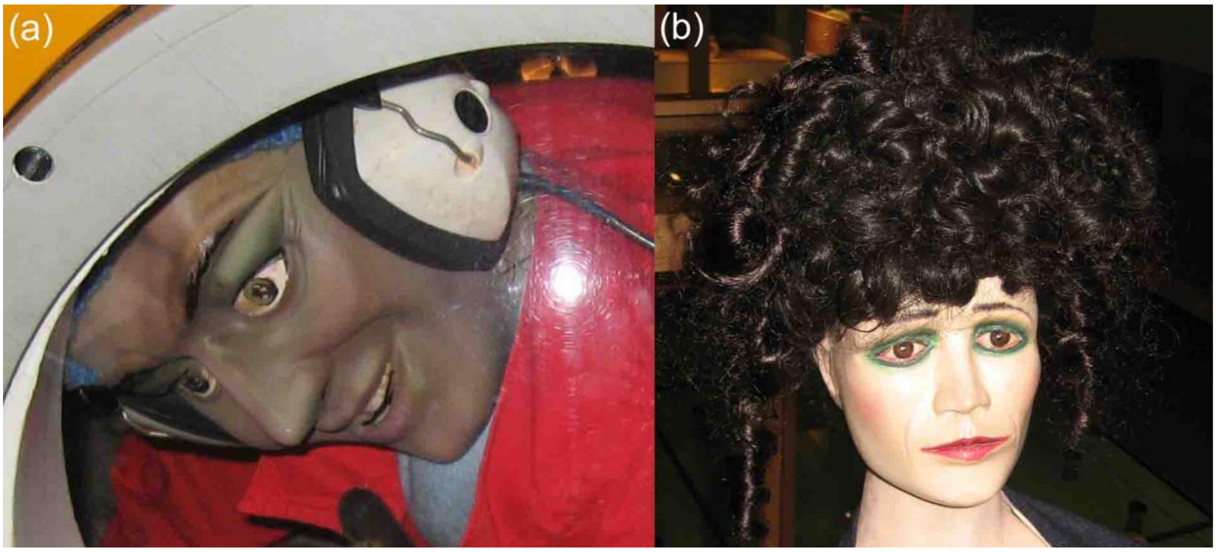

FIGURE 4.24 The two detailed representations that were considered to be of a low realism level: (a) E006 had a FR number of 10, from Haus der Natur, Salzburg; and (b) E317 had a FR number of 19, from the Museon, Den Haag, Netherlands.

COLOUR SCHEME

The FR averages were then worked out for the overall colour scheme (Figure 4.25). The bicolour representations, those with artificially coloured face and naturally coloured hair had an FR average of 4, with a minimum of 2 and a maximum score of 12. Monochromatic representations were found to have an FR average of 29, with a minimum of 1 and a maximum of 68, while the monochromatic with inserted eyes had an FR average of 58 with a minimum of 50 and a maximum of 66. The naturally coloured representations had an FR average of 106 with a minimum of 10 and a maximum of 148.

The addition of the natural coloured wigs to the blank and basic representations created the bicolour colour schemes. In the blank representations the addition of this detail meant that the blanks with the additional hair were considered to be more realistic than those without the additional feature. There were no blanks with artificially coloured hair so no determination can be made if the additional feature is more important that the colour of the feature. One of the basic faces also had a bicolour colour scheme, which in comparison to the other basic faces had quite a low score. This low level of realism may have been due to a lack of other details in the face as it lacked the iris, pupil and eyebrows. The representation was also of a standard mannequin type, as identified in Chapter 3, with an anonymous 'average' type of face (see Figure 4.3b).

Inserted eyes were found to make a difference to the realism of the basic representations as shown by the FR averages between the monochromatic representations at FR30 and ones with inserted eyes at FR58. The bicolour representations were the lowest scoring colour scheme with an average of FR4 and the highest scoring colour scheme were those of natural colours scoring an average of FR106.

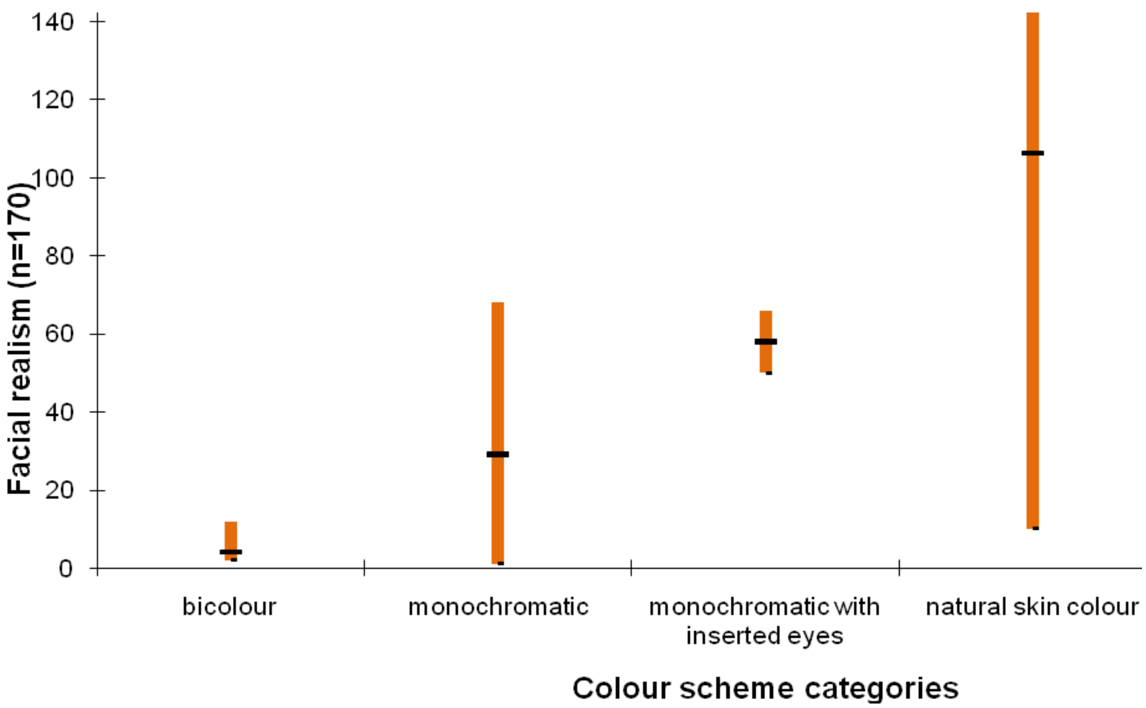

FIGURE 4.25 A graph showing the facial realism average scores within the four colour scheme categories identified with the vertical lines representing the range from minimum to maximum score for each of the colour schemes.

SKIN COLOURING

The skin colouring was one of the first characteristics identified when the representations were placed along the semantic differential scale as it represented a large portion of the visible face. The overall FR averages were found for each of the skin colour categories (Figure 4.26):

- wood grain representations had an FR average of 2 with a minimum score of 1 and a maximum score of 8;
- black coloured representations had an FR average of 2 with a minimum and maximum score of 2;
- mottled representations had a FR average of 5 with minimum and maximum scores of 5;
- brown coloured representations had a FR average of 7 with a minimum of 6 and a maximum of 9;
- the grey representations had a FR average of 10 with a minimum score of 2 and a maximum score of 66;
- white representations had a FR average of 33 with a minimum of 4 and a maximum score of 68;
- the terracotta representations had a FR average of 39 with a minimum score of 14 and a maximum score of 61;
- while the metallic coloured representations had a FR average score of 57 with a minimum of 35 and a maximum 65; and
- the most realistic representations were those with the natural skin colours which had an FR average of 106, with a minimum score of 10 and a maximum score of 148.

These results give a good indication that the range influences the average and that it is necessary to observe the positioning of the FR average within the score range. The wood grain representations have a very low level of realism and the majority of these coloured representations are at the lower end of their already low scores. The lower scoring colours (wood grain, black, mottled and brown) may also be biased due to the limited numbers in these colours. The majority of the grey representations were judged to be low when you compare the position of the FR average to the score range for that colour. Conversely, the majority of the metallic and the naturally coloured ones were judged quite high when comparing the FR average with each score range. With the white and terracotta representations, the FR average is evenly spaced along the score range. Familiarity may also play a part in the perceived realism of the white, terracotta and metallic colours as many sculptures of humans are in these colours.

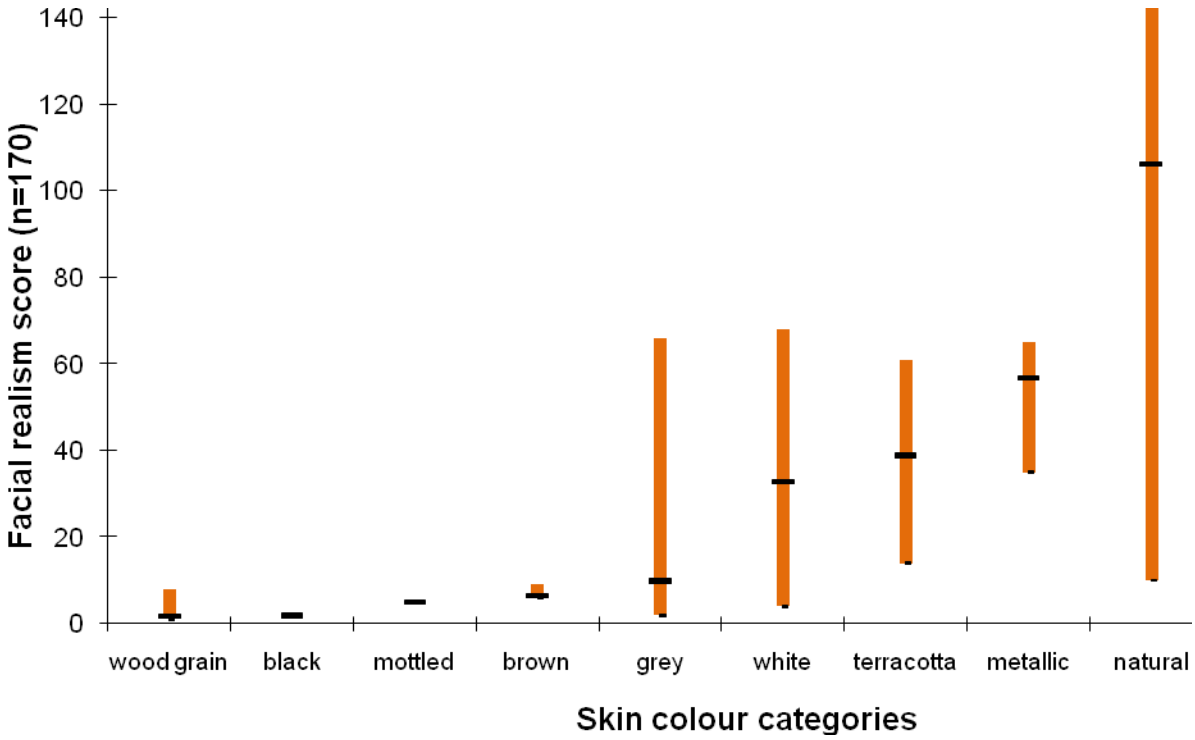

FIGURE 4.26 A graph showing the facial realism average scores within the nine skin colour categories identified with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified skin colour categories.

The natural skin colour category includes the wide spectrum of skin pigmentation found in humans from the palest 'white' to 'black'. Because of these common terms for skin colour, a distinction needed to be made between these terms and the representations that were white, black and brown. There is no link between these monochromatic skin colours and racial or ethnic features, characteristics or biases. For example, the single black representation was a blank and therefore had no facial features at all. There was one basic representation with Negroid features and it had a grey colour scheme and his half brother with more Caucasoid features was also in the same grey colour[30].

Scalp Hair

There were five scalp hair types identified; no hair, moulded hair, painted and moulded hair, individual hairs or the scalp hair was not visible due to the headwear worn by the representation (Figure 4.27). The representations with no hair had a FR average of 21 with a minimum score of 1 and a maximum score of 94. The majority of these representations were at the lower level of the scale as the average is quite low in comparison to the score range. Those representations with moulded hair had a FR average of 41 with a minimum of 14 and a maximum of 64. This was the smallest score range for the five identified categories and is confined to the basic representations only. The moulded and painted hair type had a FR average of 45 with a minimum score of 5 and a maximum score of 127. As with the no hair type, the majority of the representations with moulded and painted hair were at the lower end of the realism scale when the FR average is compared to the score range. The representations with no visible scalp hair ranged from a minimum score of 1 to a maximum score of 124 and had a FR average of 52, while, those representations with individual hairs had a FR average of 99, with a minimum score of 2 and a maximum one of 148.

There are several conclusions that can be drawn from these results. A lack of scalp hair is in some cases considered to be more realistic that having moulded scalp hair. The addition of paint to moulded scalp hair can increase its perceived realism in some cases. The representations with no visible scalp hair also had a large score range which indicates that the absence of hair is not greatly detrimental to the perception of realism. This may be due to our familiarity with the human face and head and the fact that scalp hair is not always visible due to headwear being worn and the scalp hair is assumed to be present as it has a

[30] These were facial reconstructions of Egyptian mummies at the Manchester Museum, Manchester, England. They were half brothers and there was associated historical information about their family and their relationship to each other.

contextual reason for not being seen. Those representations with scalp hair consisting of individual hairs have their realism increased due to their hair type, which can be seen even with the blanks as those with no hair scored lower than those with hair. The most realistic representations in the sample were those in the individual hairs category.

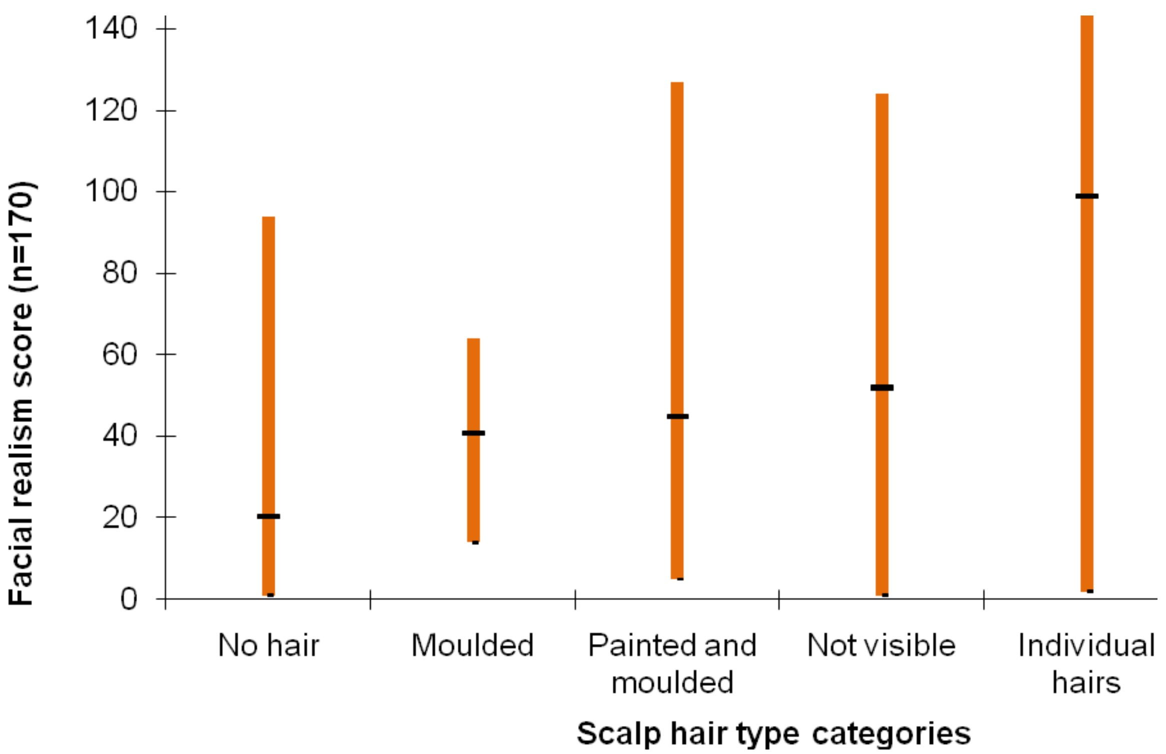

FIGURE 4.27 A graph showing the facial realism average scores within the five scalp hair types identified with the vertical lines representing the range from minimum to maximum score for each of the identified scalp hair types.

Scalp hair colour also showed differences between the FR averages for each category (Figure 4.28). The mottled scalp hair colour, as with the colour scheme scores, were 5 for the FR average, minimum and maximum scores as all three of the mottled representations had the same score. The one representation with brown hair also had the same score for the FR average, minimum and maximum, that of 9. Those representations with white hair had a FR average of 38 with a minimum score of 11 and a maximum score of 84. Terracotta hair colour was found to have a FR average of 39, with a minimum of 14 and a maximum of 61.

Metallic hair colour had the highest FR average found amongst the artificial hair colours, that of 56, this colour had a small score range with a minimum of 35 and a maximum of 64. Those representations with natural hair colours had a FR average of 100, with a score range from 2 to 148, the majority of which were at the higher end of the realism scale.

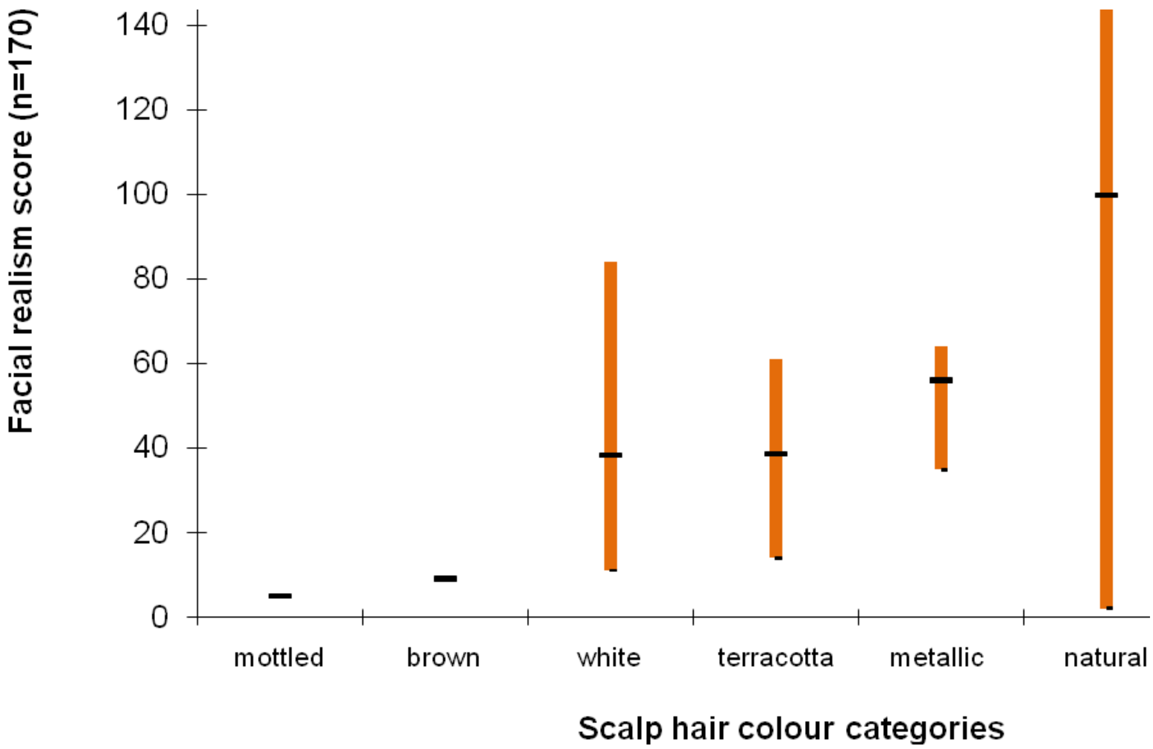

FIGURE 4.28 A graph showing the facial realism average scores within the six scalp hair colours identified with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified scalp hair colour categories.

There were less artificial colour categories in the scalp hair colours than with the skin colour categories. The representations with mottled or brown hair scored lower than all other scalp hair colour categories. Natural hair colours had the largest score range, the positioning of the FR average was in the upper third of the range, indicating that naturally coloured scalp hair is an important distinction between the basic faces which were only artificially coloured and the detailed faces which were naturally coloured. The detailed faces with the artificially (culturally) coloured hair are also less realistic than the FR average of the natural coloured scalp hair. With the metallic scalp hair colour the FR average was quite high within the score range.

EYEBROW

Eyebrows were found to be present, absent or not visible, and when present they were found to be moulded/carved, painted/moulded, painted, individual hairs stuck on or inserted (Figure 4.29). In order of the FR average, those representations with no eyebrows were found to have a FR average of 18 with a score range of 1 to 71. Those with moulded or carved eyebrows had a FR average of 38 with a minimum score of 5 and a maximum score of 122. If the eyebrows were not visible the FR average was 47 with a score range of between 4 and 90. Painted and moulded brows had a FR average of 56 with a minimum of 10 and a maximum of 101. When the eyebrows were present on the representations the FR average was 79 with a minimum score of 5 and a maximum score of 148. Painted eyebrows had a minimum score of 19 and a maximum score of 139, while the FR average was 102. The representations with individual hairs stuck on had a FR average of 104 and a minimum score of 83 and a maximum score of 136, while, those with individual hairs inserted into the head had a FR average of 136 with a score range from 89 to 148.

While eyebrows were present across a large range of the sample, the more realistic representations had eyebrows featuring individual hairs and the most realistic eyebrows were those that had individual hairs inserted into the representation. Painted eyebrows also had a high FR average but were found over a wider range of scores. Interestingly the representations that either had no eyebrows or they weren’t visible were in the lower two thirds of the sample in regard to their realism score. This indicates that the presence of eyebrows is important for the representations’ perceived realism.

The eyebrows, when present, came in a range of colours (Figure 4.30). Representations with mottled coloured eyebrows had a score of 5, those with wood grain had a general score of 8 and those with brown had one of 9 for the FR average, minimum and maximum scores. The eyebrows on the grey representations had a FR average of 16 with a range of scores from 13 to 18. Those with white eyebrows had a FR average of 35 with a minimum score of 17 and a maximum one of 55. The representations with terracotta eyebrows had a minimum score of 14 and a maximum score of 61, with a FR average of 37. Those with mettalic eyebrows had a FR average of 56 with a score range from 35 to 64. The eyebrows of naturalistic colours had a FR average of 106, with a minimum score of 10 and a maximum one of 148. There was also a representation with eyebrows the same colour as its skin which had a score of 122 for the FR average, minimum and maximum.

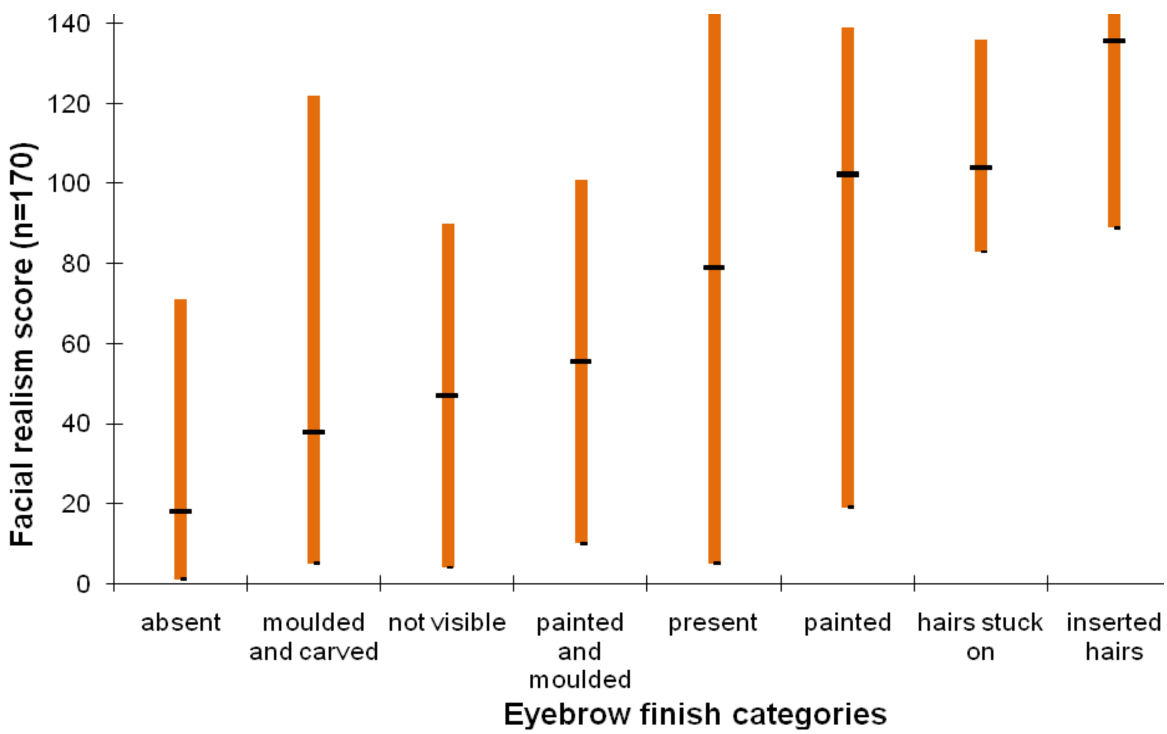

FIGURE 4.29 A graph showing the facial realism average scores for the identified eyebrow finish categories with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

The lowest scoring eyebrow colours were again the mottled, wood grain and brown categories. Only one of the wood grain representations had eyebrows and it is the highest scoring of that colour category, although it is still one of the lowest of the eyebrow colours. Very few of the grey representations had eyebrows and they were clustered together with a low realism score, this differs from the grey skin colour category that had higher maximum score. The white, terracotta and metallic representations with eyebrows were the highest scoring of the artificial colour categories, with the metallic eyebrows having the highest of the FR averages for these three artificial colours. Eyebrows of naturalistic colours follow a familar trend set by the skin colour and scalp hair colour categories with a wide facial realism score range and a reasonable high FR average. An extra eyebrow colour was identified in this category, that of skin colour, this representation had moulded eyebrows which were the same colour as its skin and had the highest of the FR average scores.

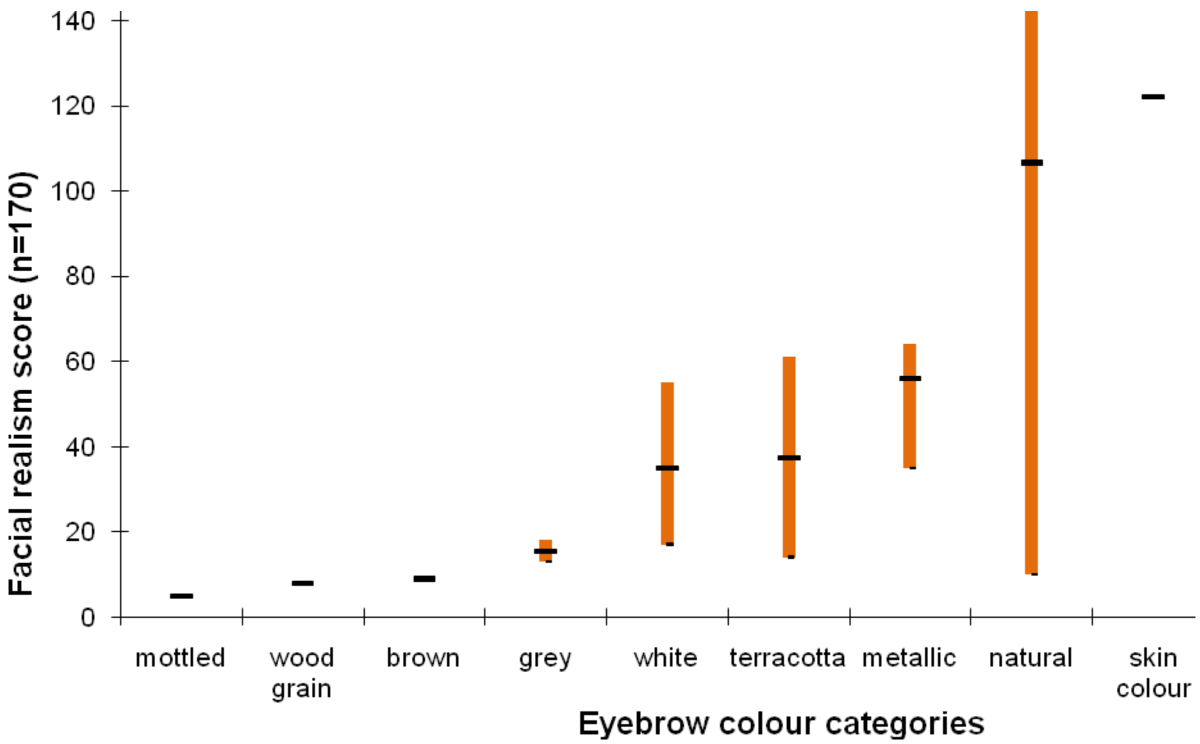

FIGURE 4.30 A graph showing the facial realism average scores for the identified eyebrow colours with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

EYELASH

Eyelashes were only found in the detailed faces to varying degrees, that is they were absent, only the lower lashes were present, only the upper lashes were present or both the upper and lower lashes were present (Figure 4.31). The representations with no lashes at all had a FR average of 59 with a score range from 1 to 146. Where only the upper lashes are present, the FR average was 109 with a minimum score of 78 and a maximum score of 147. When both lashes were present, the FR average was 112 with a minimum score of 19 and a maximum score of 148. The lower lashes only category had a FR average of 116 with a score range from 112 to 120.

While representations that had no eyelashes had the largest range of scores, the FR average places the many of them at lower than average realism. Whereas, those representations with both lashes present, which also had a large score range had a FR average in the upper third of the realism scale. Representations having lower lashes only, do not have the potential to have a very high realism score, whereas, those with only the upper lashes do. This indicates that if only one set of eyelashes are to be included on the representation they should be the upper lashes rather than the lower lashes, however, both sets of lashes would be preferable.

The eyelashes when present were found to be painted or individual hairs (either fake eyelashes or inserted hairs) (Figure 4.32). The eyelashes that were painted had a FR average of 98 with a minimum score of 75 and a maximum score of 120. Fake eyelashes or eyelash piece had a FR average of 103, with a score range from 19 to 147 while the inserted individual hairs had a FR average of 140 with a range from 135 to 145. Those representations that had eyelashes composed of individual hairs that were not able to be put into either category were not included in this section due to the ambiguity. All eyelashes were found to be of naturalistic colouring and this category had a FR average of 111 with a minimum score of 19 and a maximum score of 148.

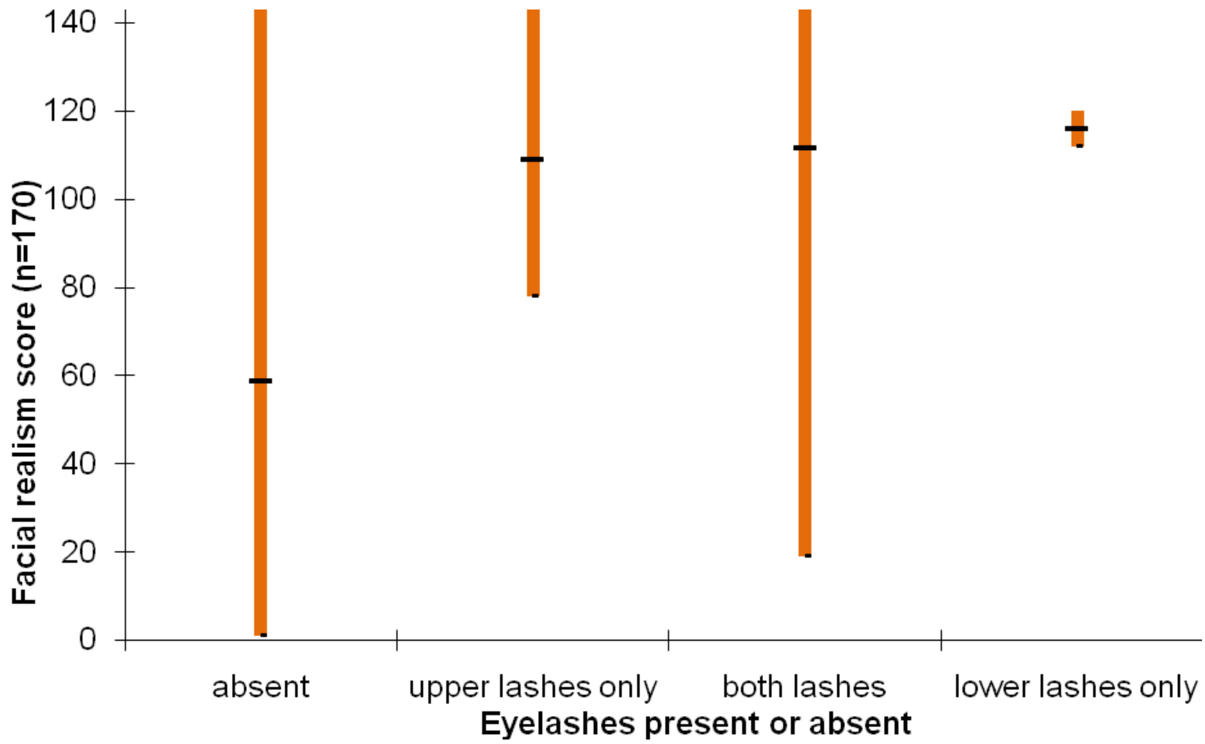

FIGURE 4.31 A graph showing the facial realism average scores for the eyelash categories with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

Painted lashes are less likely to be on the low scoring detailed representations, which is possibly due to there being limited ways that age or visitors can impact on the look of them. Fake lashes, however, have the possibility of looking 'fake' as they can separate from the eye and look odd. On a well finished detailed representation, though, individual lashes will also be more realistic than painted ones, whether they are 'fake' lashes or inserted individual hairs. These results do indicate that if the lashes are inserted individual hairs, the realism of the representation will be improved. This also indicates that if the artist has this type of attention to detail, then the overall appearance of the representation will be more realistic than if these details are not included. Eyelashes are also one of the few features that are only ever portrayed in naturalistic colours, the other is the tongue. This is in part due to the fact that they are only found on detailed representations. There is, however, the possibility to have artificial colours on detailed representations due to modern fashion trends and the advent of coloured mascaras (purple, blue, green etc.) in the 1960s (Sherrow 2006).

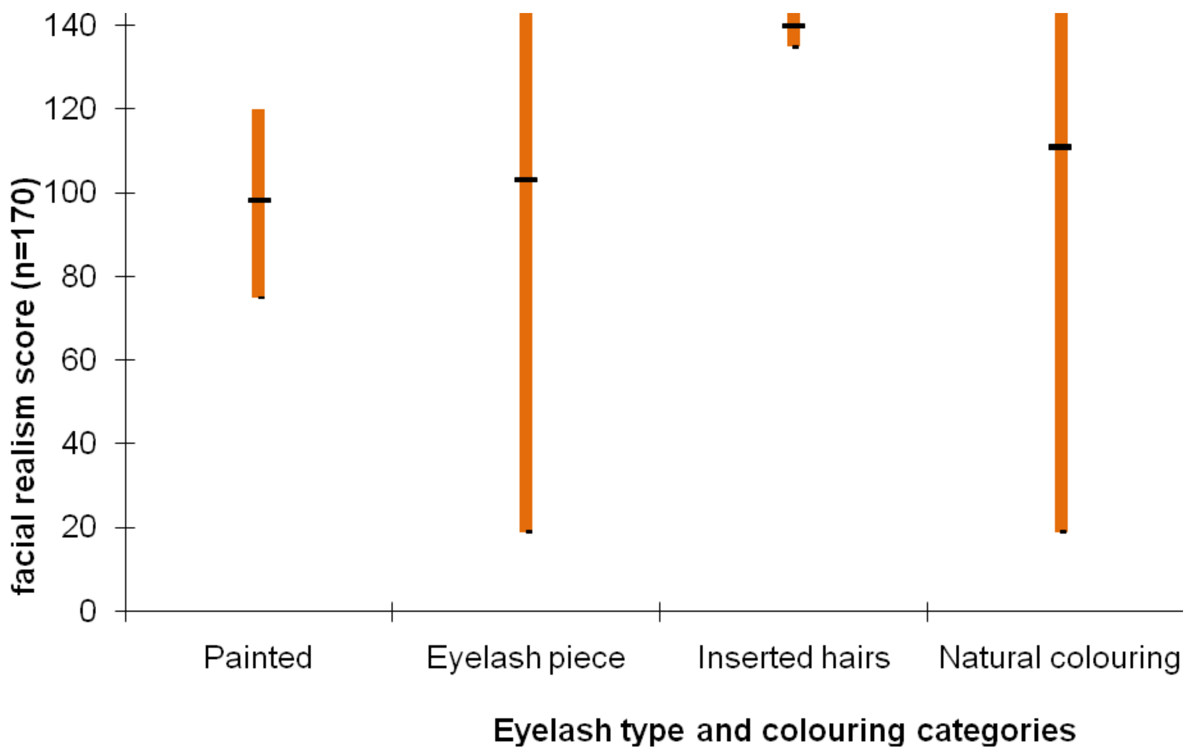

FIGURE 4.32 A graph showing the facial realism average scores for the identified eyelash types and colouring categories with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

EYE

There were a variety of eye details identified in the sample (Figure 4.33). The representations that had no eyes were confined to the blanks, this gave a FR average of 2, with a minimum of 1 and a maximum of 3. There was only one score given to those representations that had no visible eyes, limiting the FR average, minimum and maximum scores to 4. Similar results were found for those representations that had suggested eyes but no visible sclera, with a score of 6 for the FR average, minimum and maximum scores. Similar results were found for those representations with no iris (FR average 25) and no pupil (FR average 28) as they had the same minimum score of 5 and maximum score of 68. The representations with sclera had a FR average of 75, with a minimum score of 5 and a maximum score of 148. Eyes with an iris had a score range from 10 to 148 with a FR average of 91, while those with a pupil had a FR average of 95 within the same score range. The representations with closed eyes had a FR average of 112, with a minimum score of 71 and a maximum score of 147.

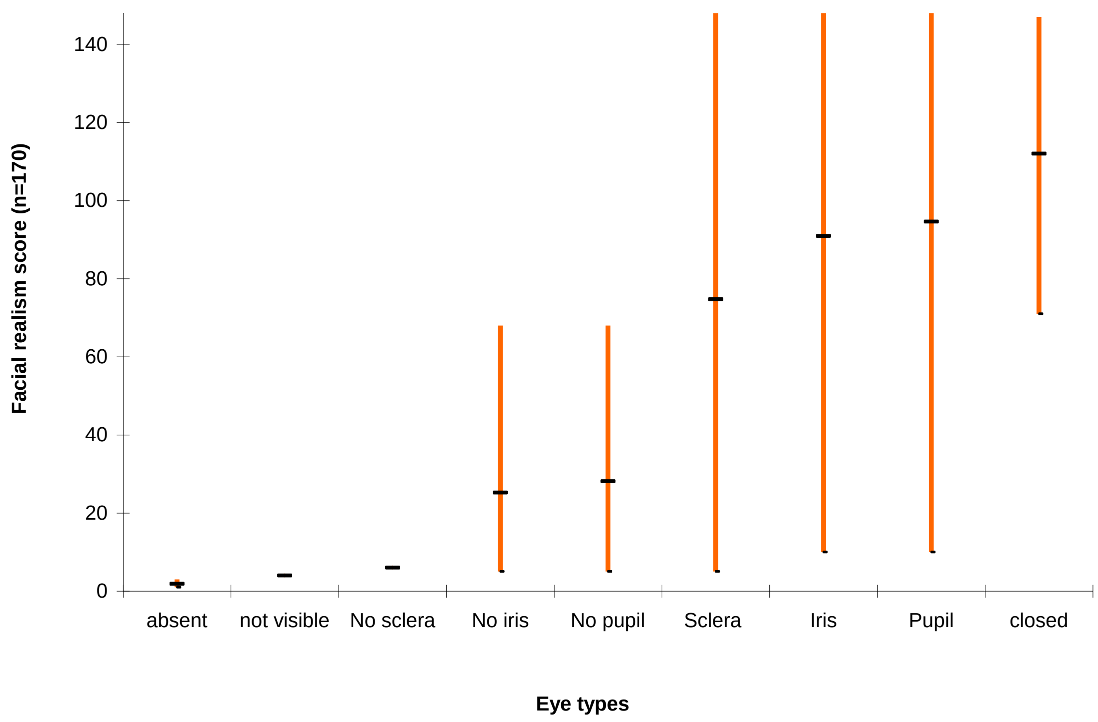

FIGURE 4.33 A graph showing the facial realism average scores for the identified eye types with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

The low FR averages and score range for both the absent and not visible eye categories indicate that there is an importance placed on the eyes which differ from other facial features. The results from the colour schemes show that the monochromatic representations with inserted eyes were judged very highly when compared with the monochromatic representations and the only difference between the two categories were the inserted eyes. Combine this information with the very wide score ranges of the sclera (as well as the central placement of the FR average), iris and pupil categories and this shows that the majority of representations have eye details of some form. These current results indicate that the artists as well as the viewers place an importance on the eyes and that they are considered essential to the perceived realism of the representation and are therefore rarely hidden. The representations that have closed eyes are confined to the more realistic scores and are only found in detailed representations, indicating that the closed eyes need to be included with extra facial details in order to maintain a realistic quality. When certain eye details are lacking, such as the iris and/or pupil, those representations are confined to the lower facial realism scores. This differs from absent eyelashes and scalp hair which have really large score ranges, eyebrows also have a score range that covers the lower half of the scale, while only the basic representations are missing eyebrows, which indicate that they are not as essential as the eyes are to the realism of the representations in this study.

Several eye finishes were also identified in the sample (Figure 4.34). The score for the moulded and paint wash eye category was 9 for the minimum, maximum and FR average. Moulded eyes gave a score of 33 for the FR average with a minimum score of 5 and a maximum score of 68. The painted eyes had a FR average of 90 with a score range from 10 to 131. The inserted eyes had a FR average of 113 with a minimum score of 19 and a maximum score of 148.

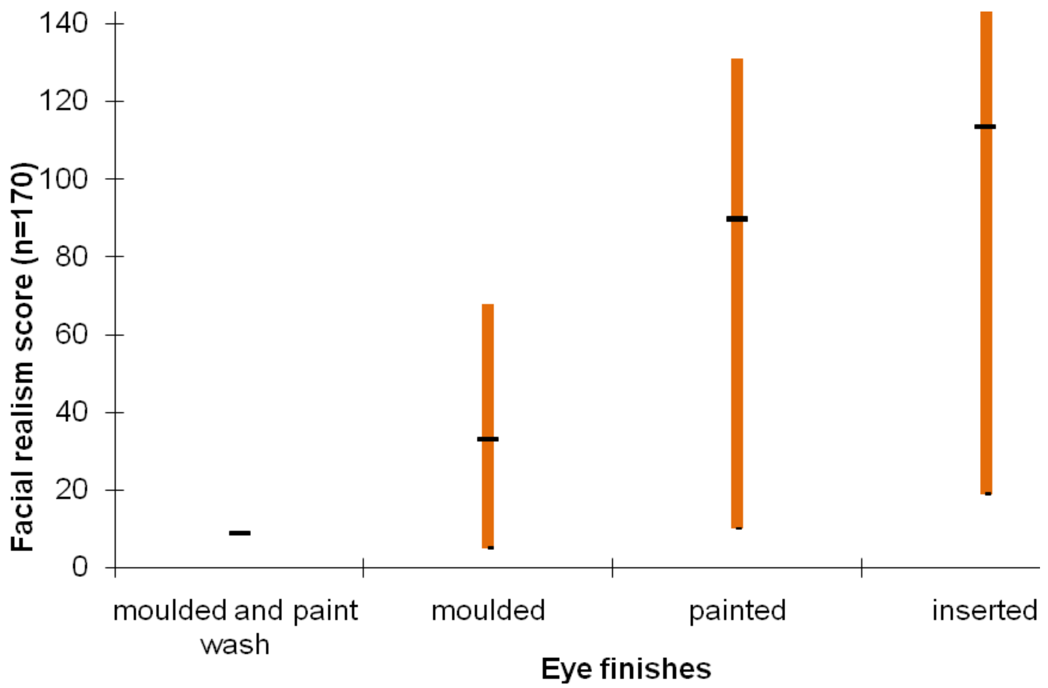

FIGURE 4.34 A graph showing the facial realism average scores for the identified eye finishes with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

The painted and inserted eyes were those with the most details (i.e., sclera, iris and pupil) and these both have high FR averages in relation to their score ranges, with the inserted eyes being considered more realistic than all other eye finishes.

Eye colours consisted of eight of the nine identified overall colours (Figure 4.35). The mottled eyes had a score of 5 for the FR average, minimum and maximum scores. Those with brown eyes had a minimum score of 6 with maximum score of 9 giving a FR average score of 7. The representations with wood grain coloured eyes had a score of 8 for the minimum, maximum and FR average scores. Grey eyes had a FR average score of 9 with a range from 6 to 18. Those with white eyes had a minimum score of 7 and a maximum score of 68, giving a FR average score of 34. The terracotta eyes had a FR average score of 38, with a minimum of 14 and a maximum of 61. The representations with metallic eyes had a minimum score of 35 with a maximum score of 65, while the FR average was 57. The naturalistic coloured eyes had a FR average of 105 with a range from 10 to 148.

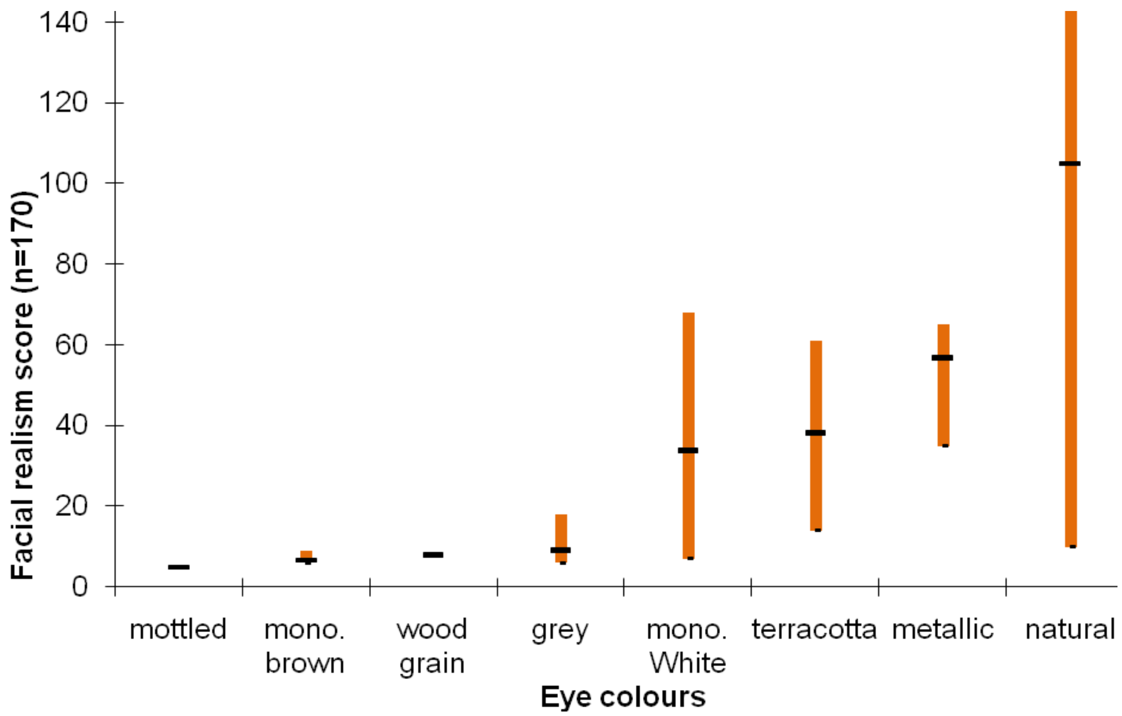

FIGURE 4.35 A graph showing the facial realism average scores for the identified eye colours with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

As with the colours identified in the other facial features, the naturalistic coloured eyes were considered to be the most realsitic of all the colour categories. The only artificially coloured representation that did not have eyes was the black one. All other categories had at least one representation with eyes, again indicating the importance of the eyes.

FACIAL HAIR

Facial hair, when present came in a range of finishes that were placed at various stages along the realism scale (Figure 4.36). Moulded and painted facial hair had a FR average score of 6, in a range of scores from 5 to 9, whereas, carved facial hair had a score of 8 for the minimum, maximum and FR average scores. Facial hair that was moulded had a minimum score of 28 and a maximum score of 64 with a FR average of 45. The representations with no facial hair were a large group and the score range was from 1 to 147 with a FR average of 59. A score of 82 was recorded for the category of facial hair that had a mix of individual hairs and paint, for the minimum, maximum and FR average. The facial hair that was painted had a FR average of 96, with a minimum score of 70 and a maximum score of 139. While, the facial hair consisting of individual hairs had a FR average of 113 with a minimum score of 81 and a maximum score of 148.

Facial hair is one feature that was expected to have a large score range indicating that it was absent throughout the sample as it is secondary sex characteristic in males and would not, therefore, be present in the female or in child representations and this was found in the results. Facial hair made up of individual hairs was found in the most realistic representations, the painted facial hair was also found on the more realistic representations while moulded and carved facial hair was found on the less realistic representations.

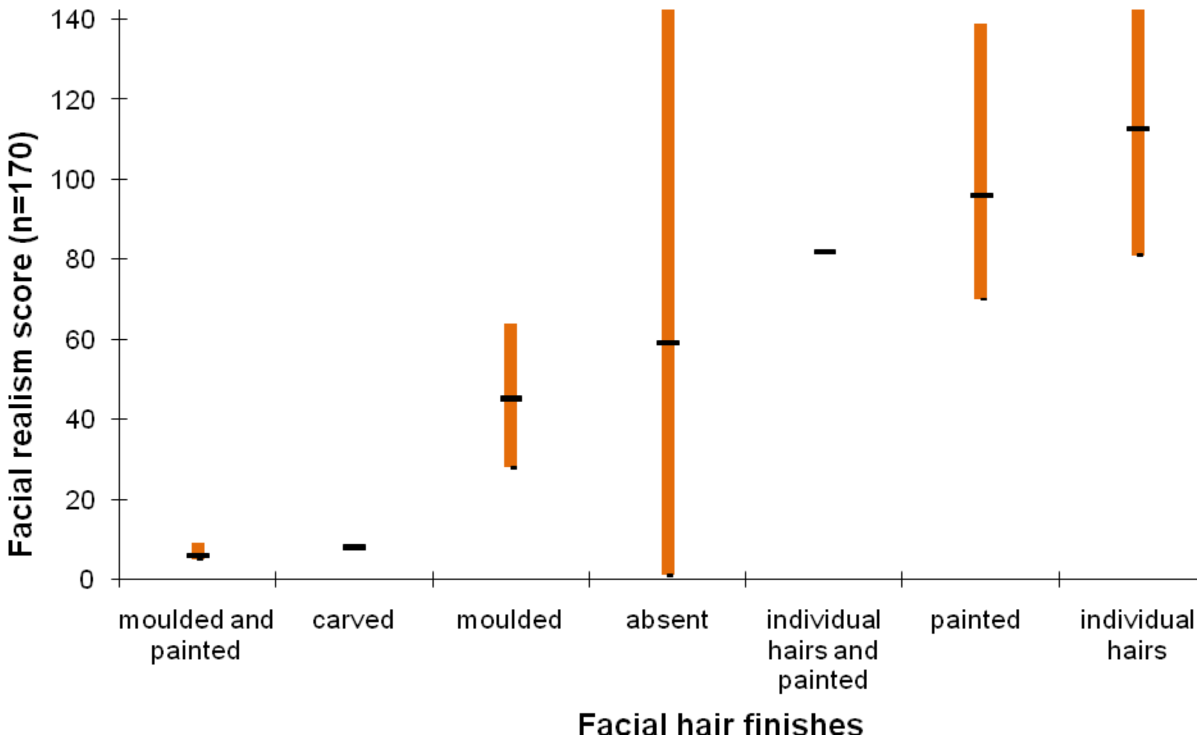

FIGURE 4.36 A graph showing the facial realism average scores for the identified facial hair finishes with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

MOUTH

The realism of the mouth was initially assessed in relation to the types of mouths identified (Figure 4.37). When the mouth was absent it had a FR average of 2, with a minimum score of 1 and a maximum score of 5. Suggested mouths had a score of 6 for the minimum, maximum and FR average scores. Anatomical mouths had a wide score range, from 4 to 148, with a FR average of 77. In the one example that had an obscured mouth there was a score of 102.

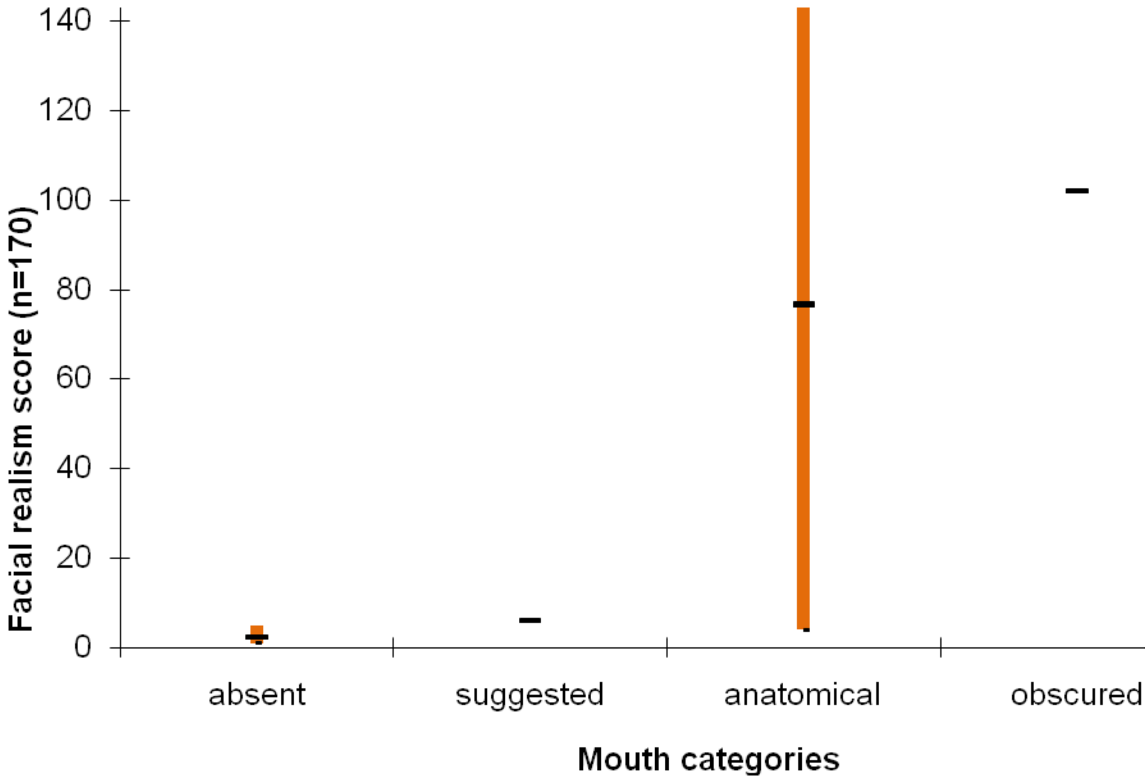

FIGURE 4.37 A graph showing the facial realism average scores for the mouths initially identified in the sample with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

Of the mouth finish types, the carved mouths had a score of 8 for the minimum, maximum and FR average (Figure 4.38). The moulded only mouths had a FR average of 39 and a score ranging from 4 to 93. Mouths that were painted had a minimum score of 10 and a maximum score of 148, which gave a FR average score of 106.

The mouth is another feature that has a very small number of representations in which it is absent. It differs however, from the eyes in that an example of an obscured mouth scored highly on the facial realism scale, this means that if there is a contextual reason to not see the mouth the representation is still perceived as reasonably realistic. The painted mouths scored higher than any of the other mouth finishes.

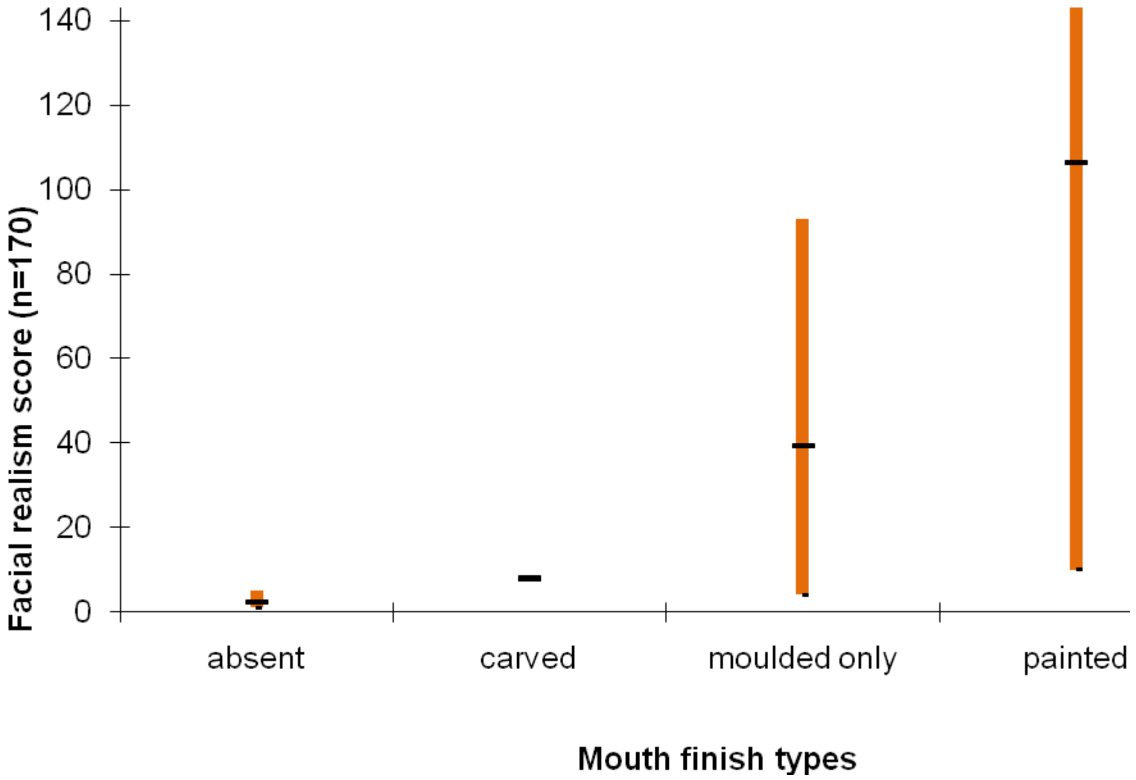

FIGURE 4.38 A graph showing the facial realism average scores for the identified mouth types with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

LIPS

Lip colours consisted of a range of colours, each having a different level of realism (Figure 4.39). The wood grain coloured one had a score of 8 for the minimum, maximum and FR average. A similar score of 9 was found for the brown lips for the minimum, maximum and FR average scores. Grey lips had a FR average of 32, with a minimum of 13 and a maximum of 66. White lips had a FR average of 33 with a range of scores from 4 to 68. The terracotta lips had a higher FR average of 39 with a minimum score of 14 and a maximum score of 61. Metallic lips came in at a FR average of 57 with scores ranging from 35 to 65. The lips that were painted cultural colours had a minimum score of 19 and a maximum of 127, the FR average was 81, where as the example that was skin colour rather than lip colour had a FR average of 93, with the same number for the minimum and maximum score. Naturally coloured lips had a score range from 10 to 148 with a FR average of 108.

There was a new colour category identified in the lip colouring as there were examples of culturally coloured lips in the sample indicating the use of lipstick or body paint. The representations in this category were on average judged to be more realistic than the artificial colours. There was also an example of skin coloured lips; lips the colour of the face so there was no colour differentiation between the skin and the lips. The facial realism score for that representation placed it between the cultural and naturalistic colour categories based on the FR average scores. The naturalistic colours were again judged to be the most realistic.

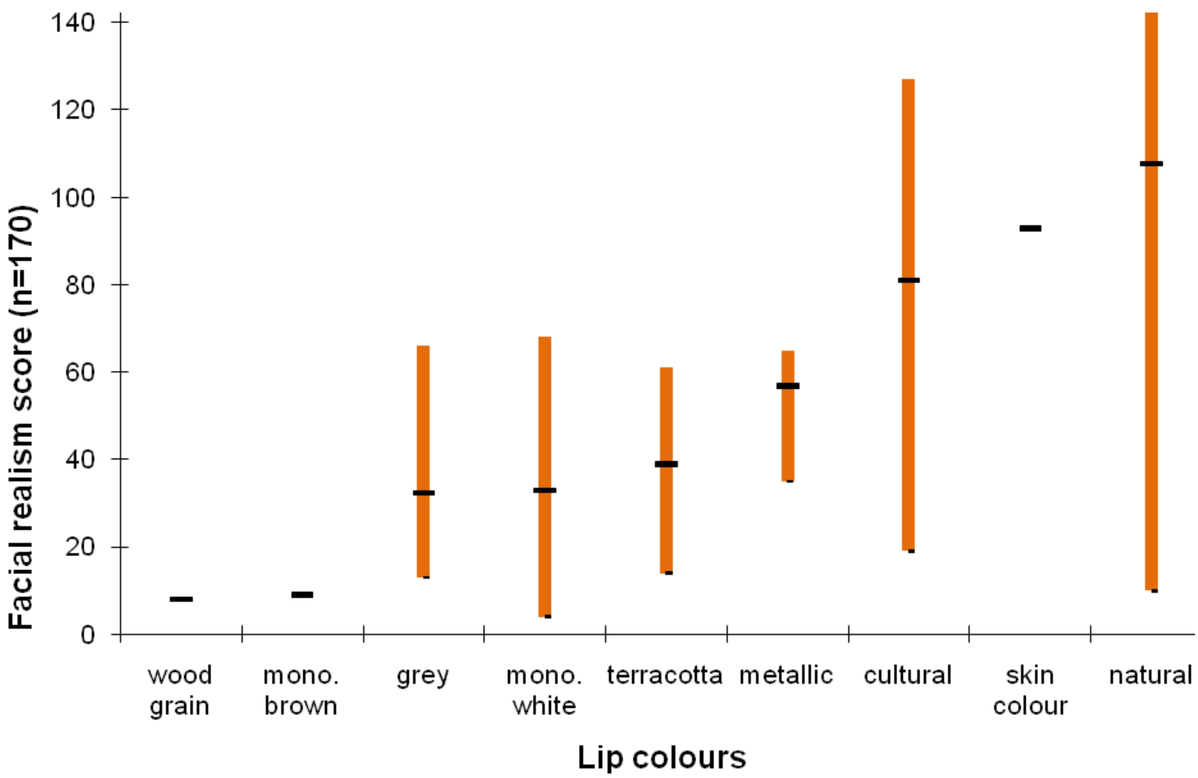

FIGURE 4.39 A graph showing the facial realism average scores for the lip colours with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

A further characteristic was found to be shine on the lips (Figure 4.40). The lips with no shine on them had a FR average of 74, with a minimum score of 4 and a maximum score of 148. Those with shine had scores ranging from 94 to 133, with an FR average score of 114. This meant that, although, the most realistic of the representations did not have lip shine, this morphological characteristic was confined to representations of a reasonably high level of realism and is only found in the detailed representations.

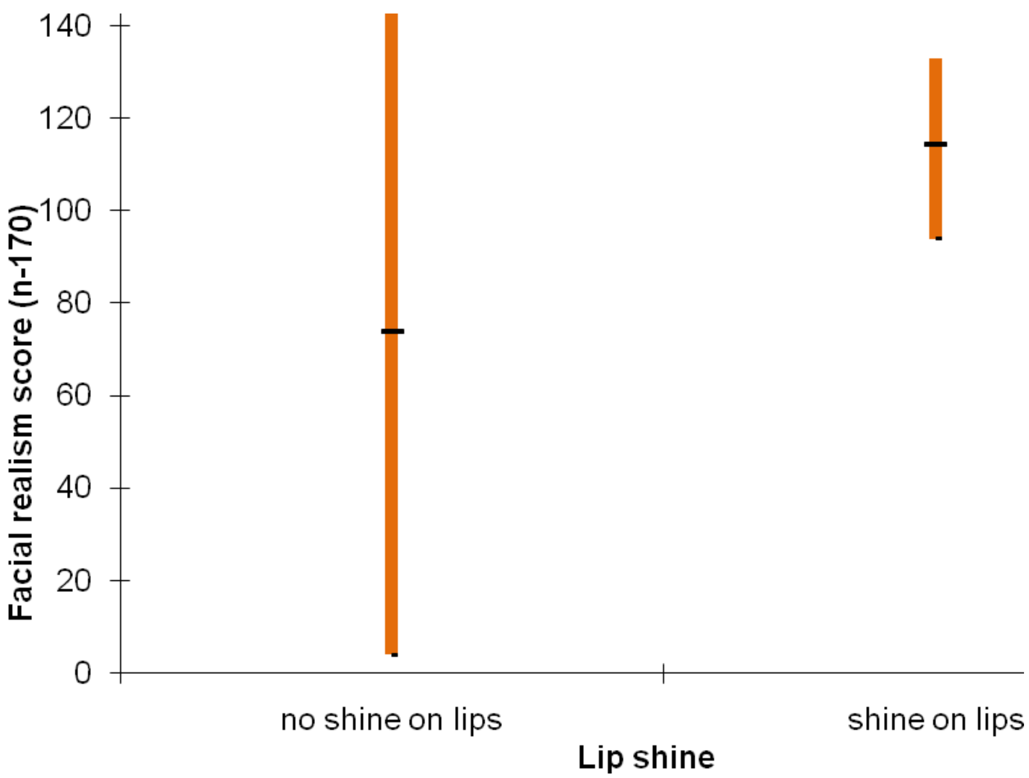

FIGURE 4.40 A graph showing the facial realism average scores for the presence or absence of lip shine with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

MOUTHS OPEN OR CLOSED

Mouths can be open or closed and this gave different levels of realism to the mouths (Figure 4.41). When the mouth was closed the FR average was 72 within a score range from 4 to 148. Open mouths had a FR average of 88 with a minimum score of 10 and a maximum score of 145. In those representations where the mouth was partially obscured the minimum score was 84, the maximum was 90 and the FR average was 87. In comparison when the mouth was absent the FR average was 2, when suggested it was 6 and when totally obscured it was 102.

Representations with their mouths open as well as those with partially or fully obscured mouths were considered to be more realistic than those with their mouths closed.

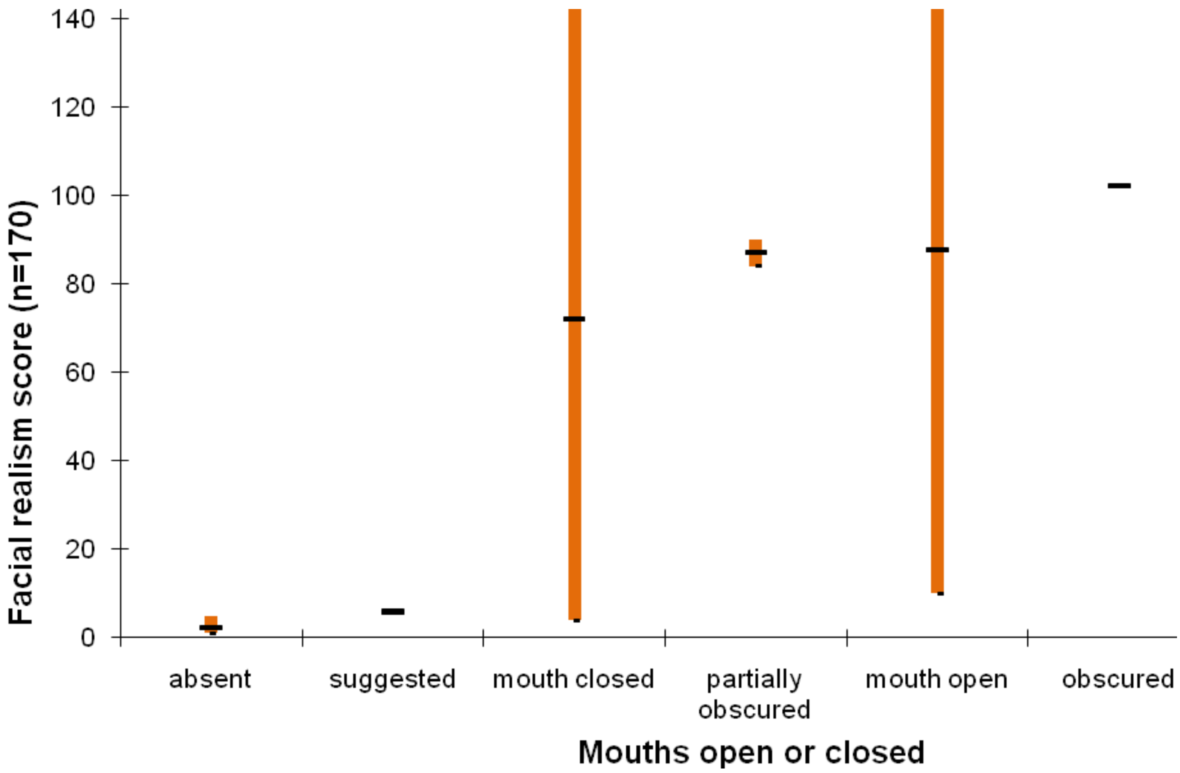

FIGURE 4.41 A graph showing the facial realism average scores for the difference between open and closed mouths with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

TEETH

The width of the mouth opening was not always sufficient to show the teeth (Figure 4.42). When the mouth was open but the teeth were not visible the FR average of these representations was 67 with a minimum score of 12 and a maximum score of 129. Visible teeth had scores ranging from 10 to 145 with a FR average of 99. For comparison purposes closed mouths had a FR average of 72 and open mouths had one of 88.

The representations with open mouths and visible teeth were judged to be more realistic that those that did not have visible teeth. In fact those without visible teeth were judged on average as slightly less realistic than those with closed mouths.

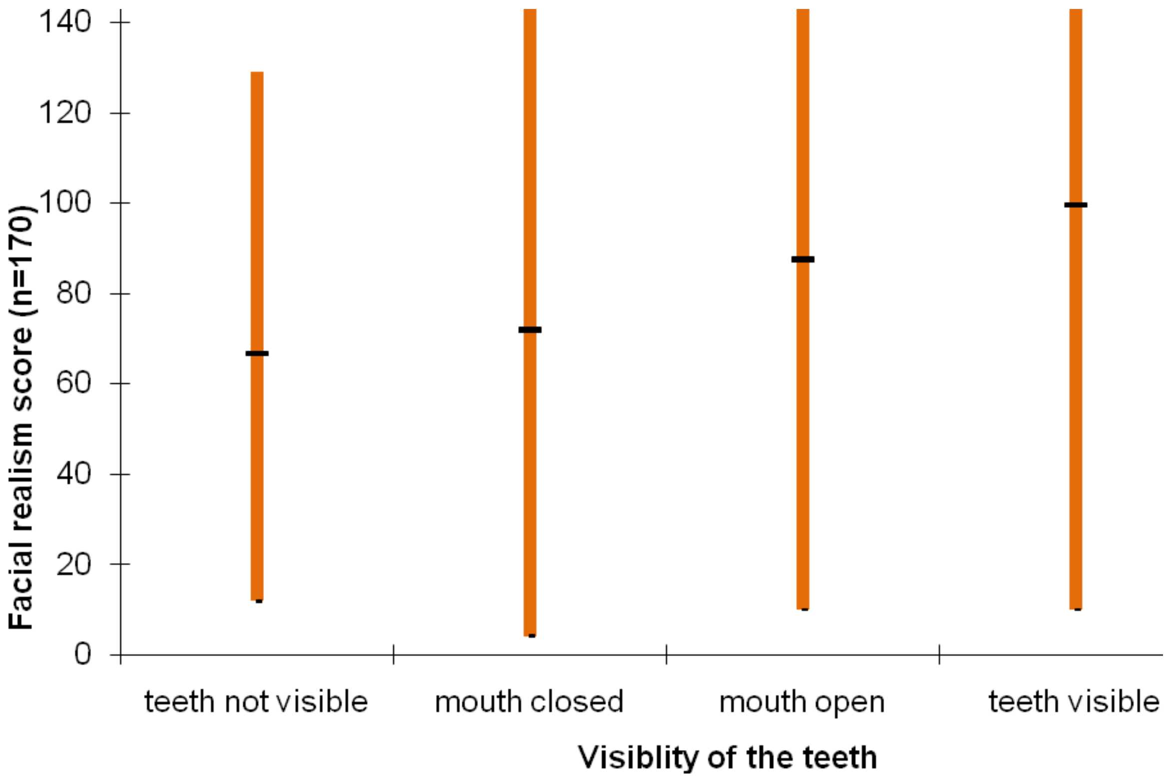

FIGURE 4.42 A graph showing the facial realism average scores for the presence or absence of teeth within the mouth with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

The teeth when visible were found to be in five different colours and these had varying levels of realism (Figure 4.43). The grey representation with grey teeth had a score of 13 for the minimum, maximum and FR average scores. While the one with the monochromatic colour scheme had a score of 29 for the FR average, minimum and maximum scores. The detailed representation with the teeth that were pale pink and white had a score of 81 for the minimum, maximum and FR average scores. Teeth that were maroon in colour, again on a detailed representation had a FR average of 84 with a minimum score of 80 and a maximum score of 88. Those representations with naturally coloured teeth had scores ranging from 10 to 145 and a FR average of 109.

Tooth colour is dependent upon the colour of the rest of the representation’s face. This is illustrated by the white category. Even though the representation was judged more realistic than the one with grey teeth, it was still considered to be fairly unrealistic. Whereas, the naturalistic coloured teeth, in naturalistic coloured faces were considered to be the most realistic. Even those representations with teeth that are not quite naturalistic colours are judged to be above average on the realism scale and are also in naturalistic coloured faces.

For the representations that had teeth there was a difference in perceived realism between those with shine and those that did not (Figure 4.44). The teeth with no shine on them had a FR average of 96, with a minimum score of 10 and a maximum score of 144. Those with shine had a FR average of 119 within scores ranging from 94 to 145. This indicates that the differences in the FR averages between having shine on a representations teeth and not having shine is not great.

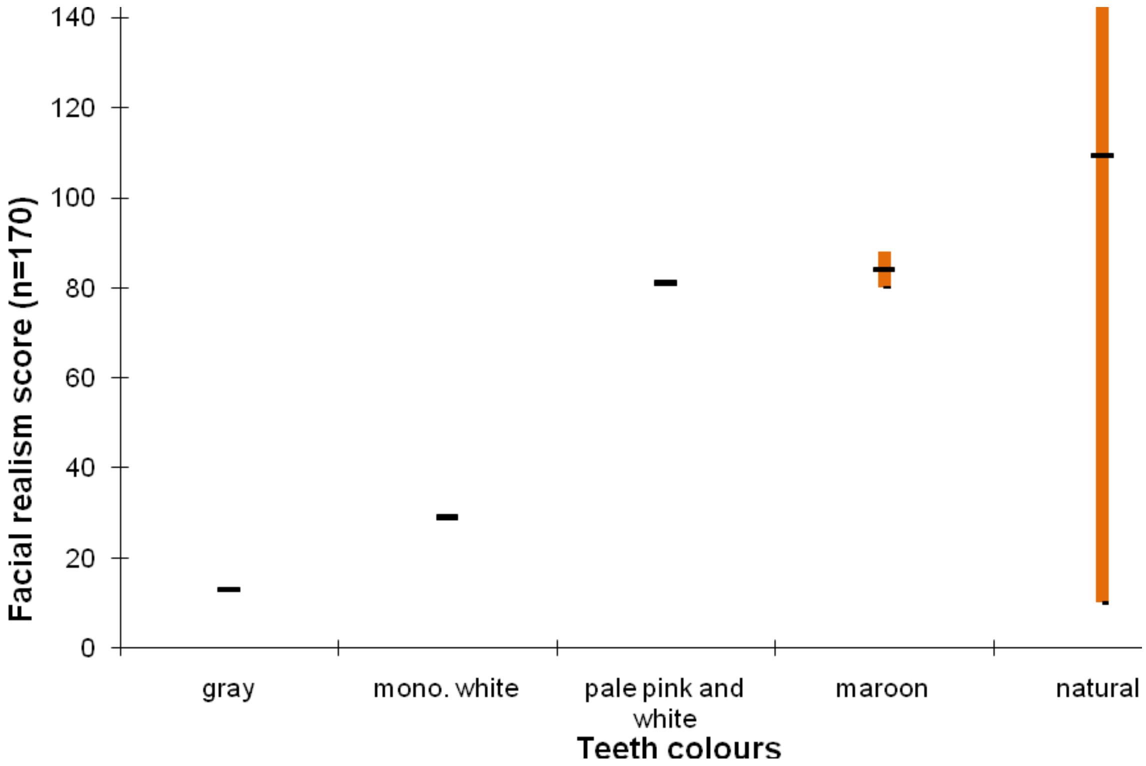

FIGURE 4.43 A graph showing the facial realism average scores for the colour of the teeth with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

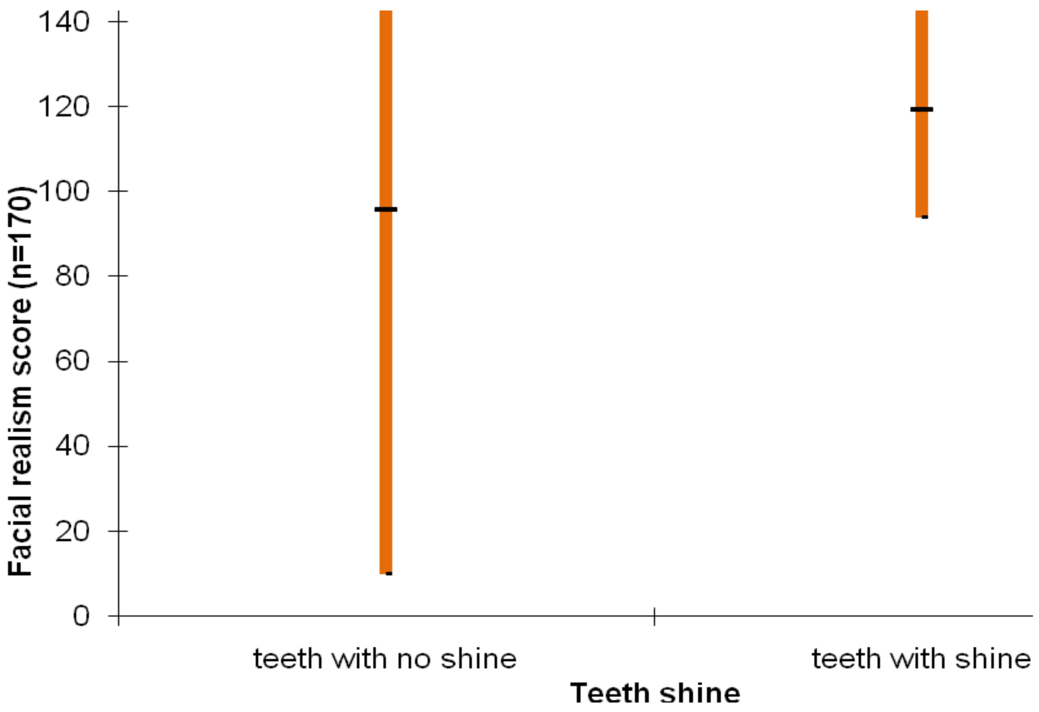

FIGURE 4.44 A graph showing the facial realism average scores for the presence or absence of shine on the teeth with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

ORAL CAVITY

The realism of the oral cavity was assessed in relation to how visible the cavity was within the mouth (Figure 4.45). When the mouth was open but the oral cavity was not visible, the FR average was 76 and the minimum score was 12 and the maximum was 145. For comparison purposes the FR average for the mouth being open was 88. A suggested cavity gave a FR average of 102 within scores ranging from 80 to 133. The actual cavity being observable had a minimum score of 10 and a maximum score of 138, with a FR average of 106. These results indicate that having either a visible or a suggested oral cavity is on average more realistic in a representation than just having visible teeth.

As with the teeth the mouth was not always open widely enough to give a view of the oral cavity and in some representations they were positioned in such a way (behind glass for example in a diorama) that the cavity was not visible although it was suggested.

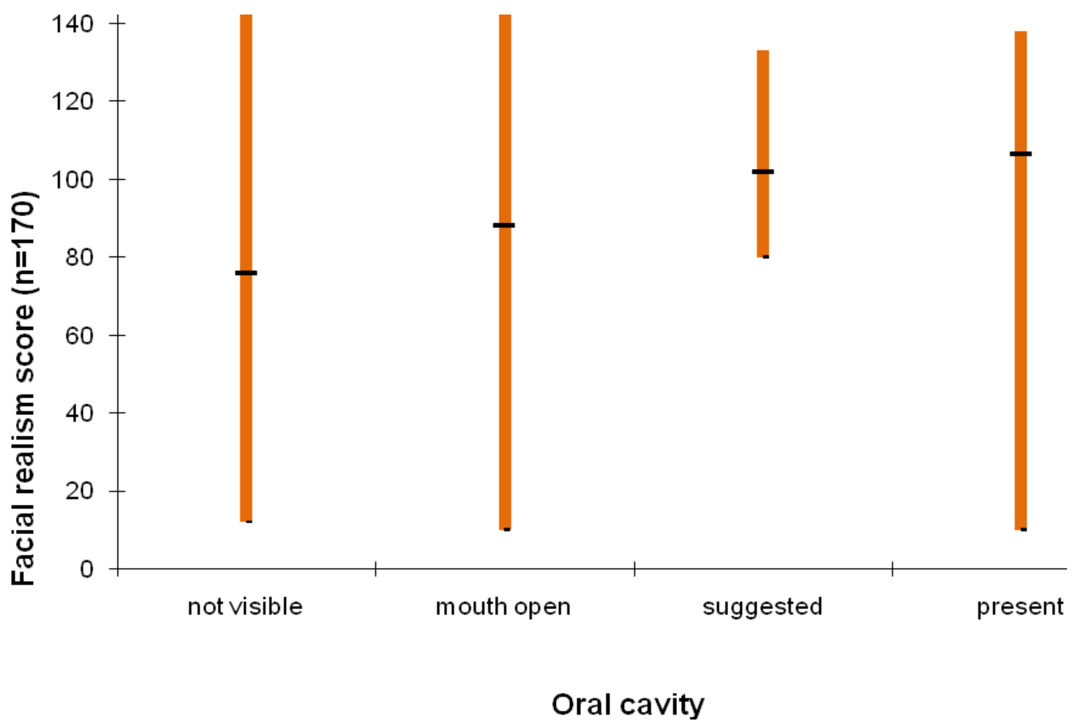

FIGURE 4.45 A graph showing the facial realism average scores for the oral cavity with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

The oral cavity was coloured, in shadow or an actual cavity rather than contained by the internal anatomical stuctures of an actual oral cavity and these different treatments had various levels of percieved realism (Figure 4.46). When the oral cavity was in shadow the FR average was 83 with a minimum score of 10 and a maximum score of 130. The one detailed representation that had an internal cavity not constrained by anatomical structures had a score of 83 for the minimum, maximum and FR average scores. Those representations with white oral cavities had a minimum score of 80 and a maximum score of 117 with a FR average of 103. The naturally coloured oral cavities had a FR average of 113 with a minimum score of 81 and a maximum score of 138.

As the oral cavity is an actual cavity, the colours were not always visible due to the lighting on the representation. This does not, however, seem to have impacted greatly on the realism of the representations that had them. The FR average score for all four categories in this section was above average on the facial realism scale. Only the in shadow category had representations in the lower half of the scale.

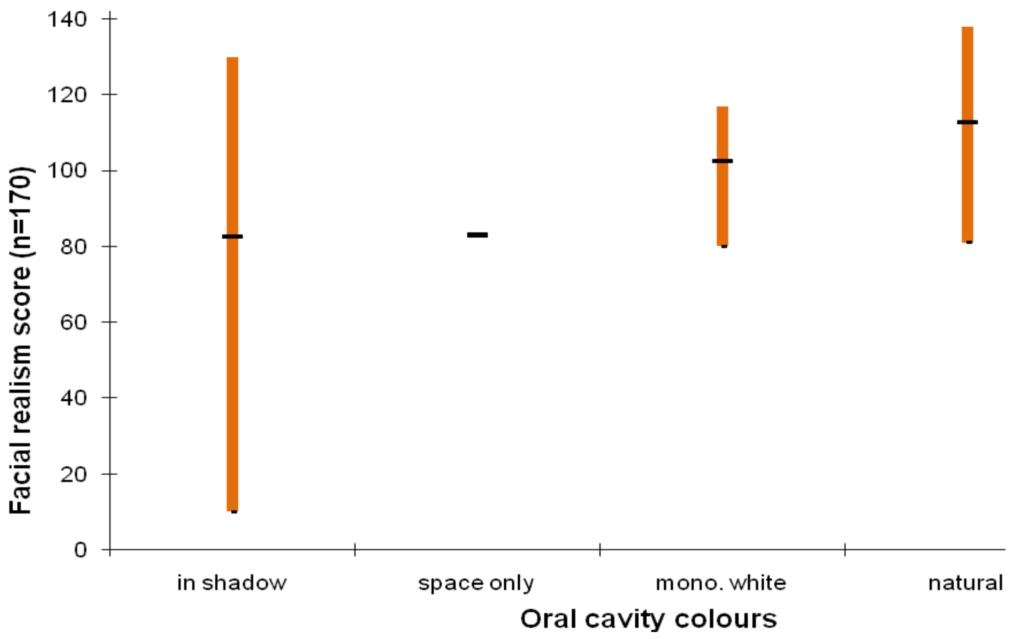

FIGURE 4.46 A graph showing the facial realism average scores for the colours of the oral cavity with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

TONGUE

The tongue had limited variables to affect it within the sample and these variables had differing levels of realism (Figure 4.47). In order to compare importance of realism, the open mouth had a FR average of 88, the presence of the tongue, however, gave a FR average of 80 with a minimum score of 10 and a maximum score of 125. When the tongue was not visible the FR average was 76 within scores ranging from 12 to 145. When the tongue was present in the sample the scores were the same as those for the tongue being naturally coloured.

The tongue differed from the other facial features visible in the open mouth of a representation. The FR average for it visible (and naturally coloured) or not visible were less than when the mouth was open, in fact some representations that did not have a visible tongue scored higher than those that did.

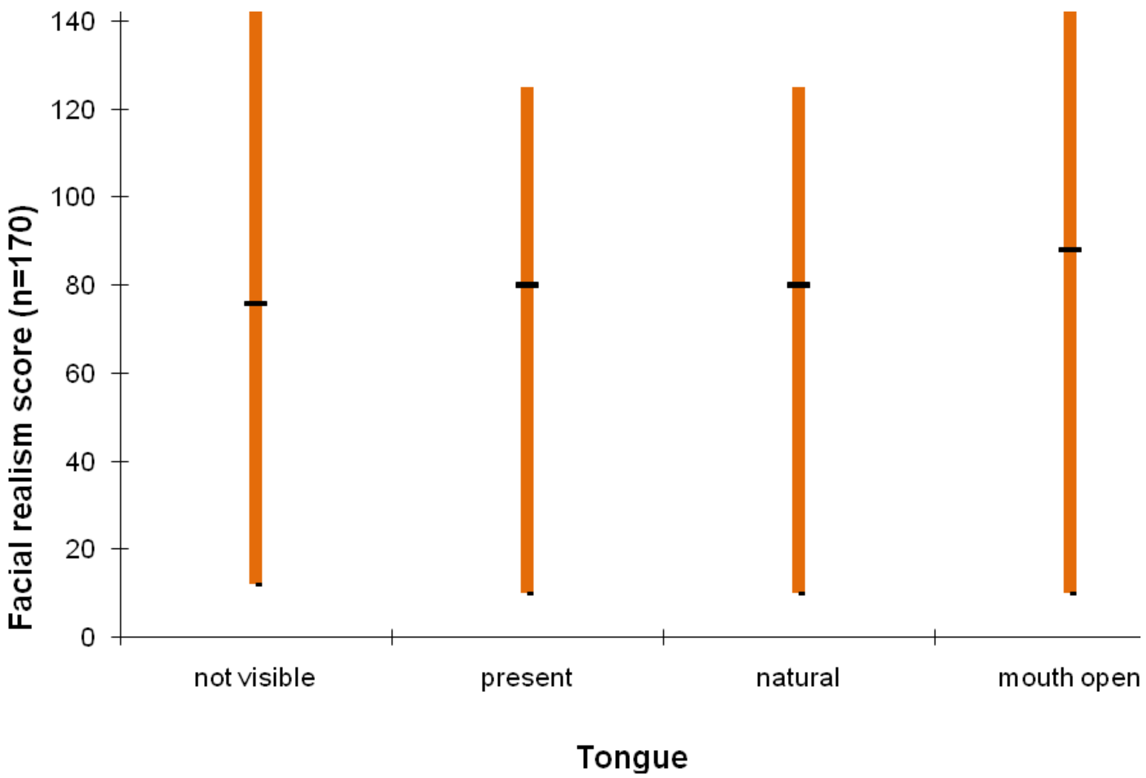

FIGURE 4.47 A graph showing the facial realism average scores for the presence or absence of the tongue as well as the tongue colour for the sample with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

Other Considerations

This study has just been confined to actual characteristics of the face and has not included external influences to the display of the representation or the inclusion of full body finish characteristics that may also influence the realism of the representation. These other considerations include the distance between the representation and the viewer as barrier type displays prevent close observation of the details of the representation. These barrier displays include vitrines (glass display cases), contextual displays with artefacts or obstructions (such as glare reflected off the display case) placed between the representation and the viewer, the representation placed within a vehicle, bars or ropes and bollards limiting access to the display. Atmospheric conditions also influence the perception of the representations and may be designed specifically to increase the believability and therefore the realism of the representation. Specific lighting designs especially when combined with audio and also the use of smoke machines, depending upon appropriate context, all increase the realism of the scene surrounding the representation.

One example of the difference lighting plays in increasing the believability of the representation within the display is an example from the Dover Museum, Dover, England in the Bronze Age Gallery (Figure 4.48). This technique is commonly used at Madame Tussauds in London as well, and as the faces are known and easily recognisable the difference in realism between photographs of representations both with and without a flash are easily discernable.

Other aspects of an exhibit can also increase the realism of a display; these include the costuming of the representation, the way it is positioned within the exhibit and its actual posture or stance as well as associated contextual information. One example of this was an exhibition of the first landing on the Moon at the Haus der Natur in Salzburg (Figure 4.49). This was an extremely realistic exhibit and yet nothing of the actual representation was visible due to the spacesuit it was wearing.

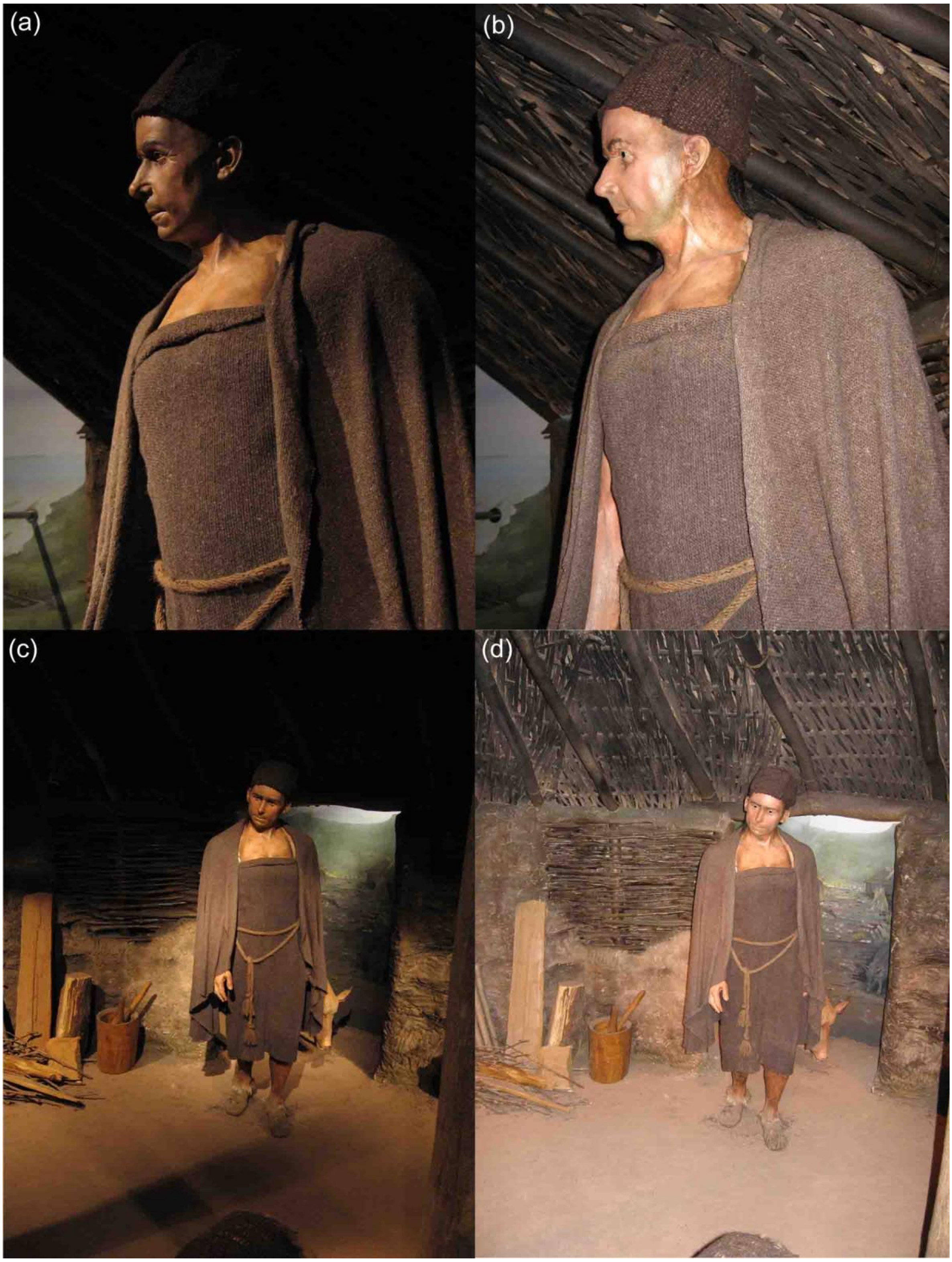

FIGURE 4.48 A Bronze Age man at the Dover Museum, Dover, England, showing the difference that lighting can make in relation to the realism of a figure: (a and c) the exhibit lighting in comparison to (b and d) where the camera flash eliminates the shadows caused by the specific exhibit lighting.

FIGURE 4.49 A example of an extremely realistic exhibit at the Haus der Natur, Salzburg, where the representation is not visible.

CONCLUSIONS

This was a pilot study originally intended to determine the logistics of this type of study, assess the results and to determine if the European results were applicable to the Australian sample. This has led to some observations on the study itself and they are; that the original sample was too ambitious for the scope of the study and that facial familiarity increases the perceived realism of the face. It must also be acknowledged that this study was highly subjective as it was based on one person's assessment of photographs, when contextual information had also been seen and/or read, and in cases of atmospheric effects, felt, although, time has assisted in this process. The judgement of the facial realism of the European sample was conducted immediately after the data collection trip in 2006. Assessment of the features was then conducted and the individual features that influenced the realism of the representations were identified. During this time analysis for other studies reported in this thesis were undertaken. These other studies included the Australian sample. This meant that the familiarity with the Australian sample as well as the knowledge of the features that increase the level of realism would influence the results if that sample was also included in this study. Due to these reasons, this pilot study was limited to the European sample in this study and the study in the following chapter. Facial familiarity has been shown to influence results in studies based on facial processing (Marzi and Viggiano 2007). The experience gained from this study, however, can be used as the basis for further research into this subject. It would be interesting to apply this realism concept to a wide ranging group of people (for example museum visitors, police, university students, artists) with different observational skills to determine if these diverse groups judge the sample differently and focus on other features to differentiate between the faces in terms of realism. A smaller sample size based on the results of this study would make a study more manageable for assessors, constrain score ranges and remove bias due to the repetition of particulars such as, for example, the colour of representations and features.

The number of details and morphological characteristics focused on in this pilot study was limited to the major features. Other details such as presence/absence of individual variation, for example, freckles, wrinkles, moles, hairline, tonal variation in skin and hair colour, the presence/absence of veins in the eyes, the positioning of the iris in regard to the palpebral fissure, etc., could also be included in this type of study.

That being said, there are several conclusions to be drawn from this study. There are varying and distinguishable degrees of realism present in the *Homo sapiens* representations in this study. This realism is in part dependent upon the finish used as well as the morphological characteristics and the amount of detail included in the faces of the representations. It must also be noted that the more realistic the representation, the more difficult it is to determine a difference between them in the degree of realism.

Blanks are the least realistic of the representations due to their lack of features. This makes them anonymous and quite generic, although as seen from the example in Chapter 3 (Page 168–169) this can also be achieved through the repetition of the same representation/s in a series. A simple addition of a wig improves the realism of blanks. If only a suggestion of facial details is made it enables the representation to be generic, representing anyone or everyone whereas the addition of precise facial features turns a representation into an individual. The amount of detail present in each feature, the type of finish used and the colouring of the representation all influence the degree of realism. They are not weighted equally, however, as specific features, finishes and colours are considered to add a higher or lower level of realism to the representation. The main facial features that were identified as important to realism were; the eyes (sclera, iris and pupil) open or closed, the mouth and if it is open with visible teeth and either suggested or visible oral cavity preferable with shine on the lips and teeth, inserted individual eyebrow and eyelash hairs, and naturalistic colouring of upper and lower eyelashes.

Examples of this different value placed on characteristics are that mottled coloured faces are on the whole less realistic than those of a uniform colour, especially when those colours are similar to those of sculptures (white, terracotta and metallic). Closed eyes are preferable to eyes without an iris or pupil. Very few representations lack eyes or mouths, whereas details such as eyelashes or tongues are less likely to be included on the representation and do not necessarily increase the perceived realism. Naturalistic colouring of the face is important but it must be believable otherwise it detracts and lowers the amount of realism. Light reflecting in the eyes of a representation, as in the case of those with inserted eyes, increases the perceived realism of the face along with lip and tooth shine as it mimics a living human.

The importance of the eyes in a representation is shown in the limited number of representations that are missing this facial feature (Brooks and Kemp 2007). This is also reinforced by the facial realism score that the monochromatic faces with inserted eyes had in comparison to monochromatic representations also identified as "basic faces". Having incorporated eyes into a representation allows the visitor to make eye contact enabling them to 'connect' with the representation simulating actual human contact. It is this behaviour that helps us to ascribe individuality and personality to a representation that is essentially an inanimate object. This in turn assists in the perception or illusion of realism and believability. This value placed on the eyes is not just social or cultural, there is a neuroanatomical basis as eye processing develops fully in children earlier than facial processing (Taylor *et al.* 2001).

While this discussion on individual characteristics gives insight into the importance or lack of importance of specific characteristics, it does not relate back to the realism scale and the actual representations in the sample. Therefore, a summary of characteristics found in the most realistic of the representations, the top 10% was compiled to define which morphological characteristics were found in common amongst these particular representations (Table 4.38). This sub–sample was arbitrarily chosen based on decimal system.

This 10% of the sample consisted of 15 detailed representations, 4 female and 11 male with FR scores of 134–148. There was one male child in the sample and the rest were adults. All of them had a natural colour scheme which meant that scalp hair, eyes, eyebrows, and mouths, as well as eyelashes, facial hair and teeth (when present) were all naturally coloured. Scalp hair consisted of individual hairs and was present in all, except for one representation wearing a helmet. The majority had inserted eyes, and all of them had eyebrows of individual hairs which were generally inserted into the representation. Interestingly none of the 15 representations had shine on their lips and only 3 had open mouths. Both sets of lashes were only found on 5 representations and 7 had no lashes at all. The majority of males had facial hair and in most cases it consisted of individual hairs. When the mouth was open, the teeth were visible in all three representations; however, only one had shine on the teeth. The oral cavity was only present in one of the representations, and no tongue was visible in that example.

TABLE 4.38 A summary of the morphological characteristics of the most realistic 10% of the sample, FR numbers from 134–148, ordered with the most realistic (FR148) at the top of the table. See Appendix E for details on the museums and countries that the representations are from.

Number	Reconstruction name or description	Sex	Age	Detailed facial features and natural colour scheme	Scalp hair, individual hairs, natural colour	Inserted eyes	Eyebrows present and all natural colours	Eyebrows	Anatomical mouth, painted lips, naturally coloured with no shine	Lower lashes present, natural colours	Upper lashes present, natural colours	Eyelashes of individual hairs and naturally coloured	Has facial hair	Facial hair consists of individual hairs	Mouth open	Oral cavity visible, natural colour, no tongue	Teeth visible and natural colour	Teeth with shine
E157	Worsley man	M	A	1	1	1	1	inserted	1	1	1	individual hairs	1	individual hairs				
E333	Trintje	F	A	1	1	**	1	inserted	1		1	fake lashes						
E229	Modern man	M	A	1	1	1	1	inserted	1									
E023	Cro–magnon man	M	A	1	1	1	1	inserted	1		1	inserted hairs	1	individual hairs	1		1	1
E232	Cro–magnon male	M	A	1	1	1	1	inserted	1				1	individual hairs	1		1	
E155	Phillip	M	A	1	1	1	1	inserted	1	1	1	individual hairs	1	individual hairs				
E334	Sensaos	F	A	1	1	1	1	inserted	1	1	1	fake lashes						
E335	Janus	M	A	1	1	1	1	inserted	1		1	fake lashes						
E299	Yde girl	F	A	1	1	1	1	inserted	1	1	1	inserted hairs						
E096	Roman soldier	M	A	1	*	1	1	painted	1				1	painted				
E123	Viking in boat	M	A	1	1	***	1	painted	1				1	individual hairs	1	1	1	
E150	Wood worker	M	A	1	1	1	1	painted	1									
E033	Underwater artist	M	A	1	1	1	1	piece	1				1	individual hairs				
E300	Marcus van Eindhoven	M	C	1	1	1	1	inserted	1	1	1	inserted hairs						
E233	Woman	F	A	1	1	1	1	inserted	1									
Total				15	14	13	15		15	5	8		7		3	1	3	1

*Scalp hair not visible due to the headwear on the representation, however, if the scalp hair was visible it is assumed that it would be naturally coloured.
**Representation has closed eyes, however, if the representation had open eyes, it would have had inserted eyes as with other examples by the same artist.
***Not able to determine if representation has inserted eyes, but it is probable that it does.

This summary shows that there are other factors that need to be taken into account when discussing the finishing techniques used on human representations. This is shown in three of the most realistic representations having painted eyebrows and one having painted facial hair, whereas the others had individual hairs (generally inserted into the representation). If the artist has a high level of skill then painted details are still found to be highly realistic. Other relevant variables, apart from the skill level of the artist/creator, are the skill level of the design team, the requirements of the exhibition designer or museum, and economic factors. Some of the artists that create the representations (mainly of the facial reconstruction type) undertake the entire process, including finishing off the representation and maintaining control over the final look of the representation. Other artists finish the face to a certain stage then the representation is 'finished' by another artist or company, or the museum arranges for it to be finished to their requirements and specifications. This can result in the finished product not being what the original artist intended. One example of this is the facial reconstruction of Mrs Getty at the Corinium Museum, Cirencester, England. The head of Mrs Getty was completed by one artist so that she would be presented in an upright position with her eyes open, and a design company attached it to a body. The final presentation of Mrs Getty is of her as she would have been when buried in her coffin surrounded by grave goods. This means that the final product looks odd, although the viewer is not quite sure why, subconsciously it is perceived that the face looks different between being vertical and horizontal due to the effect of gravitational forces on the soft tissues of the face. A second example is Trintje, another facial reconstruction on display at the National Antiquities Museum, Leiden, Netherlands. It is also presented as deceased and was made with that intention, she therefore looks more realistic within her context.

Realism is not based on details in isolation: a representation is a collection of details within a given display context. The positioning of the representation also influences the viewer, as does its posture, clothing and the things exhibited with it, all of which add or subtract from the believability of the representation. The amount of face visible also plays a part in the perceived realism of a figure. For example in the moon landing exhibit, the representation does not necessarily need to be visible for the exhibit to be highly realistic. If the face is not visible then the body of the representation is used by the viewer to make sense of the representation. If the actual representation is not visible than the context in which it is displayed needs to contain all information needed to make sense of the exhibit. Conversely the more of the face visible the more information is needed to create a realistic representation. This is shown with the low realism scores for the blank faces (FR1–3) and that the most realistic faces (FR68–148) all consisted of detailed faces.

Even with all of this information, how a representation is perceived will still depend upon the individual viewing it. Their perception will be based on the amount of detail subconsciously observed which means that it will be affected by the age and sex/gender of an individual, their prior knowledge about the topic of the exhibit as well as any cultural biases. This can be illustrated by the way different people reacted to various representations. Examples were previously given; that of the little girl who was too scared to enter the gallery at the Dover Museum, Dover, England, because of the representations that she could see, and a woman who complemented the Jorvik Viking Centre, York, England, on the 'actors' in the Viking village, which were actually representations. Another example concerns Mrs Getty; children (approximately 10 years of age) were heard to ask if she was an actual person and was she really dead. The differentiation between the perceptions of these individuals can be associated in part to how they have 'read' the representations faces as maturation influences facial processing abilities (Taylor *et al.* 2004; Taylor *et al.* 2001).

This indicates that it is not the just the lack of or the inclusion of a particular facial feature that is important but the associated contextual information (as discussed previously and in Chapter 3), as well as the overall finish. What this study gives us is an understanding of which features when combined can increase or decrease the amount of visual realism perceived in an *H. sapiens* representation.

REFERENCES

Brooks KR, and Kemp RI. 2007. Sensitivity to feature displacement in familiar and unfamiliar faces: beyond the internal/external feature distinction. Perception 36:1646-1659.

Coffee K. 1991. The restoration of the Haida canoe life group. Curator 34(1):31-43.

Coleman M. 1995. Mannequins with a twist. Rolling Stone. p 18.

Marzi T, and Viggiano MP. 2007. Interplay between familiarity and orientation in face processing: An ERP study. International Journal of Psychophysiology 65(3):182-192.

Phillips DC. 1995. The Good, the Bad, and the Ugly: The Many Faces of Constructivism. Educational Researcher 24(7):5-12.

Russell L. 2001. Manikinned displays. In: Rasmussen C, editor. A museum for the people; a history of Museum Victoria and its predecessors 1854-2000. Melbourne: Scribe Publications. p 209-212.

Sherrow V. 2006. Encyclopedia of hair: a cultural history. Westport, Connecticut: Greenwood Press.

Snider JG, and Osgood CE, editors. 1969. Semantic differential technique: a sourcebook. Chicago: Aldine Publishing Company.

Taylor MJ, Batty M, and Itier RJ. 2004. The faces of development: a review of early face processing over childhood. Journal of Cognitive Neuroscience 16(8):1426-1442.

Taylor MJ, Edmonds GE, McCarthy G, and Allison T. 2001. Eyes first! Eye processing develops before face processing in children. Neuroreport 12(8):1671-1676.

ONLINE REFERENCES

CelebrityFix. 2010. Wax figure or real star? [on–line]. Available from: http://celebrities.ninemsn.com.au/slideshow.aspx?sectionid=5961&sectionname=slideshow&subsectionid=76343&subsectionname=wax [Accessed 20 October 2010].

5

THE OVERALL FINISH AND BODY PROPORTIONS OF THE EARLIER HOMININ REPRESENTATIONS

The earlier hominin representations differ from the *Homo sapiens* representations in that their external appearance is at best, a guesstimate. It is, however, their external appearance that is essential to the presentation of information about these earlier hominins to the general public to ensure that it is in an understandable form. This type of visual presentation is commonly used to illustrate extinct life forms such as dinosaurs and megafauna as it is easier to understand an image than written descriptions or to mentally extrapolate the external soft tissue form from skeletal remains which are often fragmentary. The illustration of extinct species in this way is essentially a form of scientific publication as it is a way to visualise and impart scientific theories (Berge and Daynes 2001; Moser 1992).

Determination of the body morphology (shape, proportions etc.) of *Homo sapiens* representations is relatively easy to do as they can be compared to contemporary populations as a guide. In Western societies for example, the human shape is so familiar visually that a stick figure is understood to represent a person. Even though a variety of body shapes and forms are recognisable as human, this does not mean that they are all representative of actual human size, shape and variation, nor are they always recognised as not being true to life. Ken and Barbie dolls, for example, are recognisable as human shapes but they have been shown to have unrealistic body proportions in comparison to actual human bodies (Norton *et al.* 1996).

We do not, however, have this level of familiarity with the earlier hominin taxa. Even the names of many of these taxa are unfamiliar or unknown to many members of the public. Neandertals may be the most well known and most incorrectly or inaccurately portrayed of the earlier hominin taxa as they frequently feature in popular culture and modern fiction as well as in the media. Examples of these are:

- the Geico 'Caveman' commercials which lead to the TV series 'Cavemen' (2007);
- the Fed Ex Superbowl 'Caveman' commercial in 2006;
- Jean M Auel's Earth's Children fiction series (spanning a generation with the first book published in 1980 and the most recent (6^{th}) book in 2011), and the subsequent movie adaptation of 'The Clan of the Cave Bear' in 1986;
- some of the works of other author's such as HG Wells, John Darnton, William Golding, Robert J Sawyer, Isaac Asimov;
- they have appeared in the Doctor Who TV series ('Ghost Light' episode 1989) – the butler in this episode was a Neandertal;
- movies such as 'Quest for Fire' (1981), 'Night at the Museum' (2006), the 'Neanderthal Man' (1953);
- the use of 'Neandertal' as a derogatory term, indicating someone, generally a male, as brutish, unintelligent, primitive, stupid;
- depicted by cartoonists such as Gary Larson; and
- in documentaries such as 'Walking with Cavemen' (2003) and the associated book (Lynch and Barrett 2002).

Other taxa that may be familiar to the public are *Homo habilis* and possibly *Homo erectus* (due to the jokes that can be made around the name). Taxonomic names are rarely used however, as the term 'caveman' for Palaeolithic *H. sapiens* as well as Neandertals and the earlier *Homo* species and 'ape–man' for the Australopiths are more commonly used. Another possibility is that the names may not be known, so these taxa may be defined (possibly inaccurately) by technological advances such as the use of stone tools, fire, living in caves or growing crops.

This lack of familiarity with the earlier hominin taxa means that more information must be provided to members of the general public for them to be able to visualise what these early hominins were like. Extrapolating body shape from human remains can be achieved with a certain level of accuracy due to various studies which have been carried out on modern humans. Determining the actual body shape and proportions for the earlier hominins, however, is wrought with difficulties as we do not have actual evidence of their external appearance. This means that the finish of these representations and their body morphology may conflict with the information that these representations are meant to impart about these taxa to the public.

A comprehensive study of the finish of *H. sapiens* to draw upon for comparative purposes provides a benchmark that can be used to determine if the earlier hominin taxa are treated in the same way as the *H. sapiens* representations or, if they differ, the ways in which they differ can be identified. This study can be found in Chapter 4, "*Finishing Techniques Used on the Homo sapiens representations"* of this thesis. The differences and similarities between the two samples will give insight into the way that the taxa are perceived, presented and perhaps used within the museum contextual framework. This chapter introduces the study of facial realism, and the finishes used on the faces of the hominin representations and their body proportions in relation to extant great apes.

FACIAL REALISM OF EARLIER HOMININ REPRESENTATIONS

AIM

The aim of this section of the study was to determine the types of finish found in the facial features of the earlier hominin sample and to compare these results with those for the *Homo sapiens* sample from the previous chapter to determine if the samples are treated differently regarding the finishes used in the faces of representations. This was done in order to investigate whether the unfamiliarity with earlier hominins is thought to limit the viewer's imagination, and thus more detail needs to be provided.

MATERIALS

The sample for this chapter is confined to those hominin representations that are of taxa other than *Homo sapiens* and had a complete face, thus excluding the écorché heads. This gives a sample size of 92, three of which were found in the Australian Museum in Sydney and 89 were in 11 European Museums. The materials for this study were a selection of earlier hominin representations that were documented during a research trip to Europe in 2006 and a research trip to the Australian Museum, Sydney in 2008. These representations consisted of three heads, 26 busts and 63 complete representations. The breakdown of representation types was of 29 facial reconstructions, 46 facial reconstructions on a body and 17 sculptures.

MATERIALS: PHOTOGRAPHS

Photographs of the face of each representation were used in order to minimise the variables/extraneous information. The use of photographs for this type of study enabled representations from various museums in different countries to be compared to each other as well as those representations within the one museum that were in different galleries or on different floors. The size of the photographs used was A4, as this is similar to life–size and gives the full impact of the individual faces. Full face photographs were used where possible.

Each photograph had a label on the back, recording the representation's name, the museum it was from and an arbitrary identification number given to each representation. For the European sample this identification number was prefixed with the letter E in order to differentiate between the European sample and the Australian sample whose numbers had the prefix of A. Photographs of each representation meant that there was visual documentation which could be used repeatedly for research purposes.

METHODS

This sample was assessed in two different ways, first by facial realism which will be the subject of this section of the chapter, and secondly by body proportions which is the focus of the second section of this chapter. The facial realism of the earlier hominins' representations was assessed using the categories identified in the *Homo sapiens* sample in the previous chapter. They were, therefore, assessed in the following ways:

1. to determine how realistic and life–like the earlier hominin sample was by identifying the two extremes in the sample; the least and the most realistic and recording the range of variation between these two extremes;
2. recording the range of variation in relation to the finishes and morphological characteristics identified in the *H. sapiens* representations;
3. identifying any other finish or morphological characteristic which had not been identified previously in the *H. sapiens* sample;
4. identifying the importance of the characteristics in relation to the semantic scale assessment; and
5. comparing the results with those of the *H. sapiens* representations to determine if similar finish techniques/qualities are used with both the *H. sapiens* and the earlier hominin representations.

The Range of Variation

A semantic differential scale was used to quantify how realistic or life–like the sampled representations were judged to be in relation to each other. These types of scales allow for predetermined extremes to be placed at either end of the scale and the remaining sample to be placed along the scale in accordance with their individual variability in relation to the two extremes. The predetermined extremes in this case were from the sample and correspond to the most realistic and unrealistic representations. A linear continuum charting the variation found in the representations was then constructed using these extremes as the end points. The photograph of each was then positioned along the continuum according to their level of realism, from the lowest or least realistic to the most realistic. This sample of earlier hominins differed from the *H. sapiens* representations in that there were no 'blanks' in the sample.

Once the lowest extreme was determined from amongst the sample photographs, the rest of the sample were then positioned along an imaginary line on the floor in order to obtain rough groupings of the photographs. When these smaller, more manageable groups had been determined, the photographs were then taken one by one and judged in relation to the previous photograph as to whether or not it was more realistic and life–like. Photographs were then moved along the scale depending upon whether the photograph currently being judged was more or less realistic than the photographs that had already been judged. These photographs were placed in rows on the floor in a large area to allow for movement of photographs along the semantic differential scale. Once the entire sample had been placed along the scale, each photograph was labelled with a number from 1 to 90 and prefixed with the letters FR (facial realism) (Appendix F). The representation at the lowest extreme were designated 1, so that the larger the FR number the more realistic the representation was found to be. The highest number does not correlate with the sample size as some representations were judged to be at an equal level along the scale with other representations.

Please note that any information contained in the representation that is indicative of cultural practices or is due to decisions made by the artists/scientists/museum staff about specific choices such as specific natural pigmentation or body modification is not a part of this study. Information of that type is not assessed with regard to the finish of the representation. It will, however, feature as part of the study in Chapter 7 on the supplementary information that is embedded in hominin representations. Due to copyright issues at some museums, some photographs were for research purposes only and were not able to published or included in this thesis.

Findings and Discussion

The sample was identified as belonging to two finish types along the semantic scale, basic faces (n=27) and detailed faces (n=65) (Tables 5.1 and 5.2 and Figure 5.1). These finish types were identified in the previous chapter which sampled the *H. sapiens* representations. Basic faces were identified as having realistically shaped heads with facial features lacking in some details, artificial [1] skin colouring (this includes a lack of tonal colours within the skin e.g., monochromatic or flat colouring) and hair. Detailed faces have facial features with details such as eyelashes or shine on their eyes, presumed[2] naturalistic colouring and hair. It must be remembered that actual soft tissue details and pigmentation are not known for these earlier hominin taxa, this means that colouring showing variation in skin tones, hair, eyes, mouth and teeth will be classified as presumed naturalistic colouring of the representation.

The sample was then assessed with regard to the changes in the finish of the faces as the FR number becomes higher and as the representations changed from basic faces to detailed faces. These changes consisted of modifications and variations to the overall colour scheme, skin colour, types of hair present in the

[1] The term artificial is used rather than unnatural as the choice of colours in these representations is a decision contrived by art rather than influenced by nature. Unnatural also places a negative connotation upon the colour decision which is not justified.

[2] The use of the term presumed indicates the differences between the naturalistic colouring of the *H. sapiens* representations and the earlier hominin representations. As we have no definitive evidence as yet of the pigmentation of the earlier hominins, no judgement can be made on the range of colours found in the representations. This means that those representations that have tonal changes in their skin, colour differentiation between eye features, the lips and the rest of the mouth area, hair of different colour from the rest of the representation etc., are considered to have presumed naturalistic colouring, even if those colours may not be of 'typical' natural colours (e.g., greys). The decision to use colour to differentiate features in a way similar to *H. sapiens* representations gives a naturalistic look to the representation and there is no evidence to the contrary that these colours are incorrect.

forms of scalp hair, facial hair, eyebrows and eyelashes, hair colour and details about the eyes and mouth.

TABLE 5.1 A summary of the identified features in each finish type within this sample.

	Basic faces	Detailed faces	
1			90
	Example ▪ has a realistically shaped head ▪ artificial skin colouring ▪ may have artificial looking scalp and facial hair ▪ may have artificial coloured hair ▪ may have lower levels of detail in facial features, for example, eyes may not show iris or pupil	Example ▪ has a realistically shaped head ▪ presumed natural skin colours ▪ may have presumed natural looking scalp and facial hair ▪ presumed natural hair colours ▪ has facial features such as eyelashes, presumed natural looking eyes	

TABLE 5.2 The two finish types identified in this sample, with the percentage of representations in each category and shown as a percentage of the total sample.

Finish type	n=	%
Basic	27	29.3
Detailed	65	70.7
Total %	92	100.0

The earlier hominins differed from the *H. sapiens* representations in that there were no blanks found in earlier hominin sample and that there was a greater difference between the percentage of basic and detailed representations in the earlier hominins than in the *H. sapiens*. The presence/absence of blanks in the two samples is an indication of how familiar we are with the human body as we are able to interpret a basic shape as human, and how unfamiliar we are (or thought to be) with the earlier hominins as no basic shapes were used to depict them. In order to be able to interpret the earlier hominins, a significant amount of detail is required, even if this detail is unknown. Whereas, with the *H. sapiens* sample a lack of detail does not prevent the visitor/viewer from identifying the blank as a human representation (Brooks and Kemp 2007).

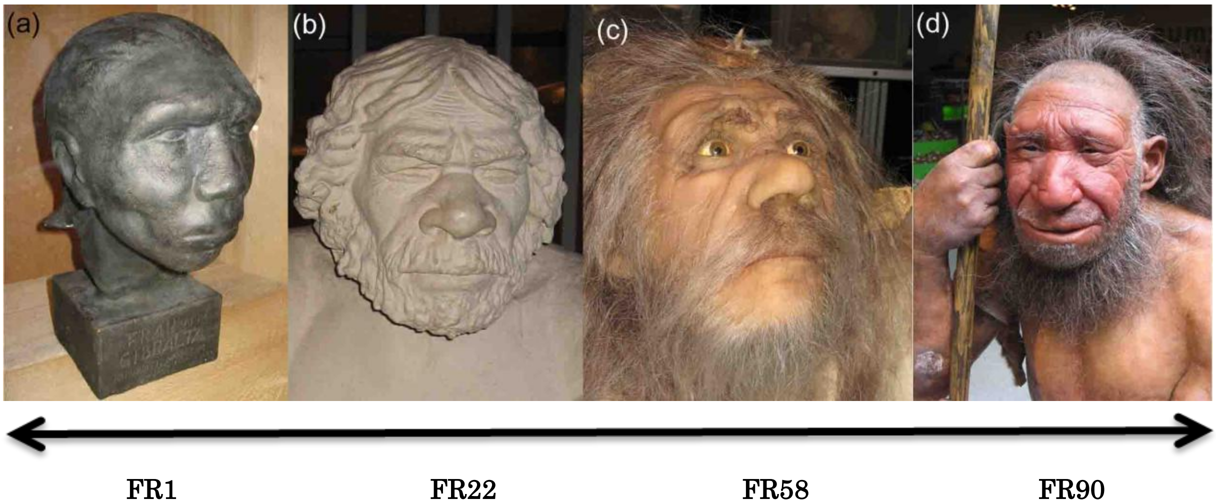

FIGURE 5.1 An example of faces along the semantic differential scale, from the least realistic to the most realistic: (a, c) basic[3] faces; and (b, d) detailed faces.

Finishes and Morphological Characteristics

Using the finish type data from the previous chapter, only two finish types were identified in the earlier hominin sample. The other major differences noted were the overall colour scheme, the skin tones and then the presence/absence of particular details and their colouring (Table 5.3). It is these differences that were used to place the faces along the semantic differential scale and are the basis of the study. This section of the chapter is about the finish of the representation and how this sample compares to the previous sample, not about how the finish relates to particular taxa.

The morphological characteristics chosen for further study were; the colour scheme, the skin colour, scalp and facial hair, the eyes, eyebrows and lashes and the mouth. Sample faces were studied and the morphological characteristics for each were recorded.

[3] The representations are from: (a, b and d) the Neanderthal Museum, Mettmann, Germany; and (c) Drents Museum, Assen, Netherlands.

TABLE 5.3 A summary of the morphological characteristics studied.

Colour Scheme	▪ Colouring
Skin Colouring	Mouth
Scalp Hair	▪ Types
▪ Type	Lips
▪ Colour	▪ Finishes
Eyebrow	▪ Colouring
▪ Types	▪ Shine
▪ Colours	Mouths Open or Closed
Eyelash	Teeth
▪ Presence/absence	▪ Visible/not visible
▪ Types	▪ Colouring
▪ Colouring	▪ Shine
Eye	Oral Cavity
▪ Types	▪ Visible/not visible
▪ Details	▪ Colouring
▪ Colouring	Tongue
Facial Hair	▪ Visible/not visible
▪ By sex and age	▪ Colouring
▪ Region	▪ Shine
▪ Type	

Findings and Preliminary Discussion

COLOUR SCHEME

The overall colouring of the representations differed from the colour schemes identified in the *H. sapiens* representations. In the earlier hominin representations only two colour schemes were identified: 1. artificial/ monochromatic colours; and 2. presumed natural colours (Table 5.4 and Figure 5.2) as opposed to the four identified in the *H. sapiens* sample. In this sample the artificial/monochromatic colours were found in 96.3% of the basic faces, the remaining representations had presumed natural colouring as the teeth, oral cavity, irises, skin, and hair were of differing colours. All 100% of the detailed finish type had a presumed natural colour scheme. Overall this means that 28.3% of the total sampled representations were of artificial monochromatic colours while the majority (71.7%) of the sample were of presumed naturalistic colouring.

TABLE 5.4 The two overall colour schemes identified in the sample shown as a percentage for the two categories.

Finish type	n=	Artificial/ monochromatic	Presumed natural	Total %
Basic	27	96.3	3.7	100.0
Detailed	65		100.0	100.0
Total Sample	92	28.3	71.7	100.0

Interestingly, in this sample, as opposed to the *H. sapiens* sample there was one basic finish type representation (E250) that had presumed naturalistic colouring (Figure 5.3). As this study, as well as the previous one, is based on a continuum it would be expected that there would be overlap between the defined finish types. This, however, was not apparent in the sampled representations. Due to the lack of details in the facial features and the artificial looking hair, E250 was defined as a basic representation even though its colouring was identified as presumed naturalistic. The choice of this colour scheme category was due to the colour differences, for example, in the colour of the iris and the sclera, even though the sclera was not white, indicates that the colour changes were a choice. As several specific features had colour changes it was thought that these decisions were deliberate and intended to show differences between features on the representation.

There was also a greater range of artificial colour schemes amongst the *H. sapiens* basic and blank faces, with the addition of the bicolour and monochromatic with natural eyes categories which were not present in the earlier hominin sample.

FIGURE 5.2 The two colour scheme categories identified in this sample: (a) artificial/monochromatic;[4] and (b) presumed naturalistic.

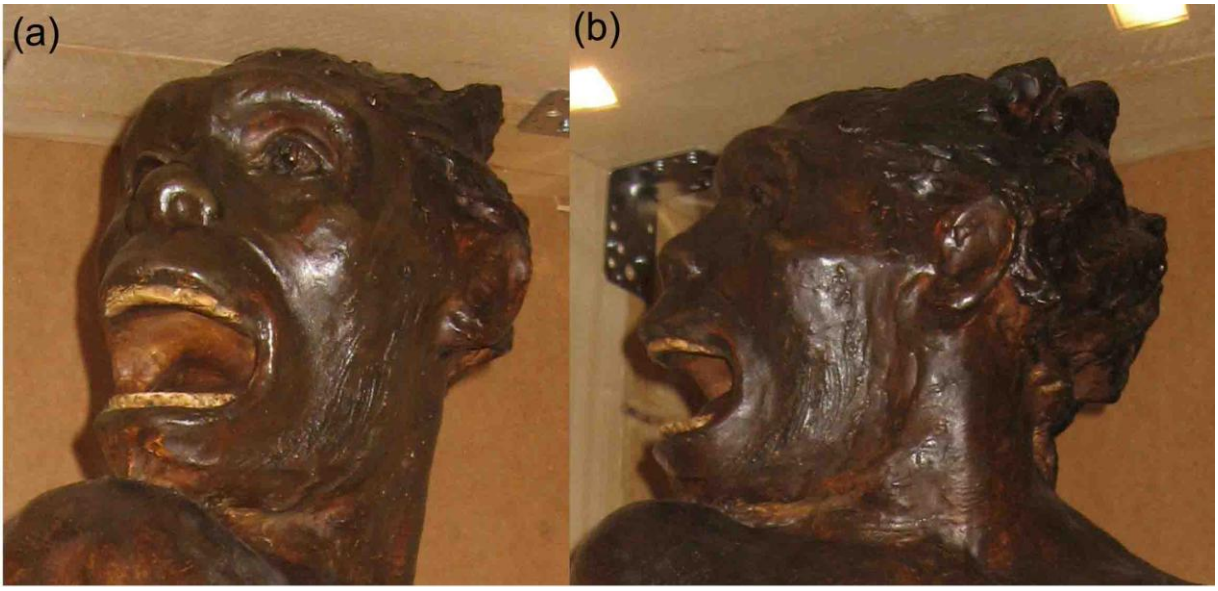

FIGURE 5.3 The representation, E250 was the only example of a basic face representation having presumed naturalistic colouring: note the (a) differences in colours between the teeth, the oral cavity, the tongue and the lips, as well as the darker iris in comparison with the other well defined eye details; and (b) the hair colour in comparison with the other features. The representation was on display at the Neanderthal Museum, Mettmann, Germany, in 2006.

[4] The representations are from the Dutch museums: (a) Museon, Den Haag; and (b) Drents Museum, Assen, Netherlands.

SKIN COLOURING

The majority of the colour in the representations is due to the skin colour. Nine skin colourings were identified in the sample; ochre (yellow/brown), gold, wood grain, terracotta, bronze, dark grey, brown, white as well as presumed naturalistic skin colours (Table 5.5 and Figure 5.4). The basic faces were found in all of the identified skin colour categories; one representation in each of the following colours, ochre, gold, wood grain, terracotta and presumed natural, 7.4% in bronze, 11.1% in dark grey, 22.2% in brown and 40.7% in white.

Brown and white are classified as being artificial colours in this study as well as the previous study, even though they are commonly used terms to describe human skin colouring. These colours are used as a monochromatic theme throughout the facial features of the representation. This means that the eyes, hair, skin etc., are all the same colour giving the face an artificial look. In the previous *H. sapiens* sample a metallic category was used consisting of bronze and copper colours, which are similar to each other. The metallic colours in the earlier hominin representations were bronze and gold which differed significantly from each other and were, therefore, placed in separate categories.

TABLE 5.5 The skin colouring consisted of nine colour categories, eight artificial colours and a presumed naturalistic colour category (shown as a percentage for both basic [n=27] and detailed [n=65] finish types).

Finish type	Ochre	Gold	Wood grain	Terra–cotta	Bronze	Dark grey	Brown	White	Presumed natural	Total %
Basic	3.7	3.7	3.7	3.7	7.4	11.1	22.2	40.7	3.7	100.0
Detailed									100.0	100.0

The identified skin colours were then separated into two groups, those that were of artificial monochromatic colours and those that were of presumed natural colours. These results were the same as those for the colour schemes, with 96.3% of the basic faces in artificial colours and one individual in presumed natural colours, with the entire detailed sample (100.0%) in presumed naturalistic colours

FIGURE 5.4 The skin colouring consisted of 8 artificial colours and a presumed naturalistic coloured category. The artifical colours consisted of: (a) ochre;[5] (b) gold; (c) wood grain; (d) terracotta; (e) bronze; (f) dark grey; (g) brown; and (h) white; as well as (i) an example of natural colouring.

The earlier hominin representations were also found to be in nine colour categories, one representing natural or presumed natural colours and eight artificial colours. White, brown, terracotta, wood grain and (dark) grey were the colours that were found in both samples. Metallic colours were also found in both samples, except due to the differences in hues they were separated into gold and

[5] The representations are from the following museums: (a) Naturhistorisches Museum, Vienna; (b, f, h and i) the Neanderthal Museum, Mettmann, Germany; (c) Museum of Natural Sciences, Brussels; (d) Magyar Természettudományi Múzeum, Budapest; (e) Australian Museum, Sydney; and (g) Musee De L'homme, Paris.

bronze categories in the earlier hominin sample. The *H. sapiens* colours not found in this sample were the black and mottled categories. In the earlier hominin representations white was still the most common artificial colour, with brown second followed by dark grey. The detailed representations of both samples were in presumed natural colours.

The differences in the colours between the two samples may be that more of the earlier hominin representations have had a statuary treatment, and the colours used are simulating traditional materials used for sculpture such as granite, marble, hardwoods, terracotta, bronze and gold.

SCALP HAIR TYPE

The hair found on the scalp region of the head is identified as the scalp hair in this study which excludes other hair found on the head, such as eyelashes, eyebrows and facial hair, as these are all separate morphological features and will be discussed individually. The absence of scalp hair on a representation means that it is either intentionally bald which may be due to archaeological/historical information or the choice of the curator or it is of the facial approximation type of facial reconstruction as discussed on page **171** in Chapter 3 where no or limited information is available as in forensic cases. When present, there are several ways to indicate scalp hair on a representation. These scalp hair types range from carved or moulded and painted hair to individual hairs inserted into the head. Each of these hair treatments has differing levels of realism.

The scalp hair finish types identified in this sample consisted of no hair, moulded hair, moulded and painted hair, carved hair or various types of individual hairs (Table 5.6 and Figure 5.5). A distinction is made in this study between a representation having no hair and a representation being bald. Having no hair is a finish type whereas bald is a choice made by the maker either due to historical, archaeological or associated evidence or conscious choice and as such, will be covered in the chapter on supplementary information embedded in hominin representations (Chapter 7). The basic faces had a range of hair finishes with the majority (55.6%) having moulded or moulded and painted hair (22.2%). Of the remaining basic representations one had carved hair, while the others (18.5%) had no hair. The majority of the detailed faces had individual hairs (96.8), while the remaining individual had moulded and painted hair

The detailed earlier hominins were more likely to have scalp hair of individual hairs rather than moulded and painted hair. No other hair types were found in this finish type. The basic representations were more likely to have moulded or moulded and painted hair or no hair, than carved hair.

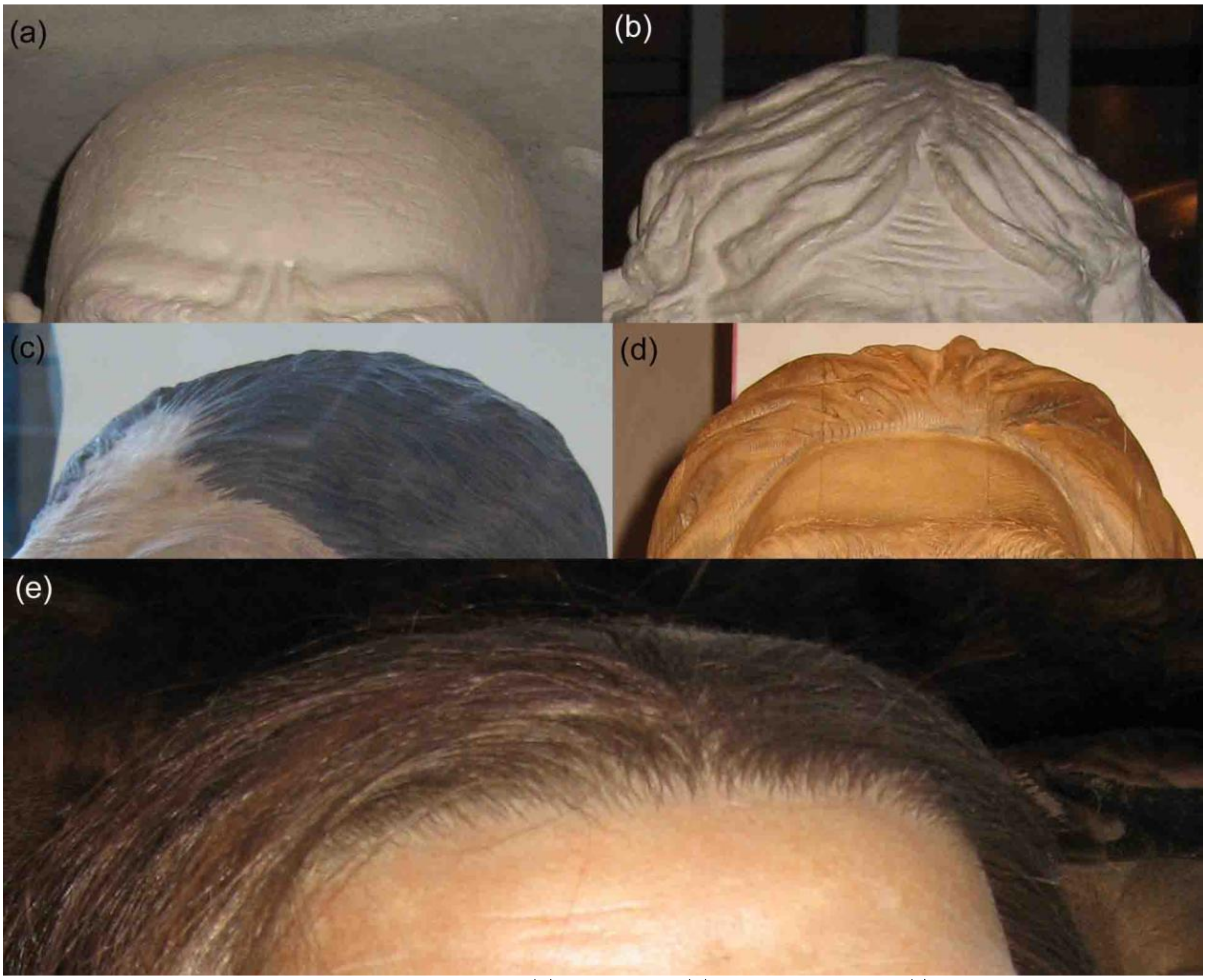

FIGURE 5.5 Scalp hair types consisted of: (a) no hair;[6] (b) moulded hair; (c) moulded and painted hair; (d) carved; and (e) individual hairs.

[6] Representations are from the following museums: (a, b and e) Neanderthal Museum, Mettmann; (c) the Natural History Museum, London; and (d) the Museum of Natural Sciences, Brussels.

TABLE 5.6 The hair types found in each finish type, shown as a percentage of the each type (basic faces n=27 and detailed faces n=65).

Finish type	No hair	Moulded	Moulded painted	Carved	Individual hairs	Total %
Basic	18.5	55.6	22.2	3.7		100.0
Detailed			3.1		96.8	100.0

The main difference between the two taxonomic samples was that there were no earlier hominin representations that had scalp hair obscured in any way, especially by head wear as in the *H. sapiens* sample. There were a smaller number of earlier hominin representations with no hair and these were limited to the basic finish type. Only the earlier hominins had representations with carved scalp hair. The moulded hair category had similar percentages in the basic finish types in both samples. The no hair category was in all three finish types in the *H. sapiens* with quite high numbers in both the basic and blanks, whereas, with the earlier hominins only the basic representations had no hair and this was over a third less than the *H. sapiens* sample. Moulded and painted hair was more common in the earlier hominin basic faces that the *H. sapiens* basic faces. More of the earlier hominins detailed representations had hair made up of individual hairs than the *H. sapiens* detailed representations. The *H. sapiens* also had basic finish types with scalp hair of individual hairs. These results show that it is presumed that more details are required for the earlier hominin representations than for the *H. sapiens* representations.

SCALP HAIR COLOUR

The scalp hair colour on the representations as with the overall colour scheme consisted of the same artificial or presumed naturalistic colours, although there were representations that had no hair (Table 5.7 and Figure 5.6). The basic faces had scalp hair in every category while the detailed faces only had scalp hair in presumed naturalistic colours. The basic faces had scalp hair in the following colours; ochre, wood grain, gold, terracotta and presumed naturalistic colours were only found on single individuals, bronze hair was found in 7.4%, while the majority of the basic representations had hair in dark grey (11.1%), brown (22.2%) and white (22.2%). The remaining 18.5% of the basic faces had no scalp hair at all.

TABLE 5.7 The range of scalp hair colours found in both of the finish types identified in the sample shown as a percentage of each finish type (basic faces n=27 and detailed faces n=65).

Finish type	No hair	Ochre	Gold	Wood grain	Terra–cotta	Bronze	Dark grey	Brown	White	Presumed natural	Total %
Basic	18.5	3.7	3.7	3.7	3.7	7.4	11.1	22.2	22.2	3.7	100.0
Detailed										100.0	100.0

This means that the majority (77.8%) of the basic faces had artificial monochromatic scalp hair colour, a further 18.5% had no scalp hair at all and the remaining representation had hair in presumed naturalistic colours, while 100.0% of the detailed faces had scalp hair in presumed naturalistic colours (Table 5.8).

TABLE 5.8 The scalp hair was identified as being in either artificial monochromatic colours or natural colours when present and shown as a percentage of the entire sample.

Finish type	No hair	Artificial	Presumed natural	Total %
Basic	18.5	77.8	3.7	100.0
Detailed			100.0	100.0

All of the earlier hominin representations with no hair were in the white colour category. With the *H. sapiens* representations, those lacking in hair were found in all of the hair colours except the mottled category, this means that of all the colour categories only the mottled representations all had hair. The *H. sapiens* sample also had basic and blank finish types with natural hair colour and artificial skin colour, whereas, the earlier hominin representation that had presumed natural hair colour also had presumed natural skin colour.

FIGURE 5.6 Scalp hair colours observed in the sample were: (a) bronze;[7] (b) ochre; (c) dark grey; (d) wood grain; (e) gold; (f) presumed natural; (g) brown; (h) terracotta; and (i) white colour categories.

[7] The representations are from the following museums: (a and f) the Australian Museum, Sydney; (b) Naturhistorisches Museum, Vienna; (c and e) Neanderthal Museum, Mettmann, Germany; (d) Museum of Natural Sciences, Brussels; (g) Musee De L'homme, Paris; and (h and i) Magyar Természettudományi Múzeum, Budapest.

EYEBROWS

Eyebrows as a term used today, are essentially a cultural construct or a form of material culture as they are shaped, waxed, trimmed and accessorised and this is what comes to mind when eyebrows are discussed. The usage of the term eyebrows in this section simply refers to hairs found on the earlier hominin representations in the same supra orbital region as the *H. sapiens* representations. The hair in this region is also known as supercilia (Gray 2002). The density of the hair has not been a factor in the designation of these categories, if hair was found in this region the representation was classified as having eyebrows. To this end eyebrows were found to be either absent or present in the sampled basic and detailed faces. In the basic faces, eyebrows were absent in 40.7% and present in 59.3%, whereas in the detailed faces they were absent in 12.3% and present in 87.7% (Table 5.9).

TABLE 5.9 The number of representations with and without eyebrows, shown as a percentage of each finish type.

Finish type	n=	Absent	Present	Total %
Basic	27	40.7	59.3	100.0
Detailed	65	12.3	87.7	100.0

Eyebrows were found to be of several finish types consisting of moulded, carved, moulded and painted and a range of individual hair types (Table 5.10 and Figure 5.7). The eyebrows on the basic faces were found to be moulded (44.4%), carved (7.4%) or moulded and painted (7.4%). The only similarity between the two finish types was found with the one detailed representation that had moulded and painted eyebrows, the other eyebrows in this type consisted of individual hairs; undetermined type (6.2%), stuck on (9.2%) and the most common form, inserted hairs (70.8%).

FIGURE 5.7 Eyebrow types found in the sample consisted of: (a) moulded;[8] (b) carved; (c) moulded and painted; (d) individual hairs undetermined; (e) individual hairs stuck on; or (f) individual hairs inserted into the scalp; as well as (g) the eyebrows being absent.

[8] The representations are from the following museums: (a) Magyar Természettudományi Múzeum, Budapest; (b) Museum of Natural Sciences, Brussels; (c) Natural History Museum London; (d) Neanderthal Museum, Mettmann; (e and g) Museon, Den Haag; and (f) Drents Museum, Assen.

TABLE 5.10 **The different types of eyebrows found in the sample, shown as a percentage of each finish type (basic n=27 and detailed n=65).**

Finish type	Moulded	Carved	Moulded/ painted	Individual hairs			Absent	Total %
				undeter–mined	stuck on	inserted		
Basic	44.4	7.4	7.4				40.7	100.0
Detailed			1.5	6.2	9.2	70.8	12.3	100.0

The basic finish type are more likely to have moulded eyebrows that any other type, they also do not have any with individual hairs. The detailed representations generally had eyebrows that were of inserted individual hairs or hairs that were stuck on.

The earlier hominins are more likely to have eyebrows than not, especially in the detailed representations. However, they are not as likely to have eyebrows as the *H. sapiens* basic and detailed representations. The earlier hominins are more likely to have eyebrows of individual hairs than the *H. sapiens* representations which are more likely to have painted eyebrows. The differences between the two samples may be traced back to the reasoning behind why *H. sapiens* have eyebrows, which have been identified as being important in the use of facial expressions (van de Graaff 2002), as protection against sunlight (Bochenek and Reicher 2003; van de Graaff 2002), and to prevent sweat from running into the eyes (Bochenek and Reicher 2003). Earlier hominins would not need eyebrows as such as their supra–orbital brow ridges would perform the same function to a better extent. It is possible, that the reduction of the brow ridge may have coincided in part with the development of the hat or not long after. As the hat performs this function to a better degree, as eyebrows on modern *H. sapiens* are limited in their shielding ability and are more of a social/cultural construct especially on women in Western cultures.

EYEBROW COLOURS

Eyebrows were also found in all nine of the colour categories, although, the majority (40.7%) of the basic finish type had no eyebrows present (Table 5.11). Of those representations that did have eyebrows they were most commonly (25.9) found to be on the white representations, while only 7.4% in each of the bronze and brown representations had eyebrows. The remaining colours; ochre, wood grain, gold, dark grey and terracotta, were each found on individual basic representations. The detailed faces had a much higher percentage of representations with eyebrows, 87.7% as only 12.3% had no evidence of eyebrows. All 87.7% had eyebrows in presumed naturalistic colours. In summary, 59.3% of the basic faces had eyebrows in artificial/ monochromatic colours while the remaining 40.7% had no eyebrows at all (Table 5.12) whereas 87% of the detailed faces had eyebrows in presumed naturalistic colours and only 12.3% had no eyebrows.

Table 5.11 The eyebrow colours found in the basic and detailed faces, with quantities shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	No eye brows	Ochre	Gold	Wood grain	Terra –cotta	Bronze	Dark grey	Brown	White	Presumed natural	Total %
Basic	40.7	3.7	3.7	3.7	3.7	7.4	3.7	7.4	25.9		100.0
Detailed	12.3									87.7	100.0

TABLE 5.12 The eyebrow colours of the representations were in either artificial/monochromatic colours in the basic faces (n=27) or in presumed naturalistic colours in the detailed faces (n=65), the remainder of each finish type was found to have no eyebrows present.

Finish type	No eye brows	Artificial/ monochromatic	Presumed natural	Total %
Basic	40.7	59.3		100.0
Detailed	12.3		87.7	100.0

The representations that did not have eyebrows were the only basic representation with presumed naturalistic colouring and representations from the dark grey, brown and white colour categories. In the *H. sapiens* sample all colour categories had representations with no eyebrows except for the mottled and wood grain categories.

EYELASHES

Eyelashes were identified as being absent or present in the sampled representations (Table 5.13). All of the basic faces had no eyelashes present whereas in the detailed faces 58.5% of the representations had eyelashes while the remaining 41.5% lacked eyelashes. Of the 58.5% of detailed representations with eyelashes, 46.2% only had upper lashes while the other 12.3% had both upper and lower lashes (Table 5.14).

TABLE 5.13 Eyelashes were either present or absent on the basic and detailed faces in the sample (shown as a percentage).

Finish type	n=	No lashes at all	Lashes present	Total %
Basic	27	100.0		100.0
Detailed	65	41.5	58.5	100.0

TABLE 5.14 The eyelashes that were present in the detailed faces were found to be either upper lashes only or both upper and lower lashes, these are shown as a percentage of the detailed faces (n=65).

Finish type	n=	No lashes at all	Upper lashes only	Both lashes	Total %
Basic	27	100.0			100.0
Detailed	65	41.5	46.2	12.3	100.0

Eyelashes were only found in the detailed representations and never in the basic representation, and this was found in both the *H. sapiens* and the earlier hominin samples. The majority of detailed representations in this sample had eyelashes, indicating that the earlier hominin representations are more likely to have lashes than the *H. sapiens* representations. Less variation was present in this sample in relation to the eyelashes, as the lower lashes in the earlier hominins were only ever present in conjunction with the upper lashes, although the upper lashes may be present without the lower lashes. These results show that more time is spent on creating the detailed earlier hominin representations. They are also more likely to have extra morphological details than the *H. sapiens* representations.

EYELASH TYPES

The eyelash types identified in the detailed faces consisted of undetermined individual hairs, fake eyelashes and inserted individual hairs (Table 5.15 and Figure 5.8). The undetermined individual hairs category consisted of those eyelashes that were unable to be classified as either fake eyelashes or as inserted individual hairs. This undetermined category was found in 41.5% of the detailed faces, while the remaining eyelashes were determined to be either fake lashes (3.1%) or inserted individual hairs (13.8%).

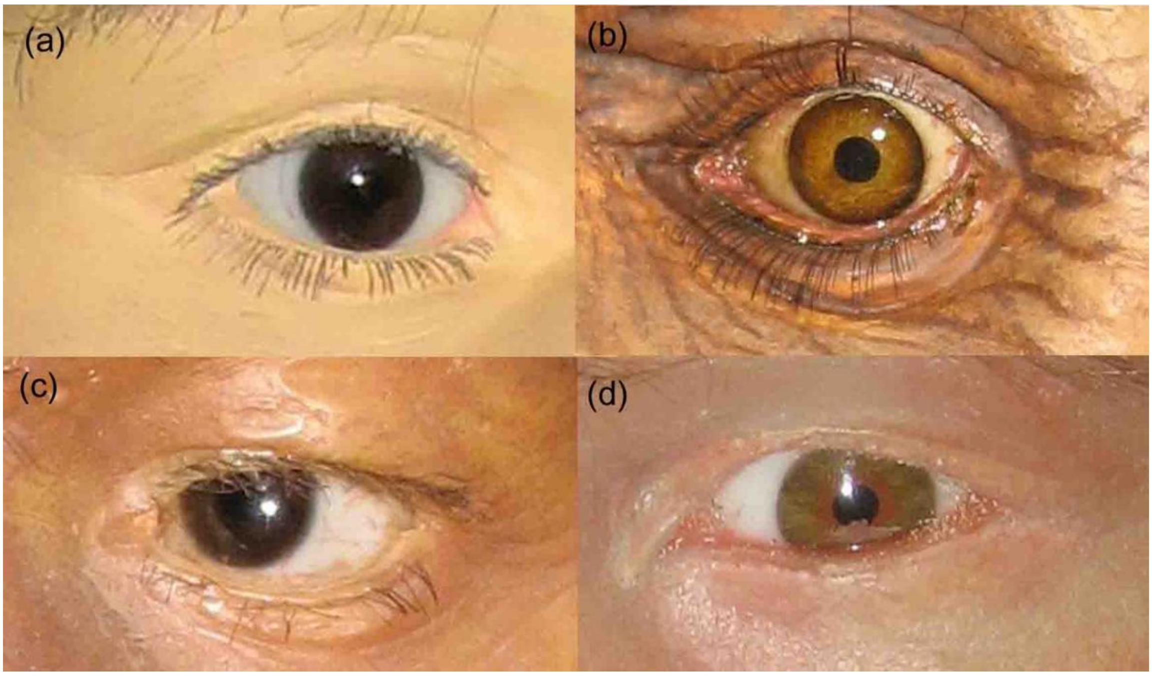

FIGURE 5.8 Eyelash types consisted of: (a) undetermined individual hairs;[9] (b) fake eyelashes; (c) inserted individual hairs; or (d) there were no eyelashes.

[9] The representations are from the following museums: (a and d) Neanderthal Museum, Mettmann, Germany; (b) Museon, Den Haag; and the (c) Hunterian Museum, Glasgow.

TABLE 5.15 **The types of eyelash hair forms found in the detailed faces shown as a percentage of this finish type (n=65).**

Finish type	No eyelashes	Undetermined individual hairs	Fake eyelashes	Inserted individual hairs	Total %
Basic	100.0				100.0
Detailed	41.5	41.5	3.1	13.8	100.0

With the earlier hominin sample it was more difficult to determine if the eyelashes were of inserted hairs or fake lashes and when able to determine the type of lashes, fake lashes were less common than the insertion of individual hairs. All lashes for this sample, when present, were of individual hairs, this differed from the *H. sapiens* sample which had representations with painted lashes. A higher percentage of lashes were identified as inserted in the earlier hominin sample, which may indicate that more time/money is spent on the earlier hominin representations as they are not mass produced, and there are limited numbers found in the museums so perhaps more time and effort is taken on their finish.

EYELASH COLOURING

The colouring of the eyelashes in the detailed sample was found to be consistently (58.5%) of colours that were classified as presumed natural (Table 5.16). This is consistent with the *H. sapiens* sample in that when eyelashes are present they are all of presumed natural colours.

TABLE 5.16 **The colouring of the eyelashes found in the detailed faces shown as a percentage of the detailed sample.**

Finish type	n=	No lashes	Presumed natural	Total %
Basic	27	100.0		100.0
Detailed	65	41.5	58.5	100.0

EYE TYPES

The orbital region can be separated into several anatomical structures; eye lids, eyes consisting of eyeballs, irises and pupils, and eye lashes. This section is only concerned with the actual eyeball, the pupil and iris. A variety of eyes were observed in the sample, which ranged from various moulded finishes to inserted eyes (Table 5.17 and Figure 5.9). Inserted eyes are purposely made eyes, often of glass or plastic which are inserted into the representation's eye socket from the inside, either through the neck of the cast head or positioned within the eye sockets of a skull prior to the creation of the face. These eyes have a sheen to them that mimics that seen in actual eyes due to the moisture of an eye. They also reflect light in a way that the other eye types do not, due to this moisture–like sheen.

The eye types found in the basic faces consisted of moulded eyes (44.4%), moulded with a paint wash (18.5%), moulded and carved (33.3%) and one representation had carved eyes. Only three eye types were identified in the detailed faces sample, they were closed eyes (3.1%), one representation with moulded and painted eyes while the majority had inserted eyes (95.4%).

TABLE 5.17 The range of eye finishes in both types, shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Moulded	Moulded, with wash	Moulded and carved	Carved	Moulded and painted	Closed eyes	Inserted eyes	Total %
Basic	44.4	18.5	33.3	3.7				100.0
Detailed					1.5	3.1	95.4	100.0

The eyes in the basic faces of the earlier hominin sample were either moulded and/or carved and may also have a wash over them, but none had inserted eyes as found in the basic *H. sapiens* representations. The detailed representations were all able to be categorised as having either moulded and painted or inserted eyes when the eyes were open. This differed from the *H. sapiens* sample that had representations with broken eyes and eyes were not able to be definitively labelled as either painted or inserted. Once again only the detailed representations had examples of closed eyes.

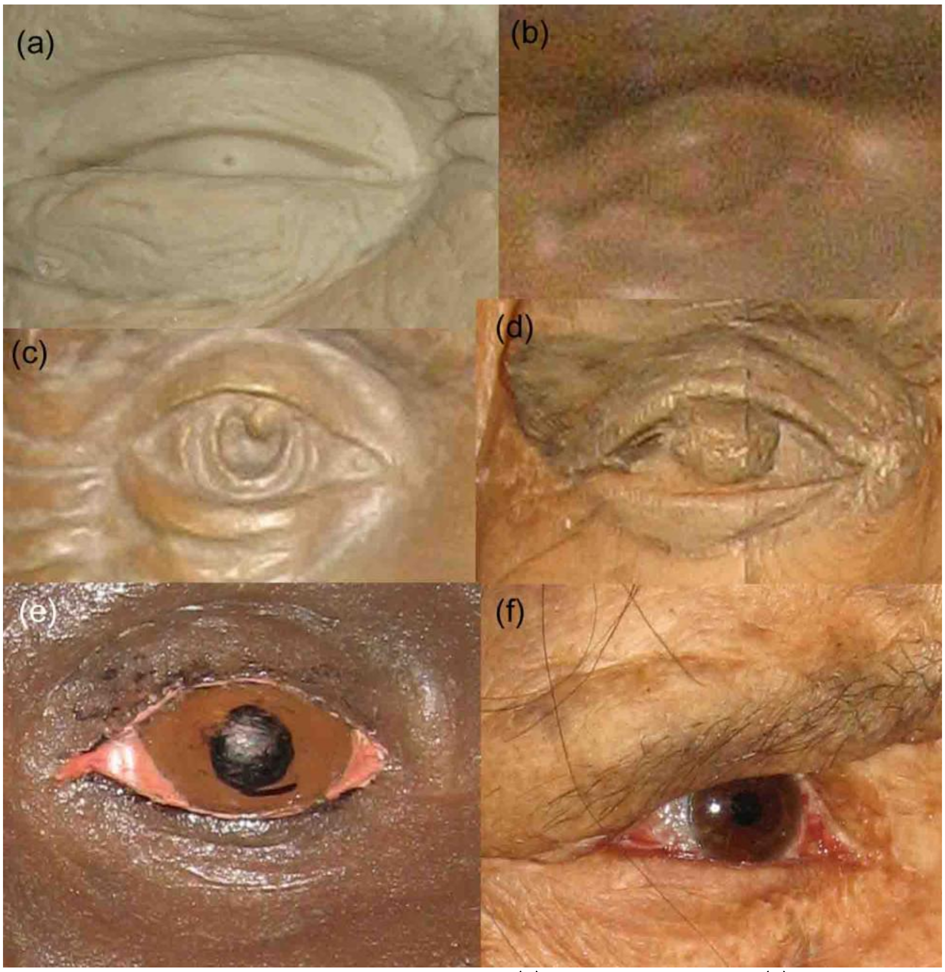

FIGURE 5.9 Eye types in the sample consisted of: (a) moulded only;[10] (b) moulded with a paint wash; (c) moulded and carved; (d) carved; (e) moulded and painted; and (f) inserted eyes.

The amount of detail in the eye also varied, as although, all eyes that were open had sclera present, only some of the eyes had iris and/or pupils (Table 5.18 and Figure 5.10). All of the basic faces (100.0%) had visible sclera, while only 37.0% had the iris and 25.9% had pupils with a further 14.8% only had suggested pupils. The detailed faces were more consistent with 3.1% closed eyes and the remaining 96.9% with eyes complete with sclera, iris and pupil.

[10] The representations are from the following museums: (a and f) Museon, Den Haag; (b) Musee De L'homme, Paris; (c and e) Australian Museum, Sydney; and (d) Museum of Natural Sciences, Brussels.

TABLE 5.18 The number of representations in each finish type in which the sclera, iris and pupil were absent or present, as well as the number of representations that had their eyes closed. Shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Eyes closed	Sclera present	Iris		Pupil		
			absent	present	absent	present	suggested
Basic		100.0	63.0	37.0	59.3	25.9	14.8
Detailed	3.1	96.9		96.9		96.9	

All of the basic representations had eyes showing sclera, differing from the *H. sapiens* sample which had representations with suggested eyes, meaning they had no discernable sclera. The basic earlier hominin representations also had suggested pupils, a category not found in the *H. sapiens* sample. There was a similar number of detailed representations in both samples with closed eyes, although, in the *H. sapiens* sample, these illustrated various reasons for having closed eyes (e.g., sleeping, exertion and death), while in the earlier hominin sample only death was illustrated. These results show that there were no major differences in the eye finishes recorded in the basic and detailed finish types in the two samples. This means that eyes are thought to have a similar level of importance to the viewer in both the earlier hominins and the *H. sapiens.*

EYE COLOURING

The eye colours were in all of the previously identified artificial colours and the presumed natural colour category (Table 5.19). The majority of the eye colours in the basic faces were found to be white (40.7%), brown (22.2%), dark grey (11.1%) and bronze (7.4%). The remaining five colours (ochre, wood grain, gold, terracotta and presumed natural) were each found in one representation. The majority (96.9%) of the detailed faces had eyes in presumed naturalistic colours while the remaining 3.1% of the representations had closed eyes. When the eight artificial colours were combined into one category, 96.3% of the basic faces' eyes were artificially coloured (Table 5.20).

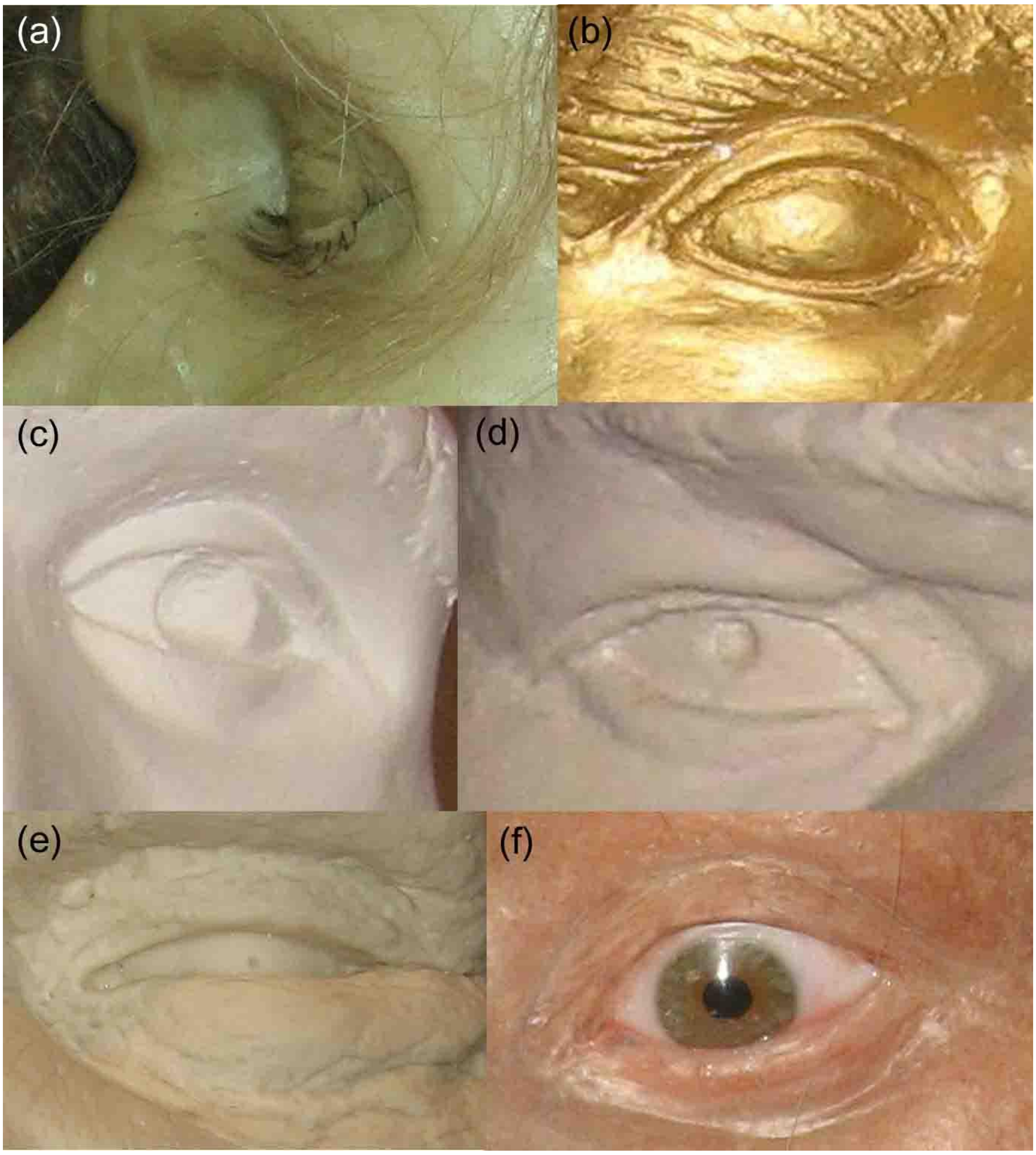

FIGURE 5.10 The various types of eye finishes identified in the sample: (a) eyes closed;[11] (b) sclera only present; (c) the iris and sclera present; (d) the pupil and sclera present; (e) the pupil suggested; and (f) an eye with sclera, iris and pupil.

TABLE 5.19 The eyes in the sample were found to come in a range of colours in the basic faces and only in presumed natural colours in the detailed faces or they had closed eyes. The eye colours are shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Eyes closed	Ochre	Gold	Wood grain	Terra–cotta	Bronze	Dark grey	Brown	White	Presumed natural	Total %
Basic		3.7	3.7	3.7	3.7	7.4	11.1	22.2	40.7	3.7	100.0
Detailed	3.1									96.9	100.0

[11] The representations were at the following museums: (a) Drents Museum, Assen, Netherlands; (b, c, d and f) Neanderthal Museum, Mettmann, Germany; and the (e) Museon, Den Haag.

TABLE 5.20 The eye colour in the sample was found to be of either artificial or presumed natural colours, the remainder of the eyes were closed. Each category is shown as a percentage of each finish type.

Finish type	n=	Artificial colouring	Presumed natural	Eyes closed	Total %
Basic	27	96.3	3.7		100.0
Detailed	65		96.9	3.1	100.0

Both samples show a similar split between the artificial and presumed natural colour categories in the basic faces as they both have examples of presumed naturalistic coloured eyes. The differences between the two samples were that in the *H. sapiens,* these eyes were inserted into monochromatic representations whereas, in the earlier hominins sample, they were painted on the only basic representation with an overall presumed naturalistic colour scheme.

FACIAL HAIR

Facial hair was defined in the previous chapter as the hair that grows on the cheeks, chin and upper lip areas of the face. As facial hair is a sexual characteristic in *H. sapiens* as well as *Pongo pygmaeus*[12] , it is essential to first separate the sample into male and female, then into adult and child in order to understand the results fully. In this sample facial hair was either present or absent in the faces studied (Table 5.21). The sample consisted of a mix of male, female and undetermined categories as well as adults and children. In the basic finish type, 81.5% were adult males, of which only 55.6% had facial hair, there was also a adult female that had facial hair. The remaining 40.7% of the basic representations did not have facial hair, these consisted of adult males (25.9%), a male child, adult females (7.4%) and one undetermined adult representation whose sex was uncertain due to a lack of visual clues and museum information. The detailed representations had a lower proportion of adult males than the basic representations at only 52.3% of the sample, of which 50.8% had facial hair. There were also adult females and undetermined adults with facial hair in the

[12] See Dixson (1998) page 90 for a summary of secondary sexual characteristics in adult male primates.

detailed finish type, 6.2% and 4.6% respectively. While the breakdown of those without facial hair consisted of one of each of the following categories; adult males, male children and undetermined adults, 23.1% were of adult females and 10.8% were of undetermined children.

TABLE 5.21 Facial hair was found to be present in several of the categories and absent in the others, separated by sex and age in the two finish types, shown as a percentage of each finish type.

Finish type	Sex	Age group	Total %	Facial hair	
				absent	present
Basic	male	adult	81.5	25.9	55.6
(n=27)		child	3.7	3.7	
	undetermined	adult	3.7	3.7	
		child			
	female	adult	11.1	7.4	3.7
		child			
			100.0	40.7	59.3
Detailed	male	adult	52.3	1.5	50.8
(n=65)		child	1.5	1.5	
	undetermined	adult	6.2	1.5	4.6
		child	10.8	10.8	
	female	adult	29.2	23.1	6.2
		child			
			100.0	38.5	61.5

It is difficult to determine the sex of child representations if no genitals are visible, as in the case of this sample, where the children were either wearing clothes or had no bodies (i.e., busts). From their general appearance and contextual information, while taking into account the artist's intentions, the majority of the children in this sample were placed into the undetermined category and very few were able to be placed in a sex category and those that were, were considered to be male. As none of the children in this sample had facial hair, the sex of the children was not as relevant as it is for the adult representations in the sample. The presence of facial hair on the undetermined detailed adults indicates that the facial hair was not substantial enough to establish those representations as male.

The majority of adult males in both the basic and detailed representations had facial hair. A number of females in both finish types as well as undetermined adults in the detailed finish type also had facial hair, whereas none of the *H. sapiens* females had facial hair. Interestingly the earlier hominins are more likely to be male than female than the *H. sapiens*. There were also detailed earlier hominin adult representations that were undetermined as to their sex.

FACIAL HAIR REGION

The facial hair in the hominin representations was not just confined to what is known as the 'beard and moustache' area in *H. sapiens.* There was also the added variable of females having facial hair in the sample. This meant that a new morphological classification was required, that of the facial hair region (Table 5.22 and Figure 5.11). For ease of definition, the terminology used in this classification is based on descriptions used by Olivier (1969) to describe facial hair in male *H. sapiens* as well as common terminology. The facial hair regions identified were; cheek area only, sideburn area, cheek and sideburn, upper lip or moustache area, beard area only, upper lip and beard area (also referred to as full beard), cheek, upper lip and beard area.

TABLE 5.22 Facial hair was visible in several regions across the face of the representations, shown as a percentage of each finish type (basic n=27, detailed n=65).

Finish type	No facial hair	Cheek only	Side–burns	Sideburns and cheek	Upper lip	Beard	Upper lip and beard	Cheek, upper lip and beard region	Total %
Basic	40.7	3.7				14.8	40.7		100.0
Detailed	38.5		1.5	1.5	3.1	9.2	43.1	3.1	100.0

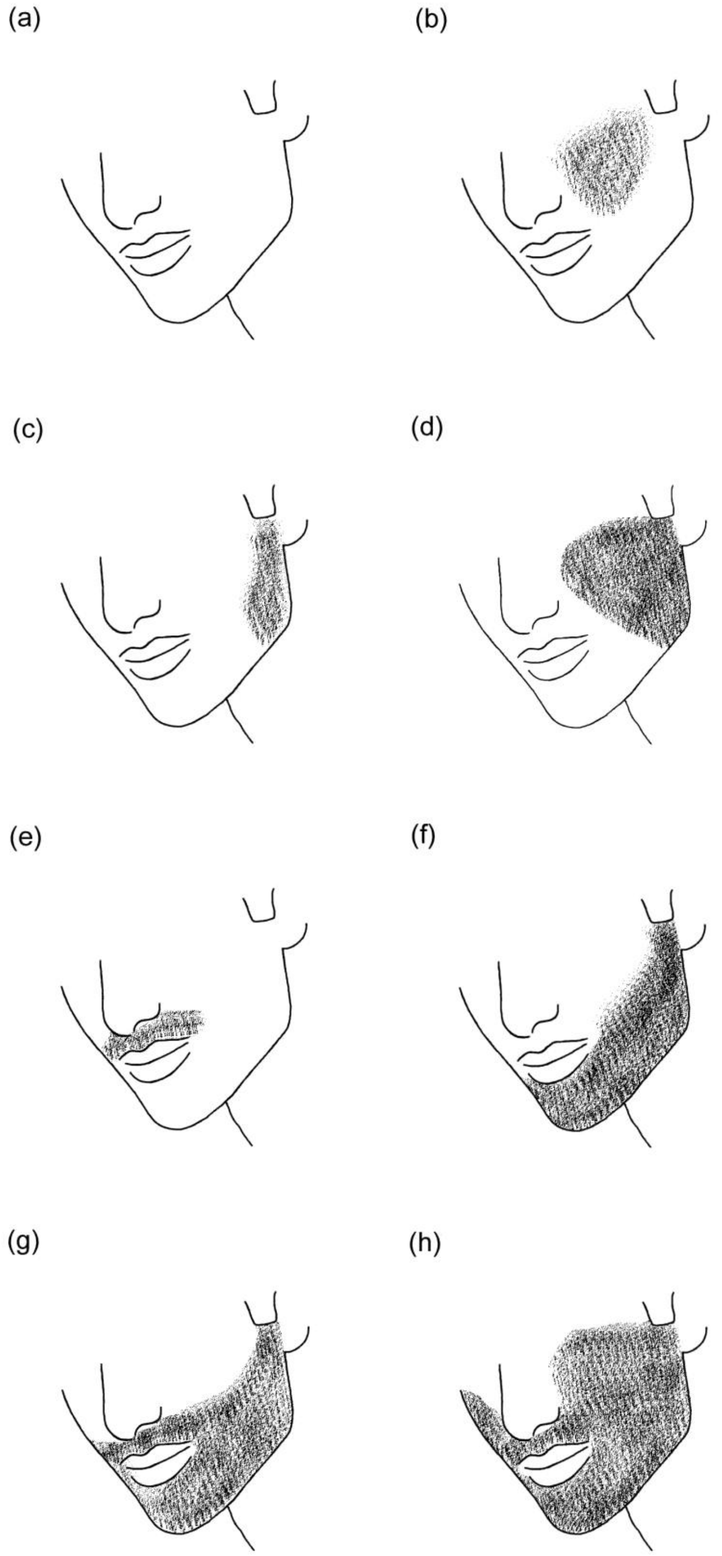

FIGURE 5.11 Facial hair was found in different regions of the face: (a) no facial hair; (b) cheek region; (c) sideburns; (d) sideburns and cheek region; (e) upper lip region; (f) the beard only region; (g) full beard region; and the (h) cheek and full beard region.

The basic representations only had facial hair on their cheeks, the beard area or their upper lip and beard area, whereas, the detailed representations had facial hair on all regions except for the cheek only area. Both the basic and detailed earlier hominin representations were more likely to have facial hair in the traditional beard and upper lip regions.

These regions do not correspond to Conrad's degrees of facial pilosity (hairiness) as recorded in *H. sapiens* adult males (Kherumian 1948) (Figure 5.12). Facial hair appears on the upper lip first and then gradually in other regions of the face. This could mean either that an individual shaves or that the representation is not human–like with regard to their facial hair growth. If the intention is to show facial hair as found in humans, then there should not be representations that have facial hair without having hair on the upper lip (moustache) area as this means that these representations may (unintentionally) indicate that they shaved. This leads to the question, which came first: the technology to cut hair and shave or scalp and facial hair growing to excess and needing to be cut or confined in some way. Some stone tools are certainly sharp enough to be used in this way, as illustrated by their use in several examples where surgeons have used knapped obsidian blades during surgery (Bruce 1982; Thomas 1998).

FACIAL HAIR TYPE

The facial hair observed in the hominin representations was found to be in a range of different finish types in both the basic and detailed finish types (Table 5.23 and Figure 5.13). Facial hair when present in the basic faces was moulded (29.6%), carved (7.4%), moulded/carved and painted (18.5%) or moulded/carved in the case of one representation. In the detailed finish type it was found to be moulded and painted (3.1%) or individual hairs stuck on (9.2%) or inserted (49.2).

Facial hair on the basic representations was generally moulded or moulded and painted while inserted individual hairs were more common on the detailed faces. These were similar results to the *H. sapiens* sample.

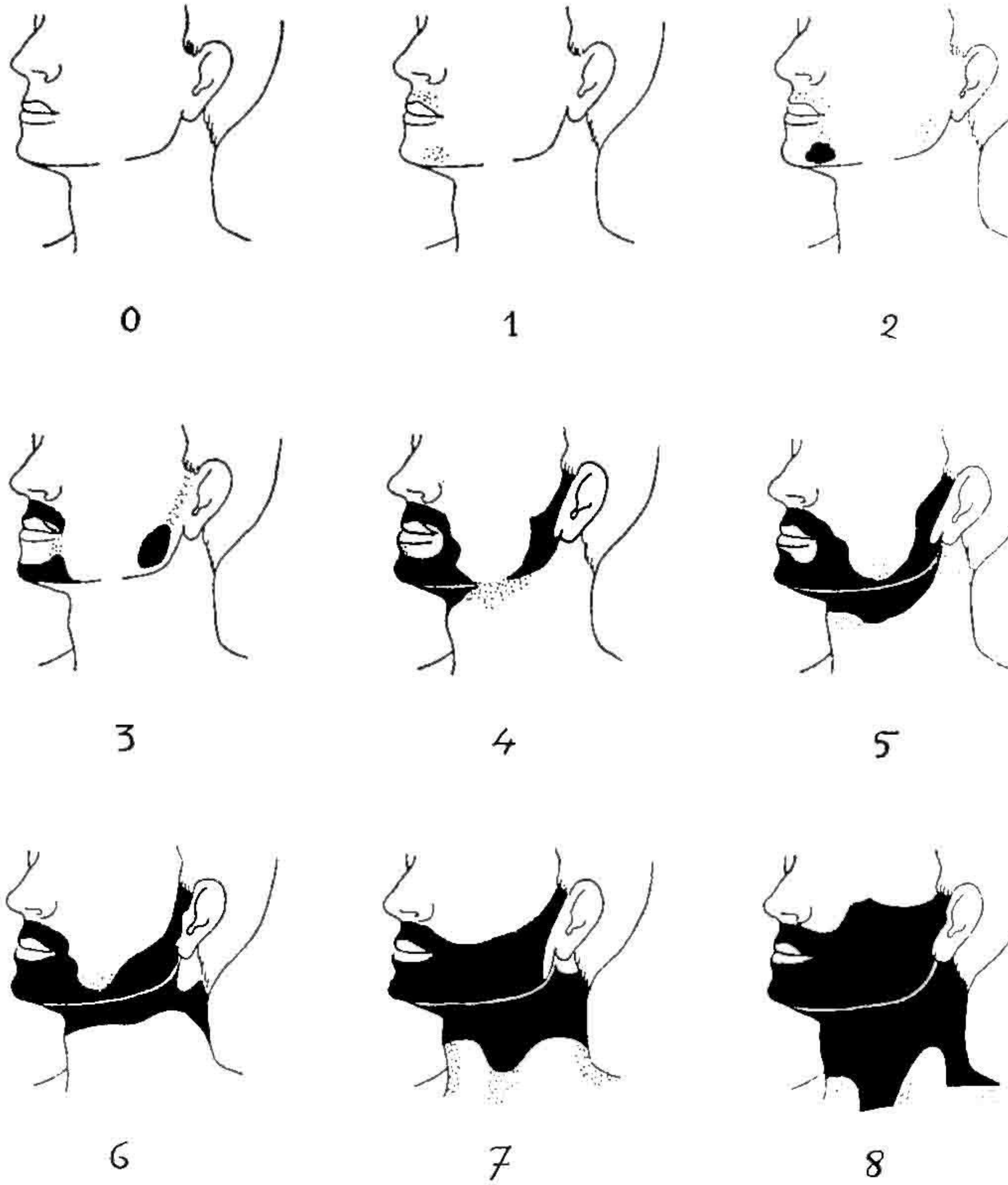

FIGURE 5.12 Conrad's facial hair scale as modified by Kherumian (1948), where 0 is the total absence of hair to 8 which is the maximum extent of normal facial hair in *H. sapiens* males.

TABLE 5.23 The range of facial hair finishes for both the basic and detailed finish types, shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Moulded	Carved	Moulded/ carved	Moulded/ carved/ painted	Individual hairs stuck on	Inserted individual hairs	Absent	Total %
Basic	29.6	7.4	3.7	18.5			40.7	100.0
Detailed				3.1	9.2	49.2	38.5	100.0

FIGURE 5.13 Facial hair types identified in this sample consisted of: (a) moulded;[13] (b) carved; (c) moulded and carved; (d) moulded and painted; (e) individual hairs stuck on; (f) inserted individual hairs; and (g) facial hair was absent.

[13] The representations are from the following museums: (a, c, f and g) Neanderthal Museum, Mettmann, Germany; (b) Museum of Natural Sciences, Brussels; and (d) Natural History Museum, London.

FACIAL HAIR COLOURING

Facial hair colouring was similar to the colouring identified previously, as there were no representations with facial hair in the terracotta or dark grey colours (Table 5.24). The majority of the basic faces with facial hair were in brown (22.2%) and white (18.5%), the remaining colours, bronze, ochre, wood grain, gold and presumed natural were each found on a single individual. In Total % this meant that 55.6% of the facial hair on the basic faces was in artificial monochromatic colours (Table 5.25). The remaining 40.7% of the basic faces had no facial hair. The 61.5% of the detailed faces that had facial hair, had it in presumed naturalistic colouring and as with the basic faces the remainder (38.5%) of the detailed faces had no facial hair.

TABLE 5.24 The colouring found in the facial hair in the basic and detailed adult representations shown as a percentage of both finish types (basic n=27 and detailed n=65).

Finish type	Ochre	Gold	Wood grain	Bronze	Brown	White	Presumed natural	Absent	Total %
Basic	3.7	3.7	3.7	3.7	22.2	18.5	3.7	40.7	100.0
Detailed							61.5	38.5	100.0

TABLE 5.25 The facial hair when present in the sample was found to be in either artificial monochromatic or presumed natural colours, shown here as a percentage of each finish type.

Finish type	n=	Artificial	Presumed natural	Absent	Total %
Basic	27	55.6	3.7	40.7	100.0
Detailed	65		61.5	38.5	100.0

Representations with facial hair were found in all colour categories except dark grey. All representations in ochre, gold, wood grain and brown had facial hair. Those basic representations without facial hair were only found in the dark grey, bronze and white colour categories and the detailed representations were from the presumed natural colour category. The *H. sapiens* basic representations without facial hair were also from the grey colour category as well as the black colour category.

Mouth

The mouth was present in both the basic and detailed faces. All representations in this sample had mouths unlike the *H. sapiens* sample, in which mouth categories (suggested, anatomical, obscured and absent) had to be identified. The mouth features recorded in this study and analysed independently were the mouth types, lip colouring, lip shine, if the mouth was open or closed and what features were visible when the mouth was open.

Unlike some *H. sapiens* representations, the earlier hominin representations were not positioned in a way that obscured the facial features, nor were there any that had the main features suggested. The only instances of suggested features were in several of the basic faces that had suggested pupils; this is, however, a feature detail rather than a main feature.

Mouth Types

The mouths of the earlier hominin representations were of four finish types; moulded, moulded/painted, carved and carved/painted (Table 5.26). The majority (70.4%) of basic faces had moulded mouths or moulded and painted mouths (25.9%) and only one representation had a carved mouth. The detailed faces only had one representation with a moulded mouth as they had a high percentage (89.2%) of moulded and painted mouths, as well as 9.2% of carved and painted mouths.

Table 5.26 The mouth finish categories found in the basic and detailed faces shown as a percentage of each finish type.

Finish type	n =	Moulded	Moulded and painted	Carved	Carved and painted	Total %
Basic	27	70.4	25.9	3.7		100.0
Detailed	65	1.5	89.2		9.2	100.0

The mouths of the basic representations were generally moulded while those of the detailed representations were moulded and painted. These were similar results to the *H. sapiens* sample.

LIP FINISHES

The lips were identified as being either unpainted or painted (Table 5.27). The lips on the basic faces were more likely to be unpainted (74.1%) than painted (25.9%), whereas the lips of the detailed faces were all (100.0%) painted.

TABLE 5.27 The lip finishes identified in the basic and detailed faces, shown as a percentage of each finish type.

Finish type	n =	Painted	Not painted	Total %
Basic	27	25.9	74.1	100.0
Detailed	65	100.0		100.0

LIP COLOURING

The lip colours were in the nine colours previously identified (Table 5.28). The basic faces had lips in all colours, the majority of which were in white (40.7%), brown (22.2%) and dark grey (11.1%). The remaining were coloured bronze (7.4%), or there was one representation that had each of the following colours; ochre, gold, wood grain, terracotta and presumed naturalistic colours. All of the detailed representations had lips that were painted naturalistic colours. The basic faces again had lip colours that could be separated into artificial (96.3%) and presumed natural (one individual) (Table 5.29).

TABLE 5.28 The lip colours identified in both the basic and detailed faces, shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Ochre	Gold	Wood grain	Terra –cotta	Bronze	Dark grey	Mono. brown	Mono. white	Presumed natural	Total %
Basic	3.7	3.7	3.7	3.7	7.4	11.1	22.2	40.7	3.7	100.0
Detailed									100.0	100.0

TABLE 5.29 The lip colours identified were in artificial or presumed natural colours, shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Artificial	Presumed natural	Total %
Basic	96.3	3.7	100.0
Detailed		100.0	100.0

LIP SHINE

Lip shine was found on 29.2% of the detailed faces only and the majority (70.8%) of the lips in this finish type had no shine (Table 5.30 and Figure 5.14). None of the basic faces had intentional lip shine. Several of the representations had shine across the whole head but as it was not only in the specific lip area it was not included as lip shine. Only the detailed representations in both samples had evidence of lip shine and the earlier hominins were more likely to have it than the *H. sapiens* representations.

TABLE 5.30 Shine on the lips was identified in the detailed faces, and is shown as a percentage of this finish type.

Finish type	n =	Shine on lips	No shine	Total %
Basic	27		100.0	100.0
Detailed	65	29.2	70.8	100.0

FIGURE 5.14 Lip shine was either: (a) absent as in this Neandertal woman on display at the Drents Museum, Assen, Netherlands; or (b) present in this Neandertal woman on display at the Neanderthal Museum, Mettmann, Germany.

MOUTHS OPEN OR CLOSED

The mouths of the representations can only be open or closed (Table 5.31). While the closed mouths only had visible lips, open mouths show more features such as teeth, tongue and internal oral cavity. The majority of representations in both the basic (74.1%) and detailed faces (78.5%) had closed mouths. The percentage of open mouths was found to be 25.9% in the basic faces and 21.5% in the detailed faces.

TABLE 5.31 Mouths were found to be open, closed or partially/fully obscured in the basic and detailed faces, and are shown as a percentage of these finish types (basic n=27 and detailed n=65).

Finish type	Mouth open	Mouth closed	Total %
Basic	25.9	74.1	100.0
Detailed	21.5	78.5	100.0

The earlier hominin representations are more likely to have closed mouths than open mouths, which is a similar finding to that from the *H. sapiens* sample. The only difference between the two samples is that the *H. sapiens* representations had other categories (e.g., partially obscured, suggested or obscured or absent) which were not found in the earlier hominin sample. In the earlier hominin sample the view of the representation was never obscured in anyway.

TEETH

The teeth are not always visible when the mouth is open (Table 5.32). As identified previously the mouth was open in 25.9% of basic faces and 21.5% of detailed faces. In the basic faces, teeth were present in all 25.9%, whereas, with the detailed faces the teeth were present in 18.5% and not visible in 3.1%. The majority of representations in each finish type, 74.1% of basic and 78.5% of detailed faces had their mouths closed.

These results indicate that if the mouth is open in the basic faces then teeth are always present, while the detailed representations occasionally have no teeth visible. This sample differs from the *H.* sapiens sample in this regard, as the *H. sapiens* representations are less likely to have teeth present in the basic representations.

TABLE 5.32 The teeth were either visible or not visible in the representations with open mouths, the remaining representations had mouths that were closed or not visible, shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Mouth open, teeth		Mouth closed	Total %
	visible	not visible		
Basic	25.9		74.1	100.0
Detailed	18.5	3.1	78.5	100.0

TOOTH COLOUR

The teeth of the earlier hominin representations were observed to be bronze, white or presumed natural colours (Table 5.33). The teeth of the basic faces were found to be in all three colour categories, with the majority (18.5%) being in the white representations, the remaining two examples were either bronze or presumed natural colours. Detailed faces only had teeth in presumed naturalistic colours (18.5%). In the remaining representations the teeth were not visible or the mouths of the representations were closed.

TABLE 5.33 Three colours were observed in the teeth of the representations when the teeth were visible, shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Tooth colour			Mouth closed or not visible	Total %
	bronze	white	presumed natural		
Basic	3.7	18.5	3.7	74.1	100.0
Detailed			18.5	81.5	100.0

Although, only a limited number of basic representations had visible teeth, it is interesting that they were only found in these three colour categories, the more traditional statue colours as well as the presumed natural category. The detailed representations all had presumed naturalistic coloured teeth. Again when compared to the *H. sapiens* representations, the results differ. Basic *H. sapiens* representations had a limited number of representations with teeth and they were found in the white and the grey coloured faces. The detailed *H. sapiens* had some representations whose teeth were not of naturalistic colours.

TEETH WITH SHINE

In 18.5% of detailed faces with visible teeth, shine was observed on the teeth of 6.2% of them (Table 5.34 and Figure 5.15). This meant that there was no shine on the teeth in 25.9% of the basic faces and in 12.3% of the detailed faces. The remaining representations either had no teeth visible or their mouths were closed.

TABLE 5.34 Shine was observed on some of the teeth of the detailed representations, shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Teeth visible		Mouth closed or not visible	Total %
	with shine	without shine		
Basic		25.9	74.1	100.0
Detailed	6.2	12.3	81.5	100.0

Shine was only observed on a limited number of teeth visible in the detailed representations of both the earlier hominin and the *H. sapiens* samples.

FIGURE 5.15 A representation at the Neanderthal Museum, Mettmann, Germany, with shine present on the teeth.

Oral Cavity

The oral cavity was only observed under certain conditions (Table 5.35). In the 25.9% of basic faces that have open mouths, only 18.5% had a visible oral cavity. In the other 7.4% the oral cavity was not visible due to the teeth obscuring the view. In the detailed faces that had open mouths (21.5%), 12.3% had a visible oral cavity while the remaining 9.2% did not. Of those 9.2%, the majority had their oral cavity obscured by their teeth, except for two of the representations. These were both detailed Neandertal representations, one had neither cavity nor teeth visible in his open mouth and the other had what looks to be a piece of leather in his mouth giving the impression he is chewing on it.

Table 5.35 When the mouth was open the oral cavity was either visible or not visible in the basic and detailed faces, and are shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Mouth open, oral cavity		Mouth closed	Total %
	visible	not visible*		
Basic	18.5	7.4	74.1	100.0
Detailed	12.3	9.2	78.5	100.0

When the mouth of the earlier hominin representations is open, the oral cavity is more likely to be visible than not visible. This differs from the *H. sapiens* sample as the oral cavity was more likely to not be visible when the mouth was open. When the cavity was visible it was just as likely to be suggested as actually present.

Oral Cavity Colouring

The oral cavity was found to be in two colour categories; white or presumed natural (Table 5.36 and Figure 5.16). White oral cavities were recorded in 14.8% of the sampled basic representations. The presumed naturally coloured oral cavities were found in 12.3% of the detailed and in one of the basic faces. The remaining representations either had their mouths closed or the oral cavity was not visible.

TABLE 5.36 The oral cavity was either coloured white or presumed natural colours in the sampled representations, shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Mouth open, oral cavity		Mouth closed or cavity not visible	Total %
	white	presumed natural		
Basic	14.8	3.7	81.5	100.0
Detailed		12.3	87.7	100.0

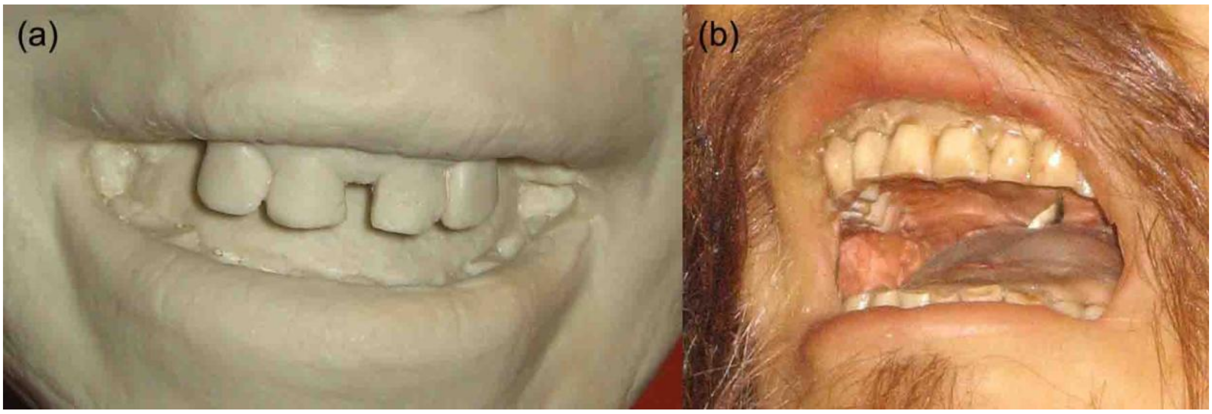

FIGURE 5.16 The oral cavity was either: in (a) white as with this representation from the Museon, Den Haag; or (b) presumed natural colours as with this representation from a travelling exhibition that was on display at the Drents Museum, Assen, Netherlands.

Only representations in white or presumed naturalistic colours had visible oral cavities. The basic faces had representations in both categories while the detailed representations were typically in the presumed naturalistic category only. Creating a head with an oral cavity requires extra work and a high level of skill. As white is a standard base colour for the presumed naturally coloured representations, it follows that white is the only artificial colour found in the representations that had visible oral cavities. The presumed naturalistic coloured representations take longer to manufacture and therefore more time would be spent on creating more details, it is also possible that the artists that use these colours have a higher level of skill.

TONGUE

The tongue is not always observable in the open mouths of representations. This is due to the number of variables as the mouth may not be open enough to show the tongue, the teeth may be closed or the representation may have something in his mouth (as with one of the representations). The tongue was positively identified in 14.8% of the blank and 10.8% of the detailed faces (Table 5.37). In the remaining representations the tongue was not visible, the mouth was closed or the view of the tongue was obscured (e.g., by teeth).

TABLE 5.37 The tongue was visible in both the basic (n=27) and detailed (n=65) faces, shown as a percentage of each finish type.

Finish type	Tongue visible	Tongue not visible	Mouth closed	Total %
Basic	14.8	11.1	74.1	100.0
Detailed	10.8	10.8	78.5	100.0

Tongues were slightly more common in the basic faces than in the detailed faces, however, representations with open mouths were just as likely to have no visible tongue as they were in having a tongue. This differed from the *H. sapiens* sample that rarely had a tongue present and these were only found in the detailed representations.

TONGUE COLOURING

As with the colouring of the oral cavity, the tongue was in either white or presumed natural colours (Table 5.38). In 11.1% of the basic faces the tongue was in white and in one representation it was of presumed natural colours. In the 10.8% of the detailed basic faces with visible tongues they were coloured in presumed naturalistic colours. In the remaining representations the tongue was not visible in the oral cavity or the mouth was closed or the oral cavity itself was not visible.

TABLE 5.38 The tongue was of either white or presumed natural colours in the sampled representations, shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	White	Presumed natural	Not visible	Mouth closed	Total %
Basic	11.1	3.7	11.1	74.1	100.0
Detailed		10.8	10.8	78.5	100.0

As with the results from the oral cavity section, the representations with tongues were only found in the white or presumed naturalistic colour categories. This again differed from the *H. sapiens* category in that the tongues were only found in the naturalistic colours as they were only present in the detailed representations.

TONGUE SHINE

Visible shine was also observed on the tongue of 4.6% of the detailed representations (Table 5.39). It was not observed in the 14.8% of basic faces with visible shine or in the other 6.2% of detailed faces with visible tongues. The remaining representations either had no tongue visible or it was not applicable as the mouth was closed or any view of the tongue was obscured.

TABLE 5.39 Shine was observed in the tongue of some of the detailed representations, shown as a percentage of each finish type (basic n=27 and detailed n=65).

Finish type	Shine on tongue	No shine	Not visible	Mouth closed	Total %
Basic		14.8	11.1	74.1	100.0
Detailed	4.6	6.2	10.7	78.5	100.0

Shine on the tongue was only identified in a minority of the detailed representations in the earlier hominin sample and not at all in the *H. sapiens* sample.

Comparison of Morphology to Facial Realism

Once the finish types and morphological characteristics had been identified and the variation within these characteristic for each representation had been recorded, the FR number for each category in each morphological characteristic was recorded. Then the average of these FR numbers, as well as the minimum and maximum scores were calculated for each category within each morphological characteristic. This resulted in a FR average score for each category as well as a minimum and maximum score range. The facial realism range was between 1 and 90 inclusive. Although the total sample was 92, the highest FR number assigned was 90 due to three of the representations being assigned the same number (FR6), due to the high degree of similarity between the representations resulting in them being judged at the same level of facial realism (see Appendix F for examples).

Findings and Discussion

FINISH TYPES

The FR average and minimum and maximum scores were found for each of the two finish types that were identified (Figure 5.17). For the basic faces the average was FR16 with a minimum of FR1 and a maximum of FR46 and for the detailed faces the average was FR57, with the minimum of FR11 and maximum of FR90. This meant that the basic faces had widely varying rankings from low to the mid–range, while the detailed faces had an even wider scope of variability as well as accounting for all of the representations with a score above FR47.

The basic representations are confined to the lower end of the scale. The detailed representations have a wider range of FR scores some of which overlap the lower scores. The detailed representations are not always necessarily considered to be more realistic than basic representations. If a detailed representation is finished with a low level of skill it will be perceived as less realistic than a highly skilled basic representation. In this sample, the lower FR numbers (1–10) were basic representations while the higher FR numbers (47–90) were all detailed representations. The FR numbers in between (11–46) were a mix of basic and detailed representations. This differed from the *H. sapiens* sample which only had 2 detailed representations in the lower end of the facial realism semantic scale.

Colour Scheme

The FR averages were then worked out for the overall colour scheme (Figure 5.18). Monochromatic representations were found to have an FR average of 16, with a minimum of 1 and a maximum of 46. The presumed naturalistic coloured representations had an FR average of 56 with a minimum of 9 and a maximum of 90. The earlier hominin basic faces were confined to the lower half of the realism scale with the majority of the detailed faces being in the upper half of the scale.

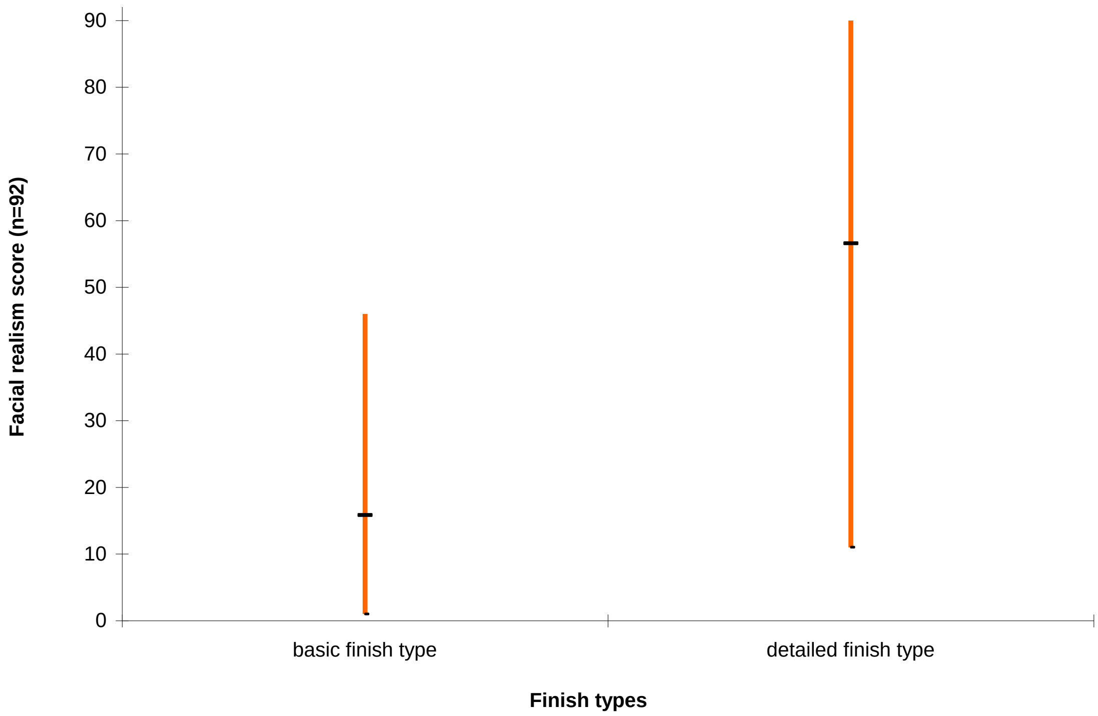

FIGURE 5.17 A graph showing the facial realism average scores within the two finish type categories identified with the vertical lines representing the range from minimum to maximum scores where applicable for each of the finish types.

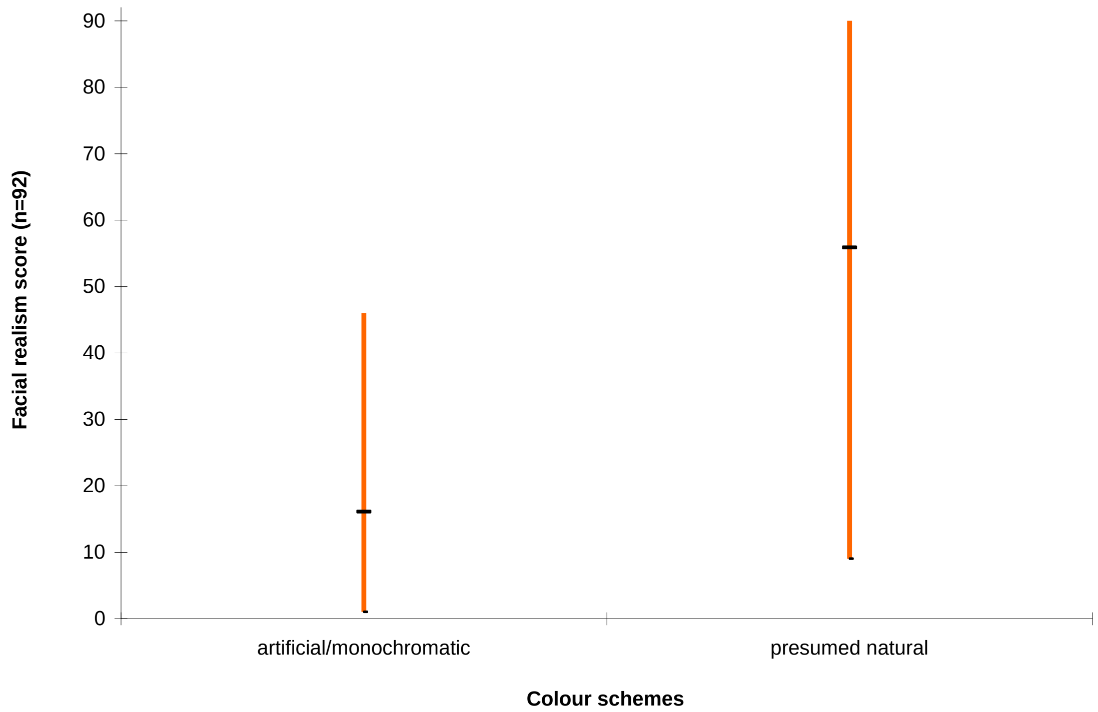

FIGURE 5.18 A graph showing the facial realism average scores within the two colour scheme categories identified with the vertical lines representing the range from minimum to maximum score for each of the colour schemes.

SKIN COLOURING

The skin colouring was one of the first characteristics identified when the representations were placed along the semantic differential scale as it represented a large portion of the visible face. The overall FR averages were found for each of the skin colour categories (Figure 5.19). Terracotta representations had scores of 2. Dark grey representations had an FR average of 5 with a minimum of 1 and maximum score of 10. Brown representations had a FR average of 6 with minimum score of 3 and a maximum score of 8. The ochre representation had scores of 12 while the gold representation scored 14 and the wood grain representation scored 18. The bronze representations had a FR average and maximum score of 21 with a minimum score of 20. White representations had a FR average of 26 with a minimum of 5 and a maximum score of 46. The most realistic representations were those with the presumed natural skin colours which had an FR average of 56, with a minimum score of 9 and a maximum score of 90.

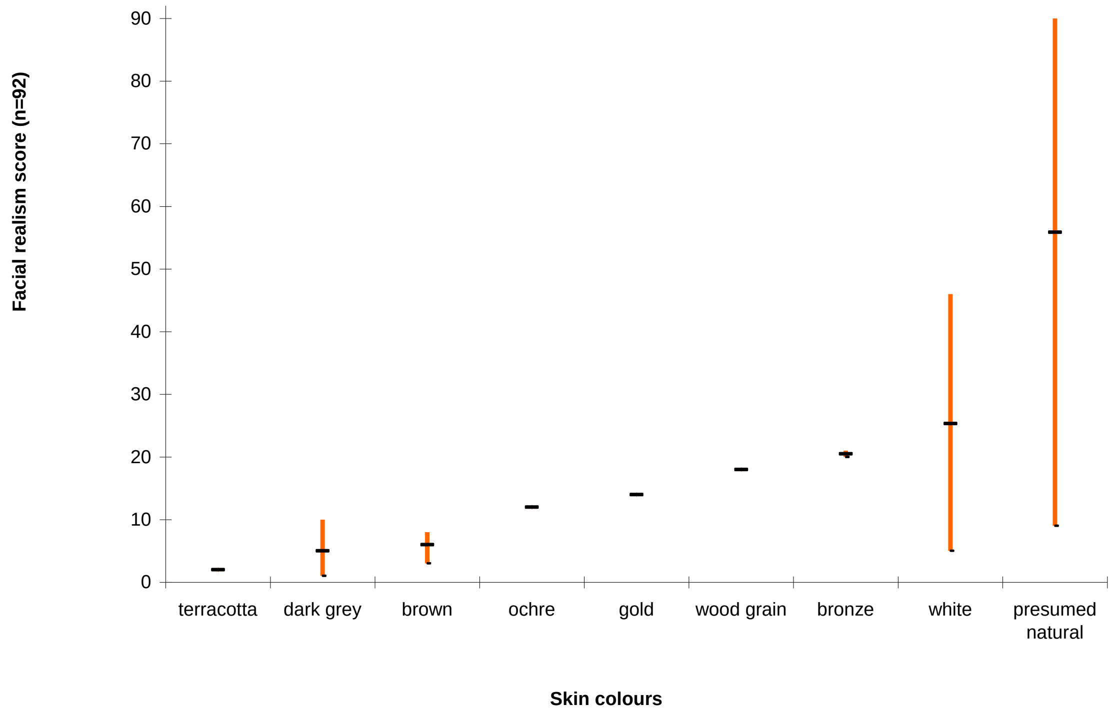

FIGURE 5.19 A graph showing the facial realism average scores within the nine skin colour categories identified with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified skin colour categories.

It is necessary to observe the positioning of the FR average within the score range. The terracotta, dark grey and brown representations were judged to be quite low on the realism scale. The ochre, wood grain, gold and bronze representations were also at the lower end of the realism scale. The limited number of these coloured representations may have an impact on the results as it limits the score ranges. The scores of the white representations ranged from the lower end of the scale to just over the halfway mark. High levels of realism were only found with the representations of presumed naturalistic colouring, although some of the representations in this category were judged to be lower than all of the other colours except for the terracotta and brown representations. Limited numbers of the terracotta and metallic colours makes it difficult to extrapolate the hypothesis about the familiarity of those colours as found in the *H. sapiens* sample where these colours often used in sculptures.

The presumed natural skin colour category includes a wide spectrum of skin pigmentation which may be found within the colour spectrum for extant primates.

As the pigmentation for the earlier hominin species is unknown, information from extant primates is used to extrapolate this information. There is no link between the monochromatic skin colours and racial or ethnic features, characteristics or biases.

Scalp Hair

There were several scalp hair types identified; no hair, moulded hair, painted and moulded hair, carved or individual hairs which were either pieced, stuck on or inserted into the head of the representation (Figure 5.20). The representations with no hair had a FR average of 36 with a minimum score of 5 and a maximum score of 46. Those representations with moulded hair had a FR average of 13 with a minimum of 1 and a maximum of 22. The moulded and painted hair type had a FR average of 11 with a minimum score of 6 and a maximum score of 25. Carved hair had a score of 18 for the FR average, minimum and maximum scores. The individual hair categories ranged in scores with the lowest being a score of 11 for pieced hair pieces (or wigs). Individual hairs that were stuck on to the representation had a FR average score of 31 with a minimum score of 26 and a maximum score of 47. The individual hairs scores ranged from 23 to 48 with a FR average of 34. Inserted hairs had the highest FR average at 63 with scores ranging from 32 to 90.

The upper two thirds of the representations had individual hairs or had no hair with the upper half of the representations having inserted hairs only. The bottom third had hair that was moulded, painted, carved or pieced or they had no hair. The most realistic of both samples had individual hairs. Differences though in the samples was that in the *H. sapiens* sample, representations with painted and moulded scalp hair had a large score range as did the not visible category.

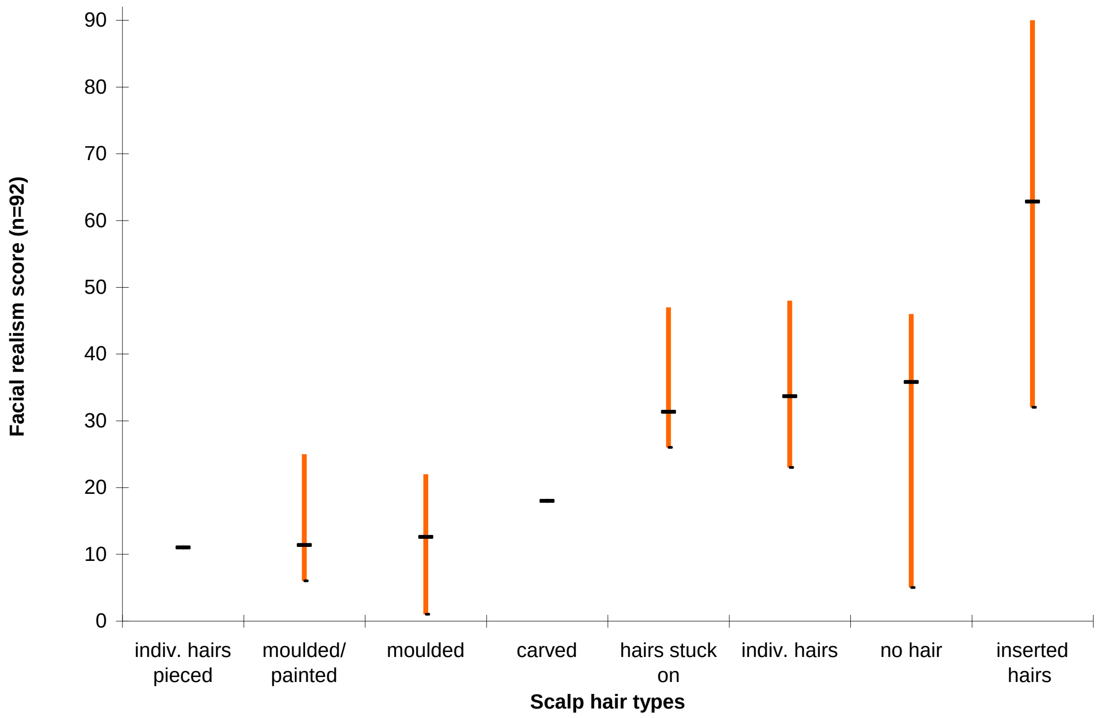

FIGURE 5.20 A graph showing the facial realism average scores within the five scalp hair types identified with the vertical lines representing the range from minimum to maximum score for each of the identified scalp hair types.

The results for the scalp hair colour categories were very similar to those for the skin colour categories (Figure 5.21). The only difference between the two, are in the white category as it was reduced in the scalp hair, meaning that the white representations were those that lacked scalp hair. White scores ranged from 13 to 22 with a FR average of 17.

In the earlier hominin sample there was very little difference between the scalp hair colours and the skin colour categories. This differed from the *H. sapiens* sample which had fewer scalp hair colours than skin colour categories. The upper two thirds of the earlier hominin sample were all in presumed naturalistic colours.

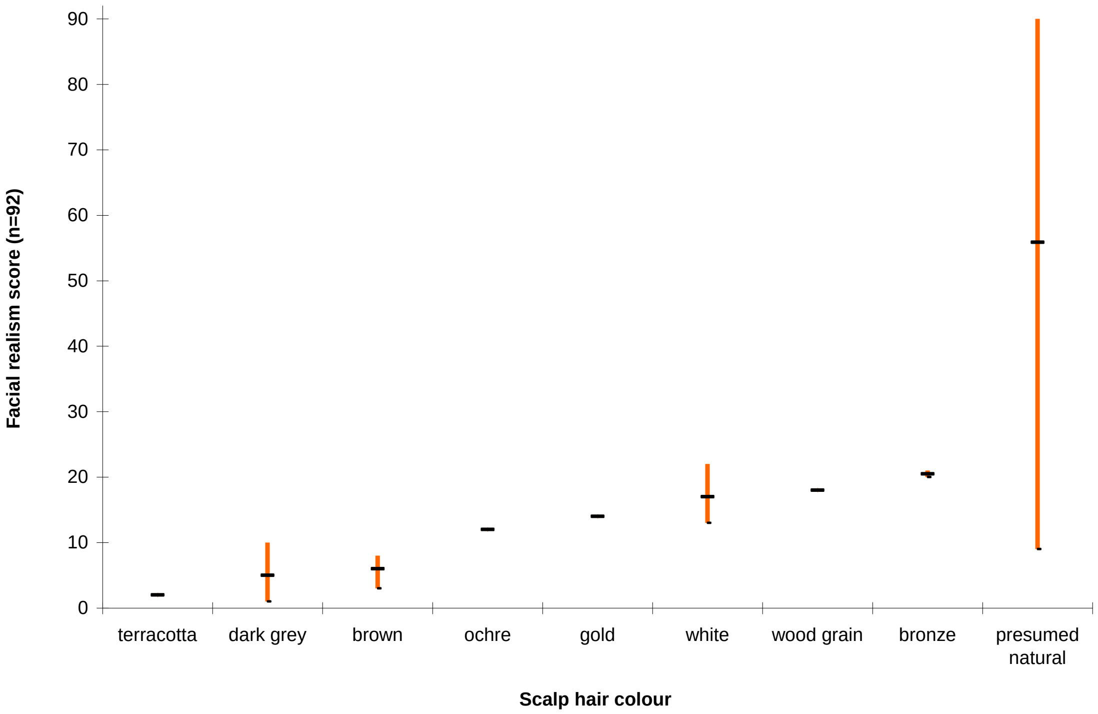

FIGURE 5.21 A graph showing the facial realism average scores within the nine scalp hair colours identified with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified scalp hair colour categories.

EYEBROW

Eyebrows were found to be absent or present. When present they were found to be moulded, carved, painted/moulded, or a range of individual hair finishes (Figure 5.22). In order of the FR average, those representations with moulded and painted eyebrows were found to have a FR average of 13 with a score range of 7 to 25. Those with moulded eyebrows had a FR average of 14 with a score range of 2 to 22. Carved eyebrows a score range of 14 to 18 and a FR average of 16. Individual hairs that were stuck on had a FR average of 31 with a minimum of 26 and a maximum of 47. When the eyebrows were absent the FR average was 33 with scores ranging from 1 to 77. The individual hair category had scores ranging from a minimum of 23 and a maximum of 52 with a FR average of 38. Inserted individual hairs had a FR average of 63 with a minimum score of 32 and a maximum score of 90.

Eyebrows that were moulded, carved or moulded/painted were only found on the representations at the lower end of the realism scale. Representations with no eyebrows were found along most of the scale except for the most realistic representations which all had eyebrows that were inserted individual hairs. Earlier hominin sample had no painted eyebrows or brows that were not visible both of which were found in the *H. sapiens* sample. These results are consistent with those from the *H. sapiens* sample and indicate that the presence of eyebrows is important for the representations' perceived realism.

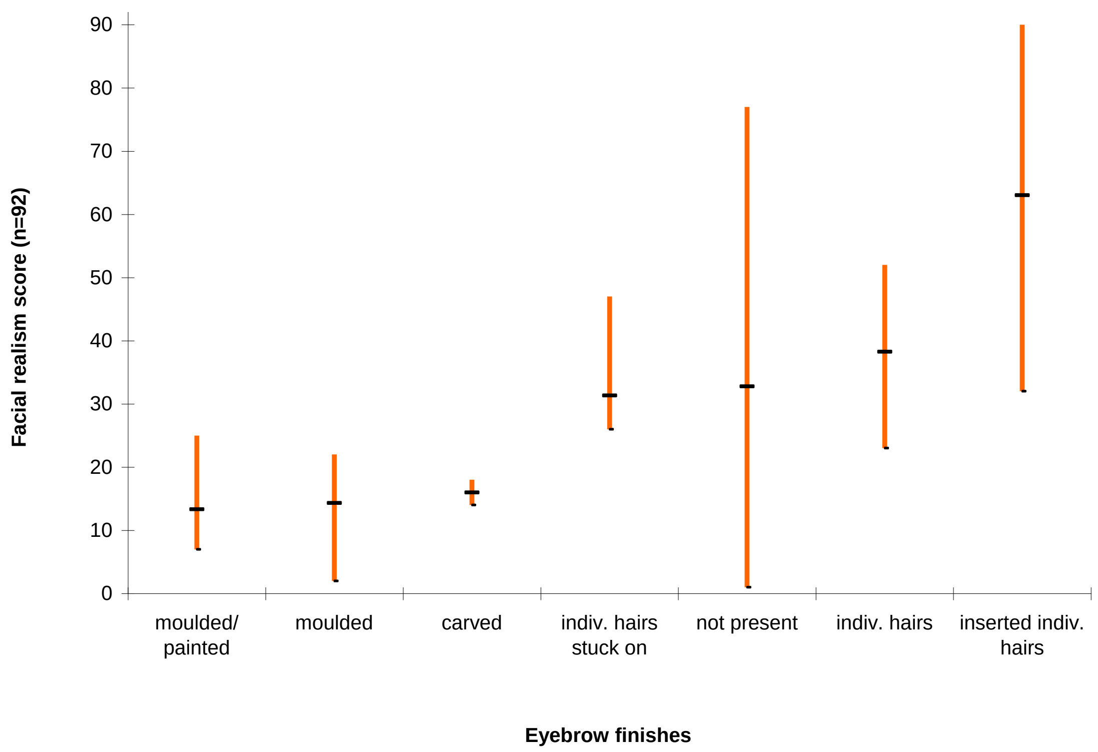

FIGURE 5.22 A graph showing the facial realism average scores for the identified eyebrow finish categories with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

The eyebrows, when present, came in a range of colours (Figure 5.23). As with the scalp hair colours, there was very little difference between the eyebrow colours and the skin colours. The only differences were reduced numbers for the the dark grey, brown, white and presumed naturalistic colours. The representations with brown eyebrows had a FR average score of 8 with a minimum of 7 and a maximum of 8, those with dark grey eyebrows had a score of 10, the ones with white eyebrows had a minmum score of 5 and a maximum score of 22, with a FR average of 15. Eyebrows in the presumed naturalistic colour category had a FR average of 57 and had scores ranging from 23 to 90.

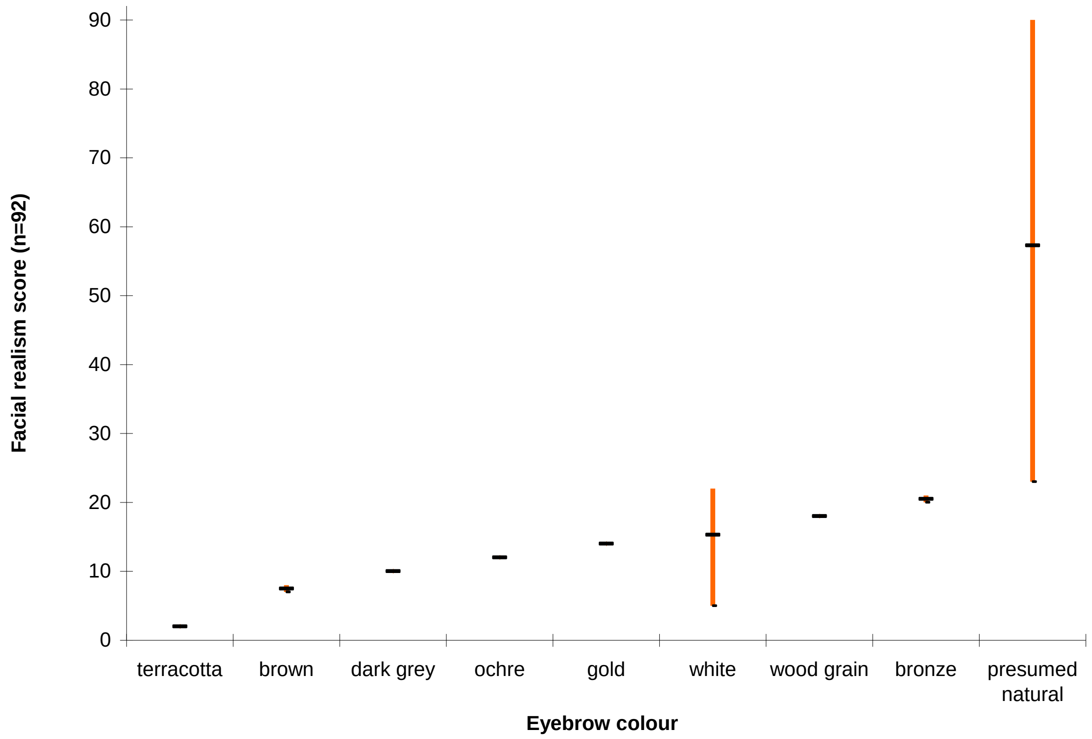

FIGURE 5.23 A graph showing the facial realism average scores for the identified eyebrow colours with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

The most realistic two thirds of the sample had presumed naturalistic coloured eyebrows or had no eyebrows at all. All of the representations with artificially coloured eyebrows were found at the lower end of the semantic scale. In the *H.* sapiens sample the naturalistic coloured eyebrows had a large score range which overlapped with several of the other colour categories, only those representations with mottled, wood grained or brown eyebrows scored lower than the naturalistic coloured score range.

EYELASH

Eyelashes were only found in the detailed faces. When present there was either the upper lashes only or both the upper and lower lashes (Figure 5.24). The representations with no lashes at all, which included the basic representations, had a FR average of 39 with a score range from 1 to 90. Where only the upper lashes are present, the FR average was 56 with a minimum score of 32 and a maximum score of 88. When both lashes were present, the FR average was 39 with a minimum score of 23 and a maximum score of 79. There were no representations in this sample that only had the lower lashes present.

The representations that had no eyelashes again had the largest range of scores. When both lashes are present the realism of the representations is judged to be lower than when there are only the upper lashes present. Again the results indicate that if only one set of eyelashes are to be included on the representation they should be the upper lashes. When the eyelashes are present they are always in presumed naturalistic colours as was found in the *H. sapiens* sample. The most realistic of the representations did not have eyelashes. These results were very similar to the other sample. The main differences being that the *H. sapiens* sample had representations which only had lower lashes; the FR average for the both lashes category was at the lower end of the score range than for the earlier hominins sample and the most realistic of the representations had both lashes present.

The eyelashes when present were only found to be of various types of individual hairs (Figure 5.25). Fake eyelashes or eyelash piece had a FR average of 39, with a score range from 31 to 47 while the inserted individual hairs had a FR average of 68 with a range from 41 to 88. Those representations that had eyelashes composed of individual hairs that were not able to be put into either category had scores ranging from 23 to 84 with a FR average score of 48. There were no painted lashes in this sample as there were in the *H. sapiens* sample.

All eyelashes in this sample were of individual hairs. It is not always possible to determine if the eyelashes are of the fake type that are stuck onto the representation or if they are inserted into the representation. There were no fake lashes that had separated away from the eye area as in the *H.* sapiens sample. The *H.* sapiens sample also had painted eyelashes, which were not found in this sample. These results indicate that the artists consider it important to have eyelashes of individual hairs on these type of representations and that painted lashes would not convey the correct message/look.

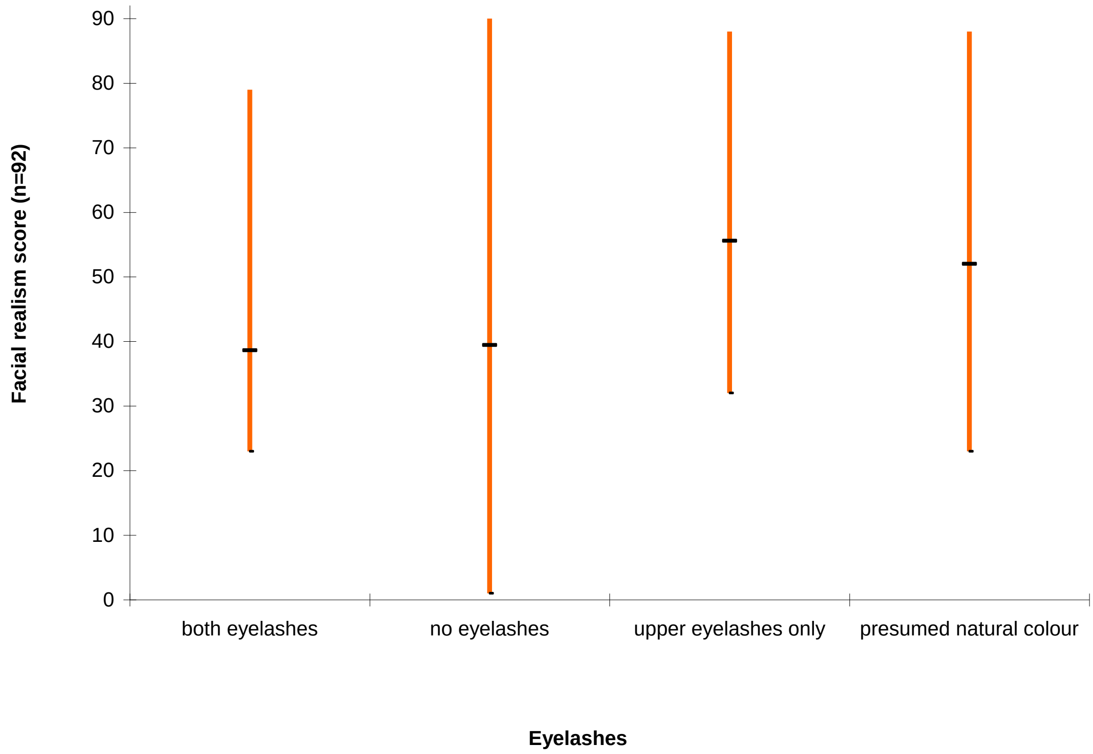

FIGURE 5.24 A graph showing the facial realism average scores for the eyelash categories with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

Eyelashes are again one of the few features that are only ever portrayed in naturalistic colours. This is in part due to the fact that they are only found on detailed representations, whether they be earlier hominin representations or *H. sapiens* representations.

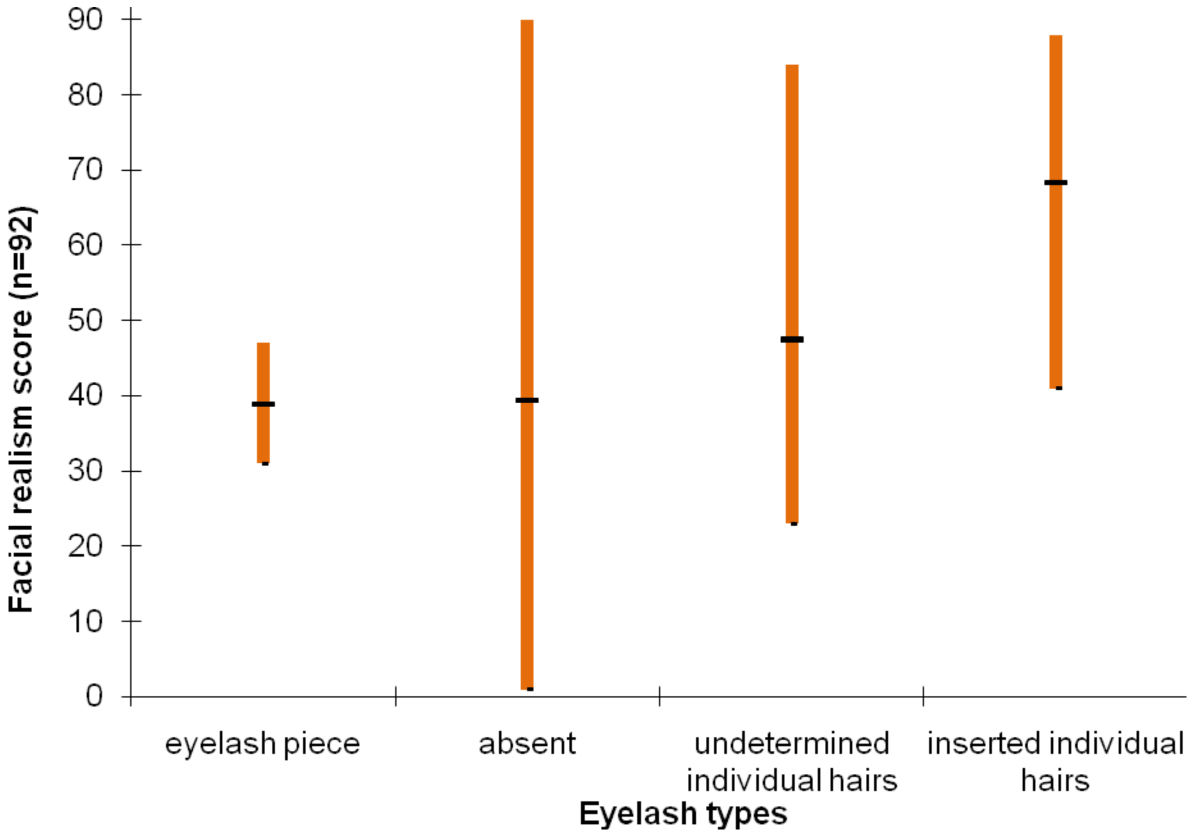

FIGURE 5.25 A graph showing the facial realism average scores for the identified eyelash types and colouring categories with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

EYE

There were a variety of eye details identified in the sample (Figure 5.26). There were no representations that lacked eyes in this sample. The representations that had no pupil had a FR average of 13, with a minimum of 2 and a maximum of 49. When representations lack pupils the FR average was 18 with scores ranging from 1 to 46. There were a limited number of representations that had closed eyes and these had a minimum score of 33 and a maximum score of 35 with a FR average of 34. A new category was found in this sample where the pupil was only suggested, the FR average was 44 with a score range of 39 to 46. Similar results to the *H. sapiens* sample were found for those representations that had sclera, iris and pupil. Those with sclera had a minimum of 1 with a maximum of 90 and a FR average score of 45. The iris and pupil both had FR average scores of 51 and maximum scores of 90 while the minimum score for the iris was 3 and for the pupil it was 4.

Very few representations in the earlier hominin sample had closed eyes and those were found in the lower half of the realism scale. Any representations that were missing eye features were found in the lower section of the realism scale while in the upper end of the scale all of the more realistic representations had all eye features present. These results continue to support the findings found in the *H. sapiens* sample which indicated the importance of the eyes to the representations perceived realism. This importance is further shown by the fact that none of the earlier hominin sample had eyes obscured in anyway other than by having the eyes closed. Those that did have closed eyes were at the lower end of the realism scale, which differed from the *H. sapiens* sample where the representations with closed eyes were only found in the upper half of the realism scale.

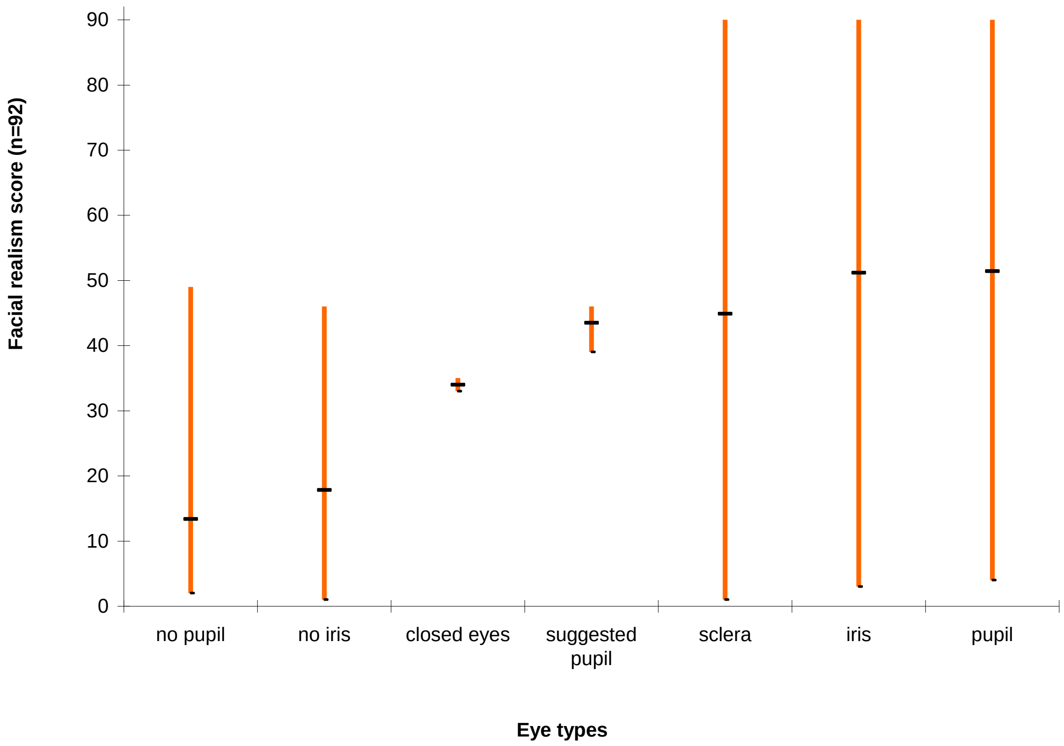

FIGURE 5.26 A graph showing the facial realism average scores for the identified eye types with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

Several eye finishes were also identified in the sample (Figure 5.27). The score for the moulded with paint wash category was a FR average of 7, a minimum score of 6 and a maximum one of 8. Moulded and painted eyes had of score of 11 while those that were moulded/carved had a score range of 3 to 21 with a FR average of 11. Carved eyes had scores of 18 whereas those that were only moulded had a FR average of 23 with a range from 1 to 46. The representations with inserted eyes had scores ranging from 23 to 90 with a FR average of 58.

The representations in the upper half of the realism scale only had inserted eyes, this differed from the *H. sapiens* sample which had a mix of painted or inserted eyes in the upper half of the realism scale. Painted eyes were not found in the earlier hominin sample. The earlier hominin sample did have additional categories that the *H. sapiens* sample did not have; these were the moulded and carved category as well as the carved category. The only overlap with the inserted eyes in the earlier hominin category was with the moulded eye category. The moulded eye category also overlapped at the lower end of the realism scale with the moulded/paint wash, moulded/carved and carved categories.

Eye colours consisted of all of the previously identified nine colours (Figure 5.28). The results were again very similar to those recorded for the skin colours. The only difference being in the FR average numbers for the presumed naturalistic colour category where it was 57 rather than 56 as in the skin colour category. This meant that the only representations that had closed eyes were in the presumed naturalistic colours.

As with the colours identified in the other facial features, the naturalistic coloured eyes were considered to be the most realsitic of all the colour categories. These results were consistent with those from the *H. sapiens* sample.

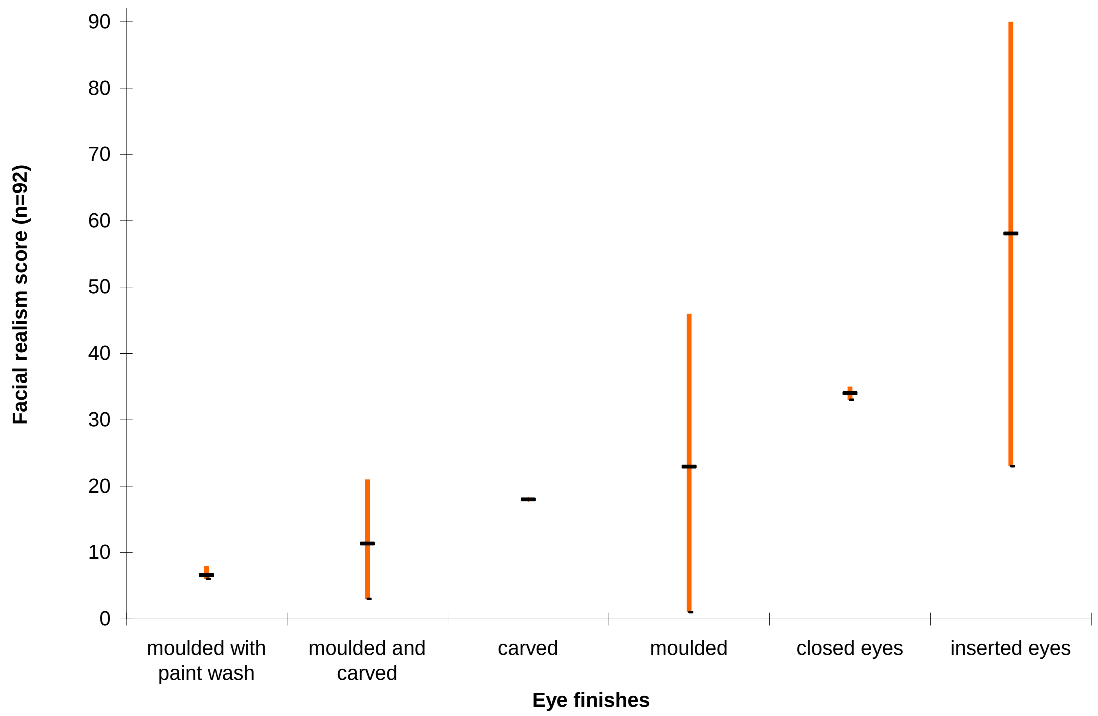

FIGURE 5.27 A graph showing the facial realism average scores for the identified eye finishes with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

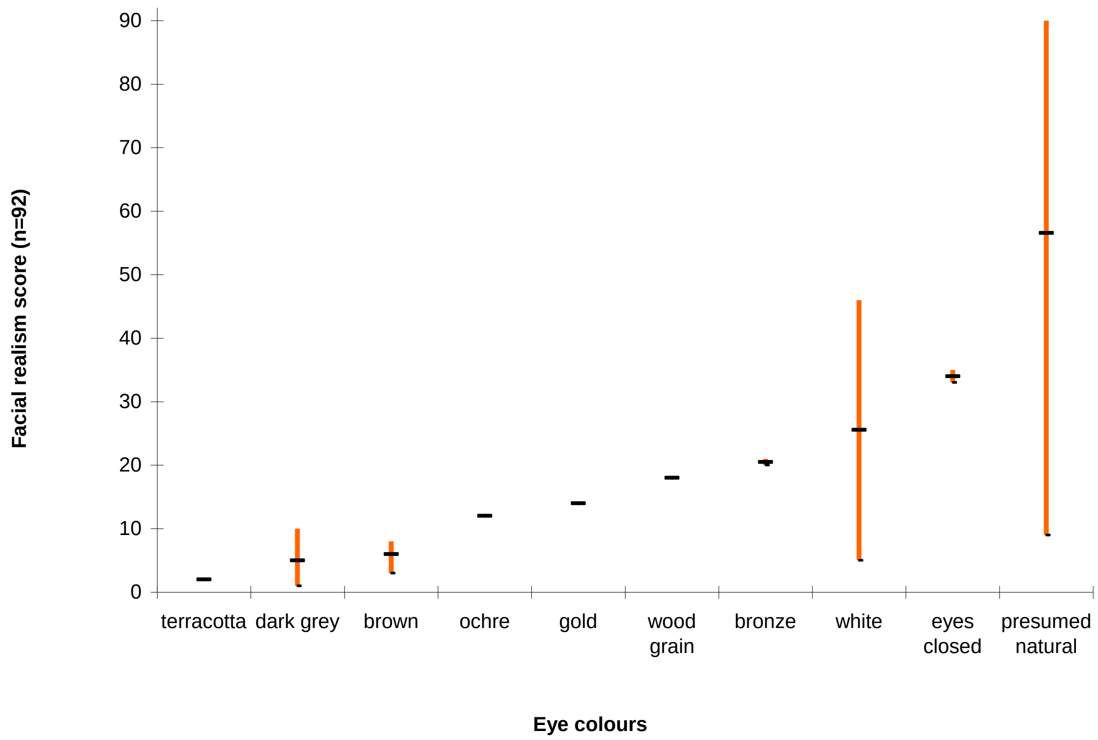

FIGURE 5.28 A graph showing the facial realism average scores for the identified eye colours with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

FACIAL HAIR

Facial hair, when present came in a range of finishes that were placed at various stages along the realism scale (Figure 5.29). Moulded and painted facial hair had a FR average score of 10, in a range of scores from 6 to 25. Carved facial hair had a score range of 9 to 18 with a FR average of 14. The moulded and carved category had a score of 14 for the minimum, maximum and FR average scores. Facial hair that was moulded had a minimum score of 3 and a maximum score of 22 with a FR average of 15. Representations that had individual hairs stuck on had a FR average of 31 within a score range of 26 to 47. The representations with no facial hair were a large group and the score range was from 1 to 89 with a FR average of 40. While, the facial hair consisting of individual hairs inserted into the representation had a FR average of 69 with a minimum score of 41 and a maximum score of 90.

Facial hair was a feature identified in the *H.* sapiens sample as having a large score range in the absent category as it is secondary sex characteristic in *H. sapiens.* In that sample it was only present on males and was absent on all female and child representations. The earlier hominin sample had different results as both males and females were found to have facial hair.

The majority of the representations in the upper two thirds of the realism scale either had no facial hair or their facial hair was made up of individual hairs. The higher up the scale the representation was then it was more likely that they would have facial hair that had been individually inserted into the representation's face.

Facial hair regions were only identified in this sample as both males and females were identified as having facial hair (Figure 5.30). The category of cheek only facial hair had a score of 9 and the sideburns category had a score of 24 for all three scores. Representations with hair only in the beard region had a FR average of 28 with a minimum score of 6 and a maximum score of 75. Those representations with no facial hair had scores ranging from 1 to 89 with a FR average of 41. Hair only in the upper lip (moustache) region had a FR average score of 43, with a minimum score of 25 and a maximum one of 60. The full beard region (which included the upper lip area) had a range of scores from 3 to 90 with a FR average of 52. The cheek and full beard region had a FR average and maximum scores of 69 with a minimum score of 68, while the sideburns and cheek region had a score of 74 for all scores.

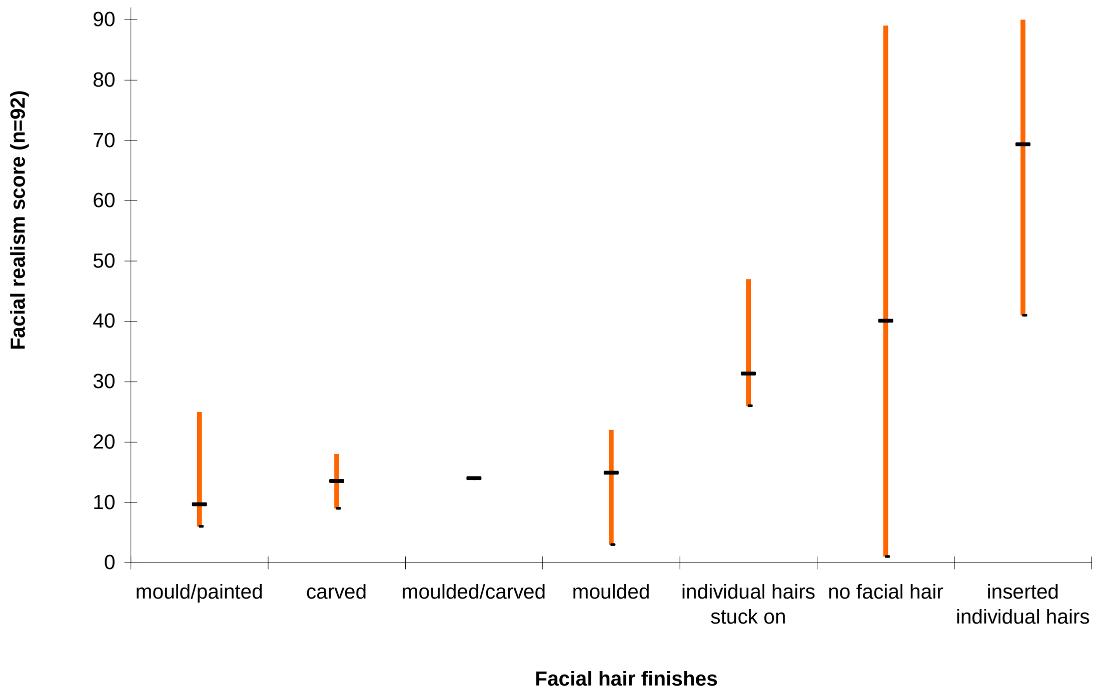

FIGURE 5.29 A graph showing the facial realism average scores for the identified facial hair finishes with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

Cheek hair was considered to be more realistic when it was combined with facial hair in other regions, then when it was confined to that region only. The most common regions were the beard only, the moustache and upper lip region and the full beard region. The least common were the cheek only, sideburn region, cheek and full beard region and the sideburn and cheek region.

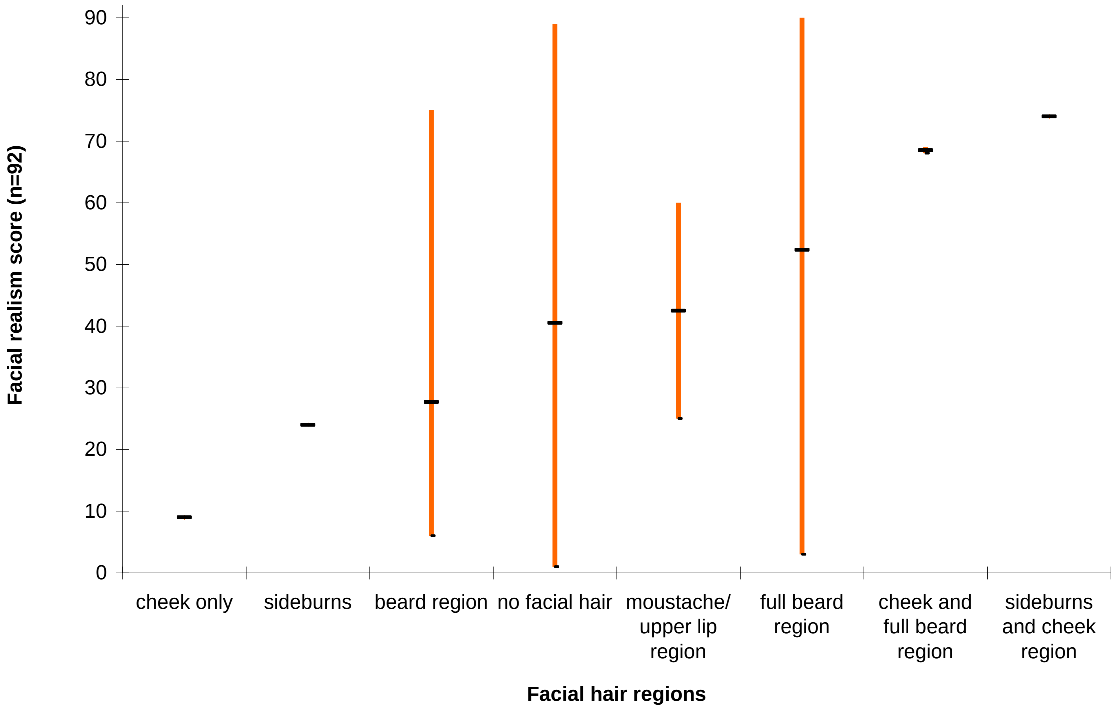

FIGURE 5.30 A graph showing the facial realism average scores for the identified facial hair regions with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

Of the originally identified nine feature colours, facial hair only had seven colours, as none of the terracotta or dark grey representations had facial hair in this sample (Figure 5.31). The brown, ochre, gold and wood grain representations had no changes to their FR average, minimum or maximum scores. Scores changed for the white, bronze and presumed natural colour categories. The white FR average dropped to 17 within a score range from 13 to 22. A score of 21 was recorded for the bronze representation for all scores, meaning that one had facial hair and one did not in this colour category. The FR average for the presumed naturalistic colouring rose from 56 to 61, although, the minimum and maximum scores remained the same at 9 and 90 respectively.

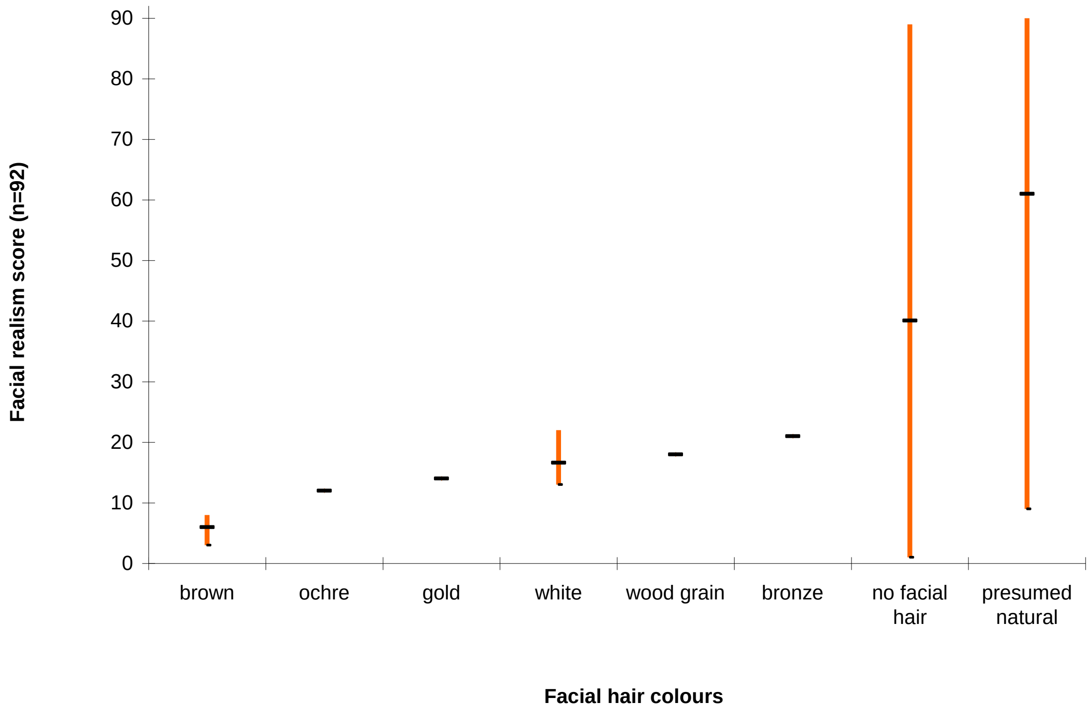

FIGURE 5.31 A graph showing the facial realism average scores for the identified facial hair colours with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

MOUTH

All mouths in this sample were anatomical. As there were no mouths that were absent, suggested or obscured, this sample differed to the *H. sapiens* sample in this respect. Of the mouth finish types, the moulded mouths had a score range of 1 to 50 with a FR average of 27 (Figure 5.32). Carved mouths had a FR average score of 29 with a minimum of 18 and a maximum of 47, while the moulded and painted mouths had scores ranging from 4 to 90 with a FR average score of 54.

The representations on the lower end of the realism scale generally had mouths that were moulded or carved, although, those with carved mouths were not found in the lowest FR numbers. The upper end of the realism scale showed that those representations only had moulded and painted mouths, which was the same finding in the *H. sapiens* sample. The earlier hominin sample had more representations with carved mouths than the *H. sapiens* sample. Carved mouths in the *H. sapiens* were also only found in the lowest of the FR numbers.

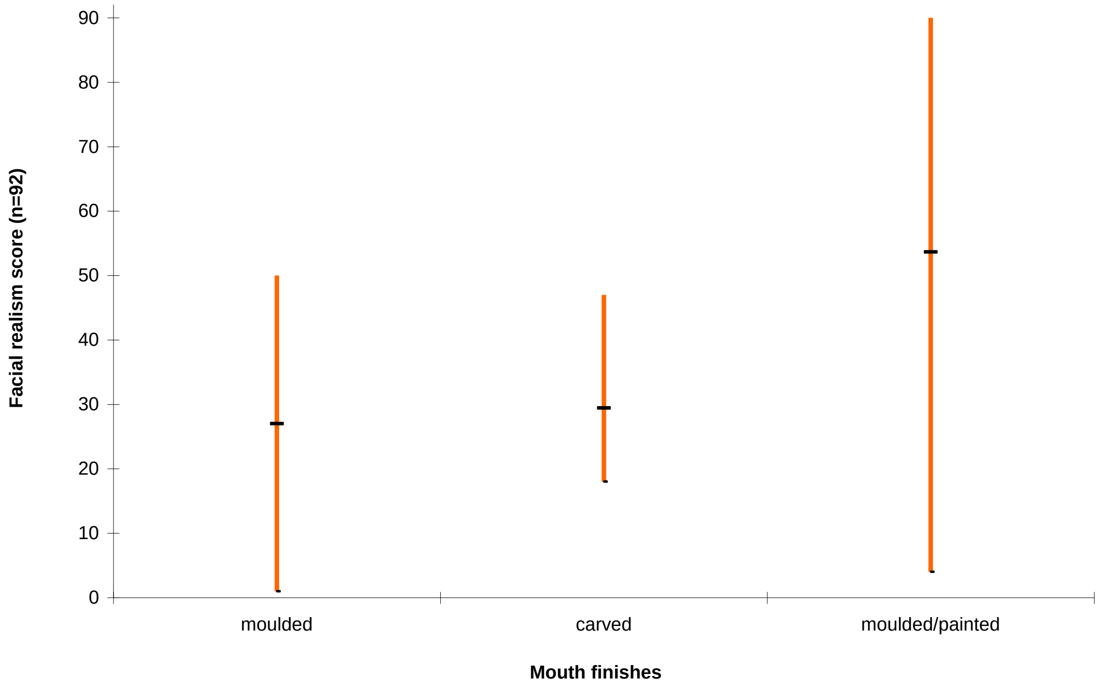

FIGURE 5.32 A graph showing the facial realism average scores for the identified mouth types with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

LIPS

Lips were colours and scores were consisted with those identified in the skin colouring section. These results differed to those found in the *H.* sapiens sample as there were additional lip colour categories added to the previously identified colour categories, as well as those representations that were missing mouths or they were only suggested. There were no lip colours that were determined to be a cultural product in the earlier hominin sample as was found in the *H. sapiens* sample.

A further characteristic was found to be shine on the lips (Figure 5.33). The lips with no shine on them had a FR average of 39 with a minimum score of 1 and a maximum score of 90. Those with shine had scores ranging from 6 to 89, with an FR average score of 61. As both categories had similar score ranges, the main difference was in the FR average scores. This meant that the representations with lip shine were generally judged as more realistic than those without lip shine. The difference between the two samples is that score range for the lip shine which was much larger in the earlier hominin sample. This may be due to the higher number of detailed representations in the earlier hominin sample than in the *H. sapiens* sample.

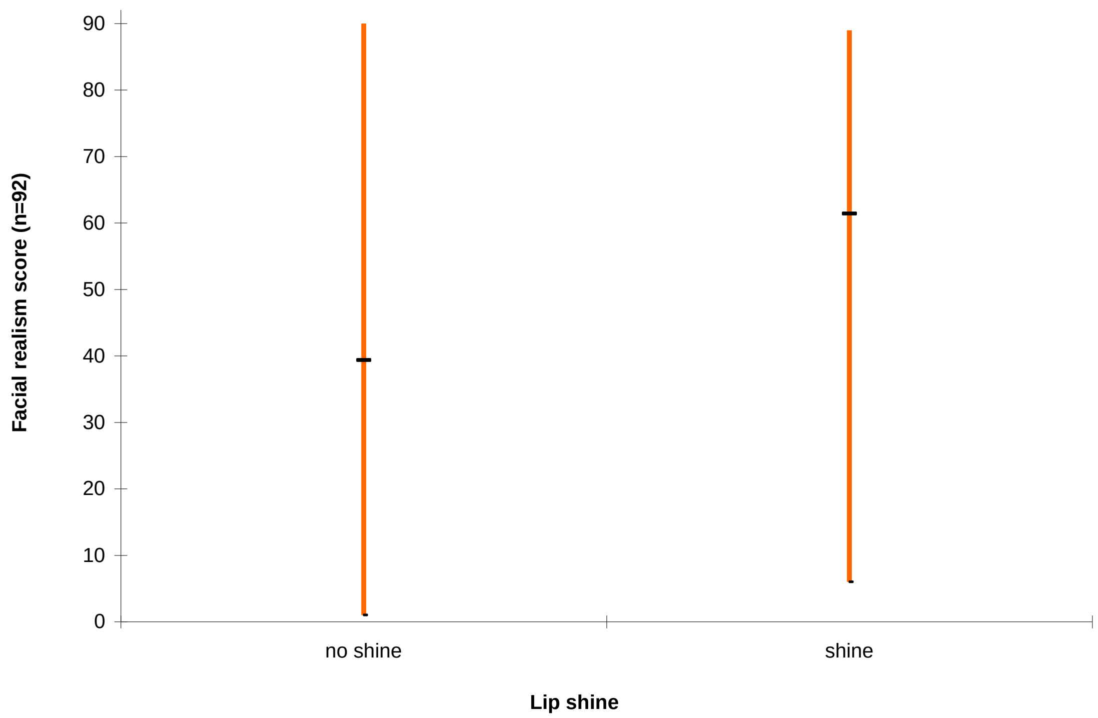

FIGURE 5.33 A graph showing the facial realism average scores for the presence or absence of lip shine with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

MOUTHS OPEN OR CLOSED

Mouths can be open or closed and this gave different levels of realism to the mouths (Figure 5.34). When the mouth was closed the FR average was 42 within a score range from 1 to 87. Open mouths had a FR average of 55 with a minimum score of 9 and a maximum score of 90.

Representations with their mouths open were considered to be slightly more realistic on average than those with their mouths closed. These results are similar to those found in the *H. sapiens* sample. The difference between the two samples was that in the *H. sapiens* sample the mouths of some representations were obscured or suggested and this was not found in the earlier hominin sample.

FIGURE 5.34 A graph showing the facial realism average scores for the difference between open and closed mouths with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

TEETH

The width of the mouth opening was not always sufficient to show the teeth (Figure 5.35). When the mouth was open but the teeth were not visible the FR average of these representations was 69 with a minimum score of 60 and a maximum score of 78. Visible teeth had scores ranging from 9 to 90 with a FR average of 52. For comparison purposes closed mouths had a FR average of 42 and open mouths had one of 55.

Those representations with open mouths but no visible teeth were judged to be on the upper end of the realism scale, whereas, those with visible teeth were found all along the semantic scale. These results differed from those from the *H. sapiens* sample, where those representations with visible teeth were judged as more realistic than those without. In the *H. sapiens* sample representations with open mouths but no visible teeth were found all along the realism scale, whereas, with the ones in the earlier hominin sample they were confined to the upper half of the realism scale.

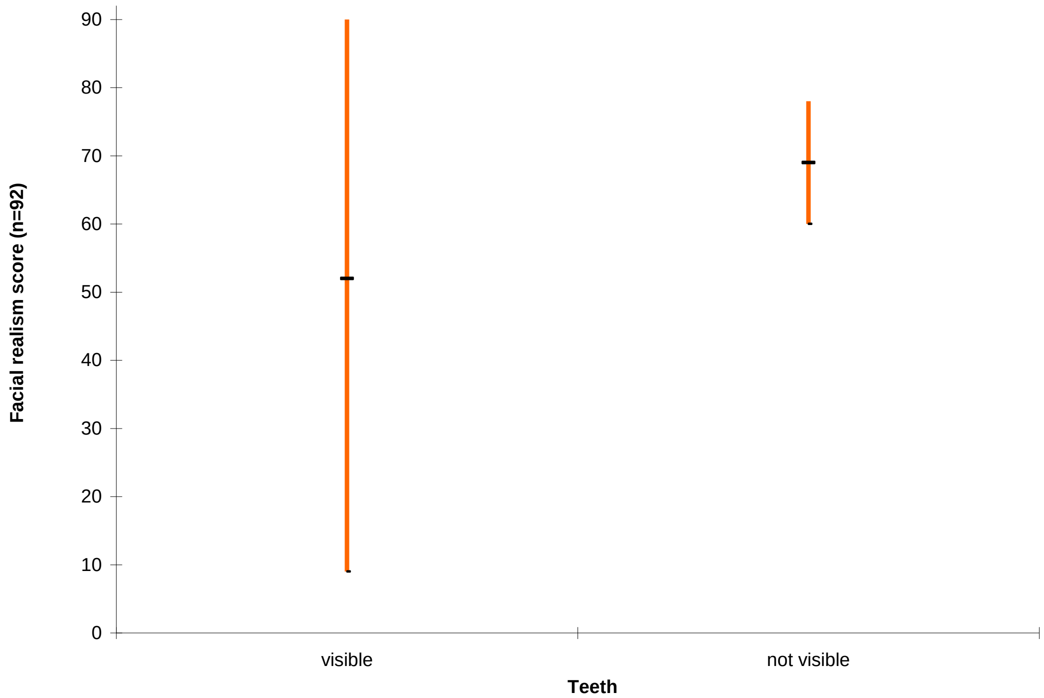

FIGURE 5.35 A graph showing the facial realism average scores for visible teeth or those that were not visible within the mouth with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

The teeth when visible were found to be in three different colours and these had varying levels of realism (Figure 5.36). The bronze representation with bronze teeth had a score of 20 for the minimum, maximum and FR average scores. While the white ones with white teeth had a score of 37 for the FR average and a score range of 13 to 46. The presumed naturalistic coloured teeth had a score of 59 for the FR average and 9 for the minimum and 90 for the maximum.

Tooth colour is dependent upon the colour of the rest of the representation's face. This is illustrated by the white and bronze colour categories. The presumably naturalistic coloured teeth, in presumably naturalistic coloured faces were considered to be the most realistic. This was also found in the *H. sapiens* sample. The main difference between the two samples was that in the *H. sapiens* sample there were detailed representations that did not have naturally coloured teeth.

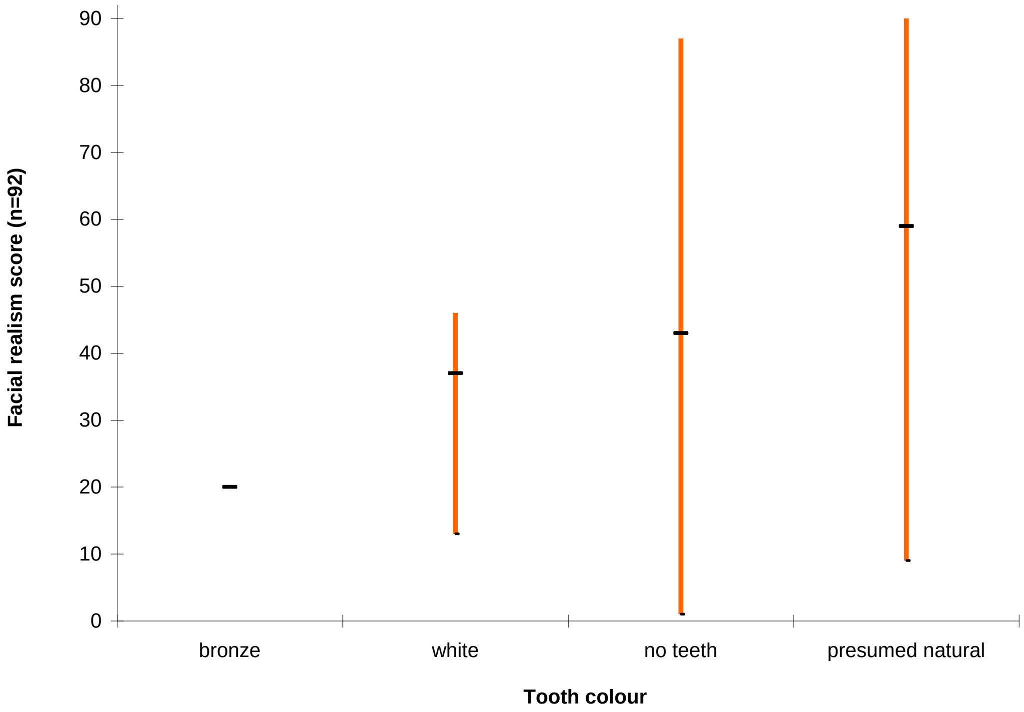

FIGURE 5.36 A graph showing the facial realism average scores for the colour of the teeth with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

For the representations that had teeth, there was a difference in perceived realism between those with shine and those that did not (Figure 5.37). The teeth with no shine on them had a FR average of 46, with a minimum score of 9 and a maximum score of 90. Those with shine had a FR average of 72 within scores ranging from 50 to 89. The representations that had shine on their teeth were only found in the upper range of the facial realism scores whereas those without shine were found all along the realism scale. This result was the same for both samples.

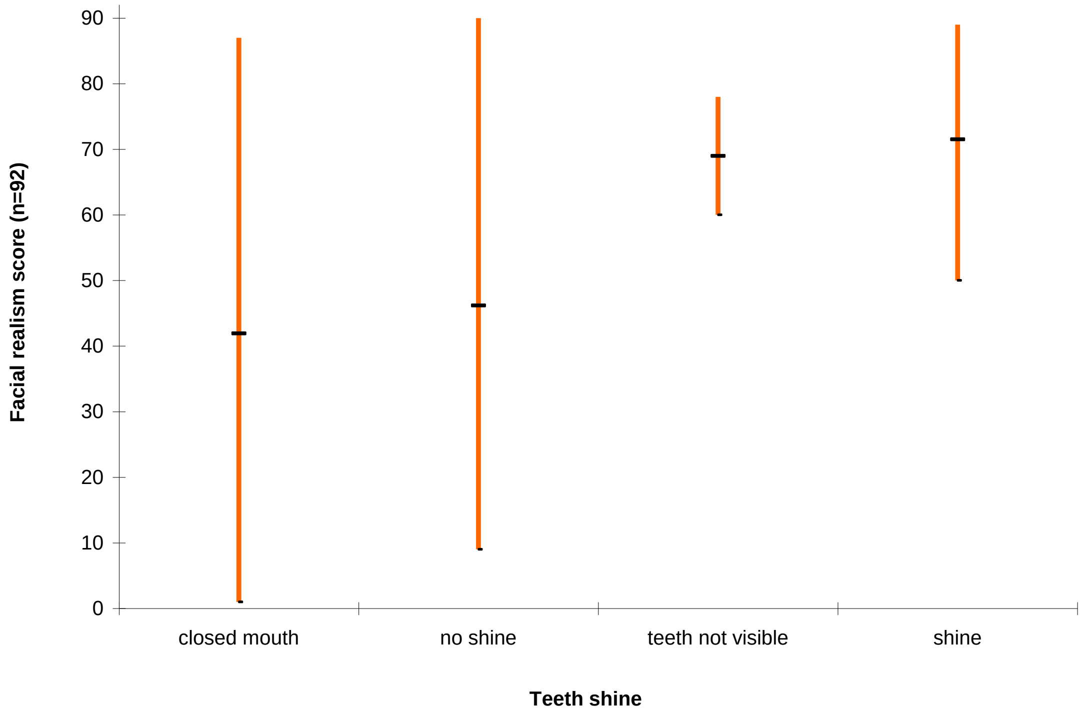

FIGURE 5.37 A graph showing the facial realism average scores for the presence or absence of shine on the teeth with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

ORAL CAVITY

The realism of the oral cavity was assessed in relation to how visible the cavity was within the mouth (Figure 5.38). When the mouth was open but the oral cavity was not visible, the FR average was 51 and the minimum score was 13 and the maximum was 90. For comparison purposes the FR average for the mouth being open was 55 and for the mouth closed it was 42. When the cavity was visible the FR average was 55 with scores ranging from 9 to 89.

There was very little difference between the categories, although the FR average for the visible category was slightly higher than the others. The FR average for the visible category was much higher than the not visible category in the *H. sapiens* sample.

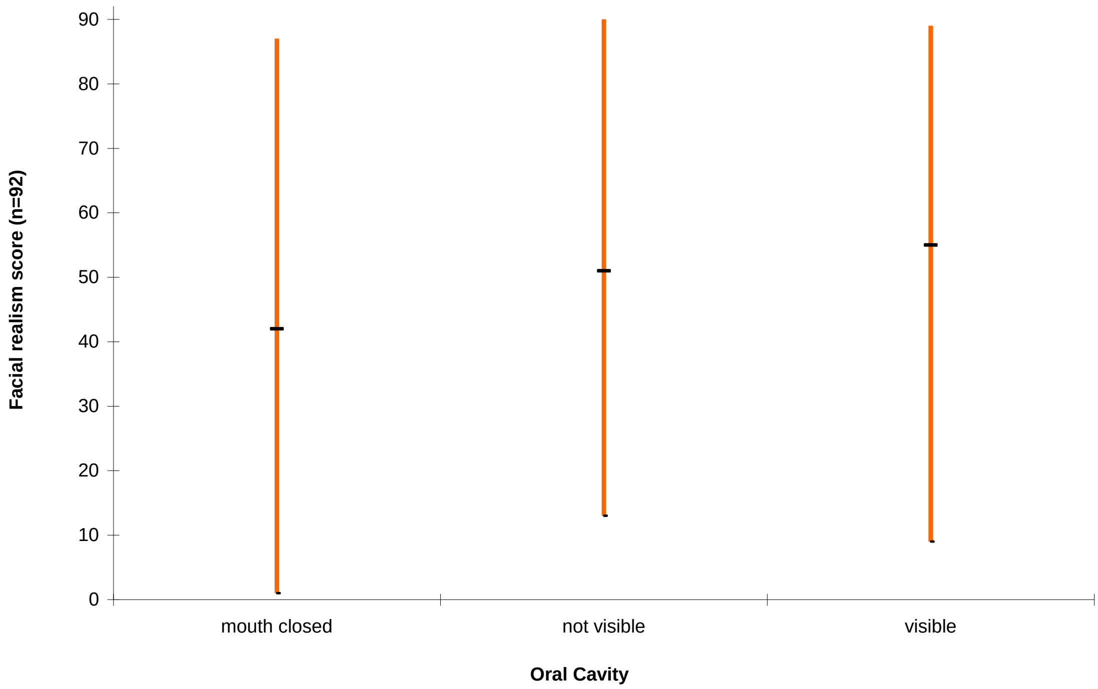

FIGURE 5.38 A graph showing the facial realism average scores for the oral cavity with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

The oral cavities identified were either coloured white or presumed natural colours (Figure 5.39). Those representations with white oral cavities had a minimum score of 39 and a maximum score of 72 with a FR average of 49. The presumed natural coloured oral cavities had a FR average of 58 with a minimum score of 9 and a maximum score of 89.

The oral cavities in this sample were easily visible and the colours discernable which differed to the *H.* sapiens sample. Representaions with presumed naturalisticly coloured oral cavities were found all along the realism scale, although the FR average for this colour was higher than that for the white category. The representations with the white oral cavities were found in the upper half of the realism scale only. In the *H. sapiens* sample both the white and naturalistic colour categories were confined to the upper end of the realism scale, while those representations that had oral cavities in shadow were found all along the realism scale.

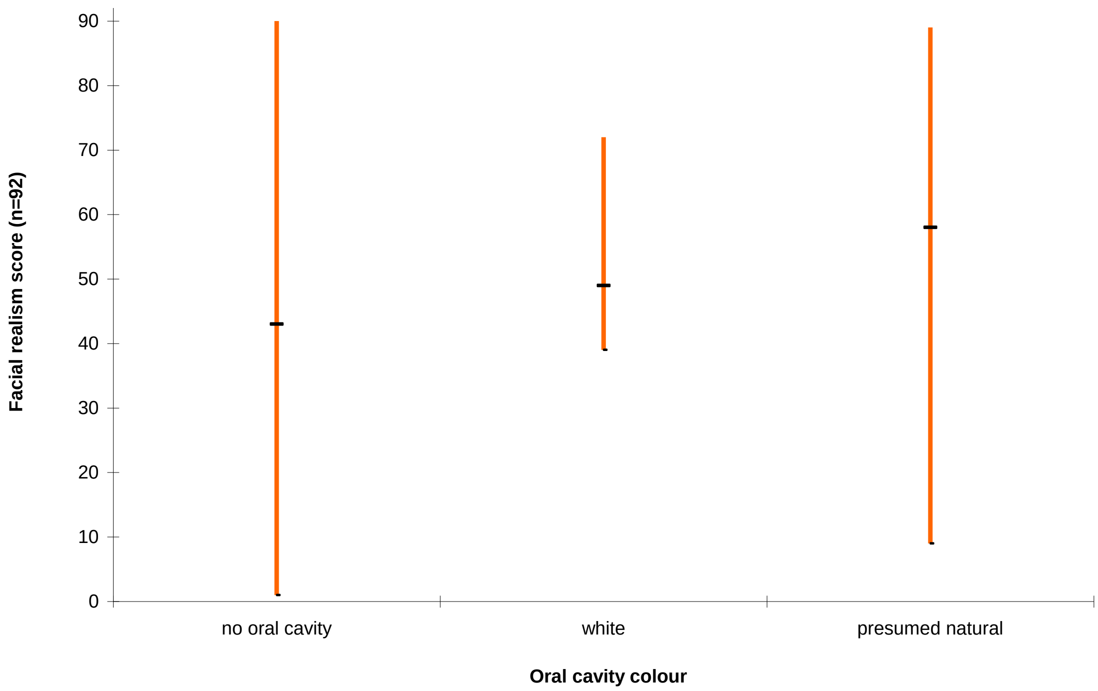

FIGURE 5.39 A graph showing the facial realism average scores for the colours of the oral cavity with the vertical lines representing the range from minimum to maximum score where applicable for each of the identified categories.

TONGUE

The tongue had limited variables to affect it within the sample and these variables had differing levels of realism (Figure 5.40). In order to compare importance of realism, the open mouth had a FR average of 55, the presence of the tongue, however, gave a FR average of 54 with a minimum score of 9 and a maximum score of 89. When the tongue was not visible the FR average was 52 within scores ranging from 13 to 90. There was very little difference between the representations whether the tongue was visible or not, although, the FR average was higher than that for the mouth closed. These results were similar to those for the *H. sapiens* sample.

When the tongue was present it was found in either white or in presumed naturalistic colours (Figure 5.41). Those that were white had a FR average of 43 with a minimum score of 39 and a maximum score of 45. The ones that were in the presumed natural colour category had a FR average of 58 within scores ranging from 9 to 89. This differed from the *H.* sapiens sample in that when the tongue was present it was only found in naturalistic colours.

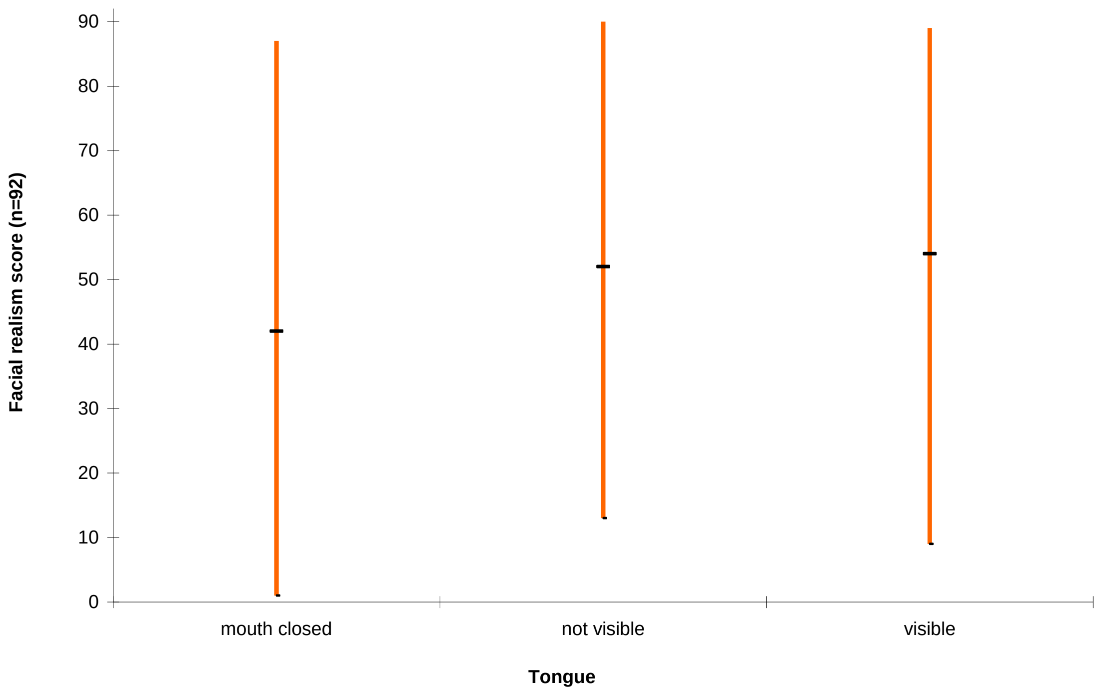

FIGURE 5.40 A graph showing the facial realism average scores for the presence or absence of the tongue for the sample with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

The tongues when present, either had shine on them or they did not (Figure 5.42). When there was no shine on the tongue the FR average was 49 and the scores ranged from 9 to 88. Tongue shine had a minimum of 50 and a maximum of 89 with a FR average of 67.

Tongue shine was only found on representations in the upper half of the realism scale. This means that it is a feature that adds to the percieved realism of a representation. Tongue shine was only found in the earlier hominin sample and not in the *H. sapiens* sample.

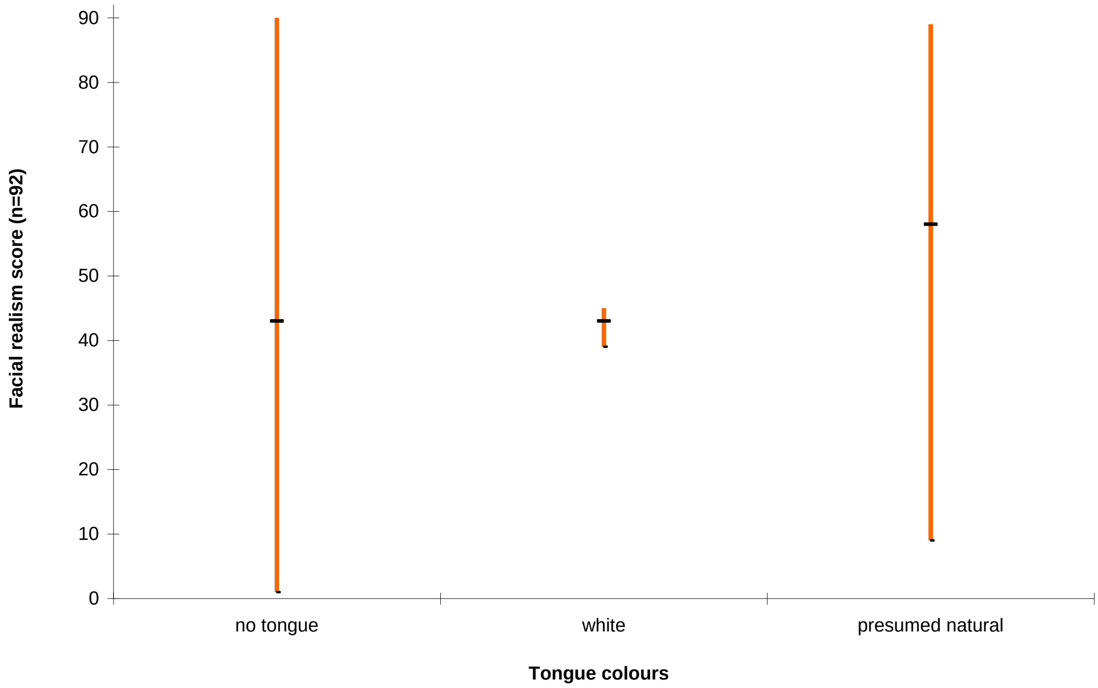

FIGURE 5.41 A graph showing the facial realism average scores for the colours of the tongue found in the sample with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

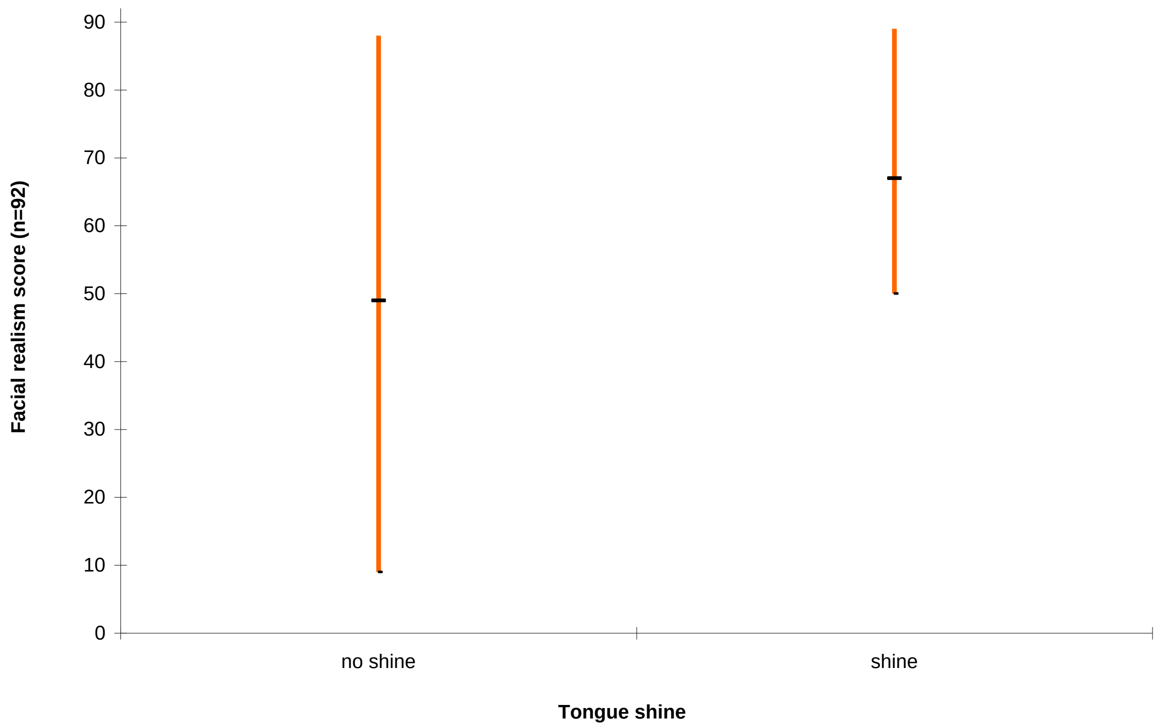

FIGURE 5.42 A graph showing the facial realism average scores for the shine on the tongues found in the sample with the vertical lines representing the range from minimum to maximum score for each of the identified categories.

OTHER CONSIDERATIONS

As with the previous chapter and its focus on *H. sapiens*, this study had been confined to the facial characteristics of the sampled representations and has not included characteristics of the body or the external influences from the display context of the representation which may also influence the perceived realism of the representation. The main consideration with the earlier hominin sample was with the representations that were placed behind barrier displays. These included fence type barriers and vitrines (glass display cases). Light glare from the glass/perspex of display cases was the main consideration with this sample.

CONCLUSIONS

As pointed out in Chapter 3, the representations that make up the studies in this thesis are only from a sample of museums. It is possible that there are variations on those identified in this study or even other representation types out there.

The results from this study show that the representations of earlier hominins are treated differently from the *H. sapiens* representations. This is due, in part, to our unfamiliarity with the earlier hominins and what they looked like. In order to make these representations believable as an earlier species, more details are used to add to the realism of the final product. The more unfamiliar the object is the more details are needed in order to be able to make sense of what is seen. This is problematic as it is these additional details that are unknown (e.g., skin colour, presence/absence of body/facial hair and eyebrows, length of hair, width of lips). These types of details cannot be deduced from skeletal material. It is difficult to create a realistic representation without these details. Leaving out details, such as the lips for example would be more likely to indicate that they had no lips than that the information is not known. Unlike reconstructions of Grecian urns, for example, where a blank section of pottery indicates a missing piece or an unknown section of the decoration, it is more difficult to create a representation that indicates a lack of knowledge about certain facial features.

This can really only be done with a basic representation as a detailed representation by definition cannot lack essential details. For example basic representations are often used to indicate a lack of knowledge about the pigmentation of the individual portrayed. By using an artificial colour for the entire representation, the artist/curator expects this to indicate to the viewer that the actual colouring of the individual portrayed by the representation is unknown. There are issues with this in that:

1. the viewer does not necessarily understand that this is the intention of the artificial colouring (for example one person asked why the skin colour of a facial reconstruction was so dark not realising that the artificially [terracotta] coloured representation was meant to show that the skin colour was unknown) (C. Wilkinson, 2006; pers. comm.);
2. our familiarity with sculptures, especially those by the Greeks and Romans, in white marble for example, give the impression that the representations are a form of sculpture and do not necessarily convey information such as the lack of knowledge about pigmentation; and
3. the modern viewer has an unprecedented knowledge and understanding (even if it is inaccurate) of facial reconstruction due to its use in a variety of media, including:
    a. television shows such as the popularity of crime dramas (the 'CSI' franchise, 'Bones' etc.);
    b. history programs ('Time Team', 'Meet the Ancestors');
    c. documentaries that portray the earlier hominins (actors with makeup and prosthetics as in 'Walking with Cavemen');
    d. reality shows on changing a person's image and plastic surgery give people an indication of how the underlying shape of the skull influences the external appearance of the face;
    e. the reporting of new finds in newspapers, science magazines and others such as National Geographic; and
    f. the use of the Internet and other technology such as iPods and the Apps that can be used on them.

Another point about familiarity is that none of the earlier hominin representations had their faces obscured in any way. This again points to our lack of familiarity with these earlier taxa (or our assumed lack of familiarity) as well as an assumption that they are so different from modern humans that we are unable to 'fill in the blanks' as such if any part of the face is obscured or if any of the features are suggested. The situation was different with regard to the eyes that were displayed in all representations, be it earlier hominins or *H. sapiens.*

The smaller sample size made this a much more manageable study than did the large *H. sapiens* sample, as did using the features and characteristics defined by the previous study in Chapter 4. As both this study and the one before it employed a scale ranging from least realistic to most realistic it might be expected that there would be no definite demarcation between finish types in the two cases. Yet this was not what was found. All of the representations were distinctly a basic or a detailed face except for one representation in this sample that was a basic face with detailed colouring.

Important factors in identifying hominin species are indicators of bipedalism and the change in dental morphology such as the reduction in canine size. These factors, however, are not necessarily shown in the representations; for example the full body is not always shown and the mouths are generally closed. This limits the scientific information that can be conveyed by an earlier hominin representation. It is a choice to present a representation with an open mouth as it is showing a dynamic oral cavity, a snapshot of a precise moment in time. The importance of the teeth is shown in the earlier hominin sample as when their mouths were open their teeth were more likely to be visible.

The 'detailed' representations in the earlier hominin sample (Table 5.40) were very detailed:

- they all had scalp hair;
- there were no painted features such as facial hair or eyelashes and they very rarely had painted eyebrows;

- they were more likely to have eyelashes that were individual hairs inserted into the representation;
- they were also more likely to have lip shine and tongue shine;
- none of the facial details were obscured in any way; and
- when their mouths were opened they were more likely to show details such as teeth, oral cavity and tongue.

There were several details in the earlier hominin sample that differed from those found in the *H. sapiens* sample, these were: lack of blank faces; lack of obscured features; when hair is present it is more likely to be of individual hair strands; detailed representations were more likely to have eyelashes; males and females had facial hair; facial hair was found in more regions of the face; more likely to have shine on lips, and tongue; and when the oral cavity is visible there are more details visible, such as the tongue. The differences between the samples indicate that: more time is spent on the actual creation of the earlier hominin than on the *H. sapiens*; and that the public is thought to be unfamiliar enough with the external appearance of the earlier hominins, so that extra details are required for these representations to be a believable depiction of these species. Perhaps the details highlight the differences rather than the similarities. In the *H. sapiens* samples representations with a lack of detail were those that indicated generic humans whereas those that were highly detailed and with a high level of realism were often those depicting specific individuals: Yde Girl, Marcus van Eindhoven, Philip, Sensaos and Janus for example. The earlier hominins, however, depict a ‘type’ rather than specific individuals. Even the Old Man of La Chapelle is more of an example of an older adult than a specific individual.

TABLE 5.40 **A summary of the morphological characteristics of the most realistic 10% of the sample, FR numbers from 82 to 90, ordered with the most realistic (FR90) at the top of the table. See Appendix F for details on the museums and countries that the representations are from.**

Number	Reconstruction name or description	Male	Adult	Detailed facial features and presumed natural colour scheme	Scalp hair, inserted individual hairs, presumed natural colour	Eyebrows, inserted individual hairs, presumed natural colour	Inserted eyes	Mouth, moulded and painted presumed natural colours	Upper Eyelashes of individual hairs and presumed natural colours	Lip shine	Mouth open, teeth visible, presumed natural colours	Tongue visible	Oral cavity visible and of presumed natural colours	Facial hair, inserted individual hairs, presumed natural colour, full beard region
E239	Feldhofer	M	1	1	1	1	1	1			1			1
E305	Neandertal woman	F	1	1	1	1	1	1		1	*1	*1	1	
E028	La Ferrasie male	M	1	1	1	1	1	1	inserted hairs		1	1	1	1
E029	Old Man of La Chapelle	M	1	1	1	1	1	1	inserted hairs	1				1
E225	*H. rudolfensis*	U	1	1	1	1	1	1		1				1
E226	*H. erectus*	U	1	1	1	1	1	1		1				
E058	Standing male with spear	M	1	1	1	1	1	1	individual hairs		*1	1	1	1
E234	Old woman	F	1	1	1	1	1	1			1			
E231	Neandertal	M	1	1	1	1	1	1	inserted hairs					1
Total				9	9	9	9	9		4	5	3	3	6

***Shine was present.**

BODY MORPHOLOGY BACKGROUND

One way in which humans[14] and extant great apes differ visually is in their body proportions. Humans have elongated legs and shorter arms than the greater apes, which tend to have longer upper limbs and shorter lower limbs. This is partly due to different methods of locomotion influencing the shape of various limb segments. As all of the earlier hominins (*Australopithecus* and *Homo*) are considered to be bipedal, one would assume that their body proportions would be similar to those of *H. sapiens* and if there was any difference it would only be apparent with the Australopithecines.

This, however, is not the case as the body proportions of the earlier hominins are difficult to determine as postcranial remains are limited and often fragmentary. In addition to this, in order to determine the body proportions, the stature of an individual is required as well as upper and lower limb length. McHenry (1974) highlights the difficulty in determining the body proportions of australopithecines with formulae designed for modern humans. Stature estimation for the australopithecines must be viewed with caution as there is some evidence that indicates that their body proportions differed from modern humans. *Ardipithecus ramidus* (4.4Ma) finds indicate that last common ancestor that we shared with the great apes was probably quite different from any of the extant African apes (White *et al.* 2009). These remains indicate that *Ar. ramidus* was not fully bipedal and had similarities to above–branch quadrupeds. The authors also suggest that using modern apes to extrapolate information about evolution will give inaccurate information. The anatomical features that are indicators of locomotion and the associated indices, relate to limb segments rather than the actual body proportions. While White *et al.* (2009) caution against the use of great apes in the extrapolation of information, the body proportions of *Ar. ramidus* (trunk 36%, upper limb 63% and lower limb 48%) based on the reconstructed skeleton by Matternes in Lovejoy *et al.* (2009) show similarity to those of gorilla with *Ar. ramidus* having slightly longer lower limbs.

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[14] The use of human in this instance refers to modern Holocene *H. sapiens.*

Another study by McHenry (1978) found that some australopithecine specimens had body proportions that were intermediate between those of apes and those of humans, while a *Homo* specimen fell within the human range. As new fossils are found, research into the area of hominin body shape and proportions is continually expanded upon. Upper limbs have been found to be larger in *Au. robustus*, *Au. boisei, Au. africanus* and possibly an *Au. afarensis* as well as in a *H. habilis* (McHenry 1992). There is some difficulty in determining which taxon postcranial remains are from, due to the anatomical similarity of some aspects of the remains. Australopithecines have also been described as being chimpanzee in size with upper limbs longer in proportion to their bodies in relation to humans, long digits which were also curved and shoulders which were oriented upwards (Lieberman 2007). Other research has determined that *Au. africanus* has proportions that are more similar to the great apes while those of *Au. afarensis* are more humanlike (Green *et al.* 2007; Richmond *et al.* 2002).

This swing between ape and human–like proportions is also evident in the later Homo specimens. Richmond and colleagues (2002) also found that *Au. afarensis* was less ape–like proportion wise than *H. habilis.* In their review Haeusler and McHenry (2004), conclude that the *H. habilis* had human–like lower limbs in addition to ape–like upper limbs. Other taxa found to have human–like proportions are Neandertals and *H. ergaster* (Ruff 1994). Neandertals have been found to have body proportions similar to those found in the Inuit whereas *H. ergaster/erectus*[15] (specifically KNM–WT 15000) is more similar to those peoples found in sub–Saharan Africa. This essentially means that European Neandertals have shorter limbs in comparison to their overall height while the results for Turkana boy indicate that he had longer limbs. These differences have been linked to the climatic conditions that the different taxa lived in, arctic vs. equatorial. Climate and locomotion are only some of the factors that influence the length of limbs and body proportions and due to these factors there is not a linear progression in the hominin fossils (McHenry and Brown 2008). This

[15] Due to the difficulty in assigning postcranial remains, KNM-WT 15000 is described as both *H. erectus* (Ruff 2008; Ruff 1994) and *H. ergaster* (Gruss 2007). KNM-WT 15000 is also known as the Nariokotome youth as well as Turkana boy.

means that it is not as simple as the body proportions gradually changing from ape–like to human–like.

A further difficulty in this area is that this is current information and it will not be relevant to the earlier hominin representations in this study. The time lag between the initial planning stage, through the actual manufacture of a representation, to the finished museum display can take several years. An example of this time lag, are the two *Au. afarensis* representations at the Naturhistorisches Museum in Vienna. The representations are based on skulls found in 1992, with the facial reconstructions done by 1999 and the bodies completed by 2000 (Berge and Daynes 2001). These representations were viewed in storage in 2006 and at that time, had not yet been displayed.[16]

In order to summarise knowledge on the current thoughts of body proportions that would have been accessible to artists during the 1980s and 1990s, tertiary texts have been used as a base level of knowledge in order to compare to the body proportions of the representations in this study. Prior to the discovery of 'Lucy' in 1974 (Johanson *et al.* 1982) the fossil record had only yielded fragmentary remains of the Plio–Pleistocene hominins which meant that any information on body size was based on estimations extrapolated from the fragmentary long bones (Johnston 1982). By the end of the decade Aiello and Dean (1990) described Australopithecines as having short lower limbs in relation to their upper limbs, while *H. erectus* and later taxa had body proportions within modern human variation ranges. *H. habilis* differed from the other *Homo* taxa as postcranial remains were found to be similar to those of *Au. afarensis* (long upper limbs) (Johansen *et al.* 1987). In the mid 90s new finds had added to our knowledge of the bodies of the earlier hominins. KNM–WT 15000–labelled early *H. sapiens*–(also *H. erectus/ergaster*) had long upper and lower limbs, australopithecines had shorter lower limbs and European Neandertals had limbs that were at the shorter end of the human range when compared to African and European samples (Wolpoff 1996). The Neandertal debate about whether they were human or not has continued since the Feldhofer bones were found in 1856

[16] These representations are not included in this section of the study as photographs of their complete bodies were unable to be taken due to their positioning while in storage.

(Drell 2000; King 1864; Schaaffhausen 1868; Stringer and Gamble 1993; Trinkaus and Shipman 1993). This is due in part to the post cranial remains falling within the range of human variation.

AIM

The aim of this section of the study was to determine which, if any, of the earlier hominins had similar body proportions to *H. sapiens* and if so were these body proportions consistent within the identified taxa.

MATERIALS

The sample for this section of the study was selected from the previously identified sample in this chapter. In order to determine the body proportions of the representations, only those representations that were on full bodies would be included in this sample which reduced the original sample from 92 to the 63 complete representations. This number was further reduced to 47 as not all of the representations were in postures or displayed positions that were conducive to taking the appropriate measurements for this study. The resultant 47 representations were only from the European museum sample.

MATERIALS: PHOTOGRAPHS

Photographs showing the complete representation were used. This meant that the specific anthropometric points were able to be marked on the photograph. The size of the photographs used was A4 as this allowed the measurements to be taken easily. The photographs used were part of a series of photographs taken during the research trip to Europe in 2006 which included the face photographs used in the previous section of the study. For this section of the study, full body profile or front view photographs were used where possible. Each photograph was labelled with the representation's identification number.

BODY PROPORTION METHODS

In order to determine the body proportions of the earlier hominins sample, the length of limbs and trunk in comparison to the height of the full body was found for each representation. The method used to determine these body proportions was based on an anharmonic ratio[17]. The principles of an anharmonic ratio as used in this study mean that ratios (which in this case refer to the body proportions converted to percentages) of measurements along a given length, remain the same irrespective of the angle of view. This means, that even though actual measurements of representations are not known, these ratios (or percentages) can be determined from measuring the representation in a photograph. This can be done by using the full length (height) of a representation as the given length and taking specific measurements of the trunk, upper and lower limbs and converting them into a percentage of the given length, thus determining the body proportions as a percent. The body proportions of various other primates (great apes and humans) can also be determined in the same way from photographs and by using existing anthropometric data in order to compare the representations proportions to those of extant species. The data used were those of gorillas, chimpanzees, orang–utans and humans gathered by Schultz (1933).

Standardised anthropometric measurements were used (Figure 5.43). These consisted of:

- full body length, vertex to base (v–b);
- trunk measurement, suprasternale to symphysion (sst–sy);
- upper limb length, acromiale to dactylion (a–da); and
- lower limb length, symphysion to base (sy–b).

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[17] For further information about anharmonic ratios see Hatton (1913)

The use of standardised measurements enabled consistency of measured points and comparison with Schultz's data. To assist in the visualisation of the body proportions and the anatomical structures that are used to define the anthropometric points extant primate and human comparison figures have been included in Appendix G.

Photographs of a volunteer were also taken from various heights, angles and positions mimicking those of the representations to allow for comparison to the volunteers' actual anthropometric measurements (Figure 5.44). This meant that any errors in taking measurements from the photographs were able to be identified especially when the measurements taken of the representations in positions that differed greatly from the anatomical position that is used when these measurement are normally taken. Anatomical position is when the body is upright, with palms facing forward, as illustrated in Figure 5.43.

Several measurements of the volunteer were used; these included actual anthropometric measurements as well as measurements taken from photographs of different poses. These were then converted to percentages and average proportions were found for the trunk, upper limb and lower limb. This was also done for the human, gorilla, chimpanzee and orang–utan data from Schultz (1933).

The error one can make when comparing body proportions of a particular representation to those of a human or an ape has two components: that resulting from inter–individual variation in each species, and that resulting from error of measurement of photographs in various poses. To determine the error of assessment, therefore the total variance of the scores (V_T) was found using the following formula

$$V_T = V_E + V_H$$

NOTE:
This figure is included on page 364 of the print copy of the thesis held in the University of Adelaide Library.

FIGURE 5.43 The anthropometric points used in this study on both a chimpanzee and a human to illustrate the difference in body proportions between the two, the points consist of: (v) vertex; (a) acromiale; (sst) suprasternale; (sy) symphsion; (da) dactylion; and (b) base. Figure adapted from Zihlman (1982).

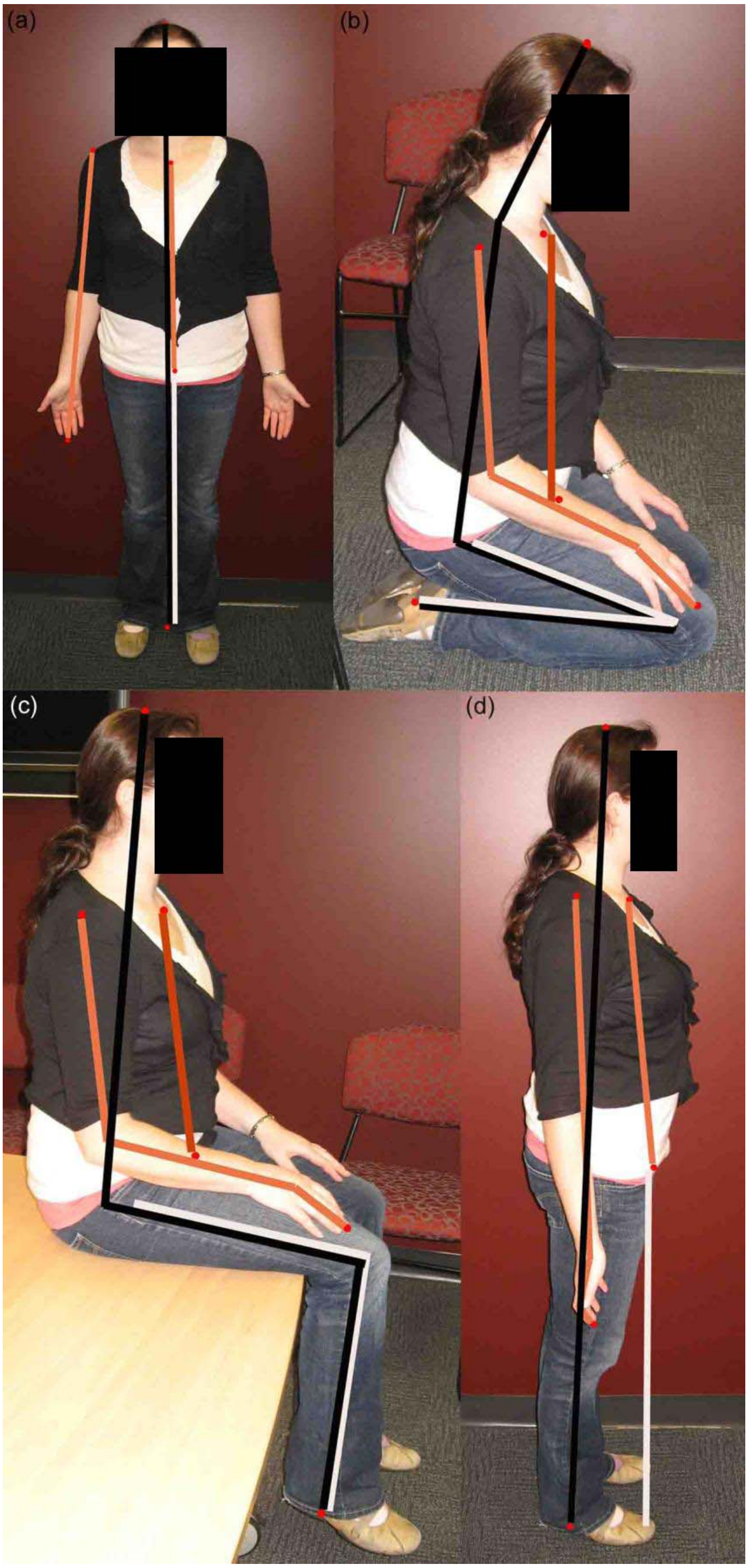


FIGURE 5.44 Examples of the anthropometric points used in this study on a volunteer in various positions and angles and the resultant body proportions as a percentage, showing the: (a) frontal view; (b) a kneeling view; (c) a seated view; and (d) a profile view. The anthropometric points are in red, the actual measurements as shown as lines: v–b in black; a–da in pale orange; sst–sy in orange; and sy–b in white.

The variance (squared standard deviation) (V) for the trunk, upper and lower limbs for each group/species (H) was determined and added to that of the volunteer's (E). The total standard deviation (S_T) equals the square root of the total variance.

$$S_T = \sqrt{V_T}$$

This gave the error ranges for each species. The following equation was then used to determine the statistical significance of difference between the representations' score for the trunk, upper and lower limbs when compared to human, orang–utans, chimpanzees and gorillas.

$$\frac{[X_H - X_i]}{S_T} = t^o$$

X = Average percentage for the trunk, upper or lower limb.

H = Human volunteer/species.

i = Representation.

S_T = The total standard deviation.

For a 95% confidence level (i.e., 0.05 significance of difference) $t^o \geq 1.96$ was used. Alternatively a 90% confidence level has a cut–off at 1.65.

RESULTS

The total variance of each species in the data sets were found for the trunk, upper and lower limb (Table 5.41). Variance in the trunks ranged from 3.5 to 4.0% with chimpanzees having the smallest amount of variance while gorillas had the largest. There was a 5% variance in both the upper and lower limb for all species.

The averages for the three body sections ranged in percentages amongst the species in the study (Table 5.42). The body proportions for the female volunteer were found to be similar to those of Schultz's (1933) humans. Her trunk was 29%

of her overall body length, with her upper limbs being 46% and her lower limbs the longest at 49%. The human data set had averaged proportions of 30% for the trunk, 45% for upper limb and 52% for the lower limb. The orang–utans had the longest upper limbs in relation to their overall body length with upper limbs that were 75% of their total body length, their trunk was 37% while their lower limbs were 44%. Chimpanzees and gorillas also had long upper limbs with 64% and 63% respectively and trunks that were proportionally the same at 37% of their overall body size. Chimpanzees had slightly longer lower limbs (47%) than those of the gorillas (45%).

TABLE 5.41 The percentage of body proportions and their standard deviation . Great Ape data from Schultz (1933) and the Human group consisted of data from Schultz (1933) as well as data from the volunteer.

Species	1xT					
	% Trunk		% Upper limb		% Lower limb	
	avg	st	avg	St	avg	st
Human	29.81	3.63	45.73	5.02	50.49	4.88
Chimpanzee	36.58	3.51	64.00	4.85	46.80	4.56
Orang–utan	37.01	3.94	74.68	5.21	44.01	4.54
Gorilla	36.67	4.32	62.56	5.13	45.20	4.55

TABLE 5.42 The body proportions for the volunteer and the modern human and extant great apes (Schultz 1933) shown as a percentage of their overall body length.

Species data sets	Averages		
	Trunk %	Upper limb %	Lower limb %
Volunteer ♀	29.20	46.22	48.93
Modern *H. sapiens* ♂	30.29	45.35	51.71
Orang–utan ♀♂	37.01	74.68	44.01
Chimpanzee ♀♂	36.58	64.00	46.80
Gorilla ♀	36.67	62.56	45.20

These results indicate that modern *H. sapiens* have short trunks and lower limbs longer than their trunks or upper limbs. The extant great apes have long upper limbs and their lower limbs are longer than their trunks.

The statistical significance for each representation was tabulated for the three sets of body proportions as they related to the four species used for comparison (Table 5.43). Several of the representations had trunk proportions significantly smaller than the human trunk proportions which were the smallest of the four species. These were E074, E231, E253, E063*, E064*, E252, E254, E061, which were all Neandertals, E230 and E213 both *H. erectus* and E214 and E215 which were Australopithecines. Those with an * were child representations, all others were adults. The representations that fell within the human trunk range only were E039, E057, E068, E071, E305, 310, E239, which were Neandertals, E307 and E209 which were *H. habilis* and E173, E216, E207 and E208 were Australopithecines. Several of the representations were not significantly different from the trunk measurement of the humans or extant primates and these were Neandertals E056, E066, E075, E172, E236, E062, E228, *H. ergaster* E210, *H. erectus* E306, and Australopithecines E296, E308 and E311. Two representations (E211 and E060, Neandertals) did not differ significantly from the human or chimpanzee but did from the orang–utan and gorilla averages only at the 90% confidence level. The following representations were significantly different from the human trunks but did not differ from the extant great apes, E054†, E070†, E024†, E053, E059, E295 (Neandertals) and E309† (Australopithecine). The † indicates that significance is only at the 90% confidence level. The trunk for one representation (E055), a Neandertal scored outside the trunk proportions for both humans and great apes.

TABLE 5.43 The statistical significance of each representation in relation to the comparative human and primate samples based on data from Schultz (1933) for the trunk, upper limb and lower limb proportions. The dark grey shading indicates significance at a 95% confidence level and the light grey shading show significance at a 90% confidence level.

Number	Reconstruction name or description	% Trunk	Human t°	Orang–utan t°	Chimp t°	Gorilla t°	% Upper limb	Human t°	Orang–utan t°	Chimp t°	Gorilla t°	% Lower limb	Human t°	Orang–utan t°	Chimp t°	Gorilla t°
E039	Wooden Neandertal	27.50	0.47	2.41	2.59	2.12	44.44	0.35	5.80	4.03	3.53	48.79	0.03	1.05	0.44	0.79
E054	Male with boar	36.25	1.94	0.19	0.09	0.10	45.87	0.07	5.53	3.74	3.25	48.76	0.03	1.05	0.43	0.78
E056	Pointing child	31.25	0.56	1.46	1.52	1.25	50.00	0.75	4.74	2.89	2.45	43.97	1.02	0.01	0.62	0.27
E057	Hyena bait child	26.67	0.70	2.63	2.82	2.32	50.27	0.81	4.69	2.83	2.40	44.92	0.82	0.20	0.41	0.06
E066	Male at fire	35.00	1.60	0.51	0.45	0.39	50.68	0.89	4.61	2.75	2.31	46.58	0.48	0.57	0.05	0.30
E068	Standing woman	29.17	0.01	1.99	2.11	1.74	42.98	0.64	6.08	4.33	3.82	50.44	0.31	1.42	0.80	1.15
E070	Sitting woman	35.42	1.71	0.40	0.33	0.29	49.37	0.63	4.86	3.02	2.57	50.63	0.35	1.46	0.84	1.19
E071	Mourning male	28.75	0.12	2.10	2.23	1.83	50.76	0.90	4.59	2.73	2.30	46.70	0.46	0.59	0.02	0.33
E074	Shaman	22.92	1.73	3.58	3.89	3.18	46.50	0.06	5.41	3.61	3.13	45.22	0.76	0.27	0.35	0.01
E075	Lying child	33.33	1.14	0.93	0.92	0.77	48.05	0.36	5.11	3.29	2.83	44.16	0.98	0.03	0.58	0.23
E172	Female Neandertal	31.67	0.68	1.36	1.40	1.16	51.06	0.96	4.53	2.67	2.24	50.64	0.35	1.46	0.84	1.20
E211	Neandertal	30.00	0.22	1.78	1.87	1.54	48.47	0.45	5.03	3.20	2.75	47.16	0.36	0.69	0.08	0.43
E231	Neandertal	22.50	1.85	3.68	4.01	3.28	45.27	0.19	5.64	3.86	3.37	43.92	1.03	0.02	0.63	0.28
E236	Female gatherer	31.25	0.56	1.46	1.52	1.25	47.60	0.27	5.20	3.38	2.92	43.27	1.16	0.16	0.77	0.42
E253	1994 Kieser/Schnaubelt	22.50	1.85	3.68	4.01	3.28	46.79	0.11	5.35	3.55	3.07	44.23	0.96	0.05	0.56	0.21
E305	Neandertal woman	24.17	1.39	3.26	3.54	2.89	48.63	0.48	5.00	3.17	2.71	51.37	0.50	1.62	1.00	1.36
E310	Neandertal	28.33	0.24	2.20	2.35	1.93	47.76	0.31	5.17	3.35	2.88	45.77	0.65	0.39	0.23	0.13
E060	Child dragging rocks	30.00	0.22	1.78	1.87	1.54	47.56	0.27	5.21	3.39	2.92	37.33	2.38	1.47	2.08	1.73
E024	Hunched Neandertal	35.42	1.71	0.40	0.33	0.29	57.08	2.16	3.38	1.43	1.07	44.58	0.89	0.13	0.49	0.14
E062	Male with meat	34.17	1.37	0.72	0.69	0.58	58.61	2.47	3.09	1.11	0.77	45.90	0.62	0.42	0.20	0.15
E228	Neandertal	32.92	1.02	1.04	1.04	0.87	35.24	2.19	7.57	5.93	5.33	44.29	0.95	0.06	0.55	0.20
E239	Feldhofer	25.83	0.93	2.84	3.06	2.51	60.32	2.81	2.76	0.76	0.44	46.56	0.49	0.56	0.05	0.30
E053	Yorik male	36.67	2.06	0.09	0.02	0.00	52.20	1.19	4.31	2.43	2.02	53.56	0.95	2.10	1.48	1.84
E055	Male flintknapper	45.42	4.47	2.13	2.52	2.02	47.19	0.19	5.28	3.47	3.00	49.06	0.03	1.11	0.50	0.85

TABLE 5.43 Continued, the statistical significance of each representation in relation to the comparative human and primate samples based on data from Schultz (1933) for the trunk, upper limb and lower limb proportions. The dark grey shading indicates significance at a 95% confidence level and the light grey shading show significance at a 90% confidence level.

Number	Reconstruction name or description	% Trunk	Human t°	Orang–utan t°	Chimp t°	Gorilla t°	% Upper limb	Human t°	Orang–utan t°	Chimp t°	Gorilla t°	% Lower limb	Human t°	Orang–utan t°	Chimp t°	Gorilla t°
E059	Crouching male with spear	39.58	**2.86**	0.65	0.86	0.67	40.45	1.15	**6.57**	**4.86**	**4.31**	54.05	1.05	**2.21**	1.59	***1.94***
E063	Child with meat	15.83	**3.68**	**5.37**	**5.91**	**4.82**	43.80	0.48	**5.93**	**4.17**	**3.66**	45.99	0.60	0.44	0.18	0.17
E064	Wounded child	19.58	**2.65**	**4.42**	**4.84**	**3.96**	53.59	1.47	**4.05**	**2.15**	***1.75***	47.06	0.38	0.67	0.06	0.41
E252	1962 standing	20.00	**2.53**	**4.32**	**4.72**	**3.86**	46.48	0.05	**5.41**	**3.61**	**3.13**	47.89	0.21	0.85	0.24	0.59
E254	Neandertal in suit	21.25	**2.19**	**4.00**	**4.37**	**3.57**	50.77	0.91	**4.59**	**2.73**	**2.30**	40.77	***1.67***	0.71	1.32	0.97
E295	Neandertal	37.08	**2.17**	0.02	0.14	0.10	49.00	0.55	**4.93**	**3.09**	**2.64**	42.17	1.39	0.41	1.02	0.67
E061	Stepping male with spear	18.33	**2.99**	**4.74**	**5.20**	**4.24**	62.40	**3.22**	**2.36**	0.33	0.03	43.20	1.17	0.18	0.79	0.44
E210	*Homo ergaster*	32.92	1.02	1.04	1.04	0.87	50.57	0.87	**4.63**	**2.77**	**2.34**	47.51	0.29	0.77	0.16	0.51
E230	*Homo erectus*	22.92	***1.73***	**3.58**	**3.89**	**3.18**	41.94	0.85	**6.28**	**4.55**	**4.02**	45.16	0.77	0.25	0.36	0.01
E306	*Homo erectus*	32.92	1.02	1.04	1.04	0.87	53.36	1.42	**4.09**	**2.19**	***1.79***	45.38	0.73	0.30	0.31	0.04
E213	*Homo erectus*	16.67	**3.45**	**5.16**	**5.67**	**4.63**	42.86	0.67	**6.11**	**4.36**	**3.84**	48.87	0.01	1.07	0.45	0.81
E307	*Homo habilis*	28.33	0.24	**2.20**	**2.35**	***1.93***	51.47	1.05	**4.45**	**2.58**	**2.16**	47.55	0.28	0.78	0.16	0.52
E209	*Homo habilis*	27.92	0.35	**2.31**	**2.47**	**2.03**	48.53	0.46	**5.02**	**3.19**	**2.74**	48.04	0.18	0.89	0.27	0.62
E173	Australopithecus	24.58	1.27	**3.15**	**3.42**	**2.80**	48.89	0.53	**4.95**	**3.12**	**2.66**	48.89	0.01	1.07	0.46	0.81
E216	Australopithecine	28.33	0.24	**2.20**	**2.35**	***1.93***	50.67	0.89	**4.61**	**2.75**	**2.32**	51.12	0.45	1.57	0.95	1.30
E309	*Australopithecus africanus*	35.42	***1.71***	0.40	0.33	0.29	54.96	***1.74***	**3.79**	***1.86***	1.48	45.04	0.80	0.23	0.39	0.03
E207	Australopithecine 1	26.67	0.70	**2.63**	**2.82**	**2.32**	64.06	**3.55**	**2.04**	0.01	0.29	41.67	1.49	0.52	1.13	0.78
E208	Australopithecine 2	24.17	1.39	**3.26**	**3.54**	**2.89**	60.80	**2.90**	**2.66**	0.66	0.34	42.05	1.41	0.43	1.04	0.69
E296	Australopithecine	31.67	0.68	1.36	1.40	1.16	60.20	**2.79**	**2.78**	0.78	0.46	39.29	***1.98***	1.04	***1.65***	1.30
E308	*Australopithecus boisei*	34.58	1.48	0.62	0.57	0.48	65.07	**3.76**	***1.84***	0.22	0.49	41.63	1.50	0.52	1.13	0.79
E311	*Australopithecus afarensis*	32.92	1.02	1.04	1.04	0.87	66.51	**4.04**	1.57	0.52	0.77	42.66	1.28	0.30	0.91	0.56
E214	Australopithecine	16.25	**3.57**	**5.27**	**5.79**	**4.73**	42.86	0.67	**6.11**	**4.36**	**3.84**	47.32	0.33	0.73	0.11	0.47
E215	Australopithecine	21.25	**2.19**	**4.00**	**4.37**	**3.57**	40.68	1.10	**6.53**	**4.81**	**4.27**	51.41	0.51	1.63	1.01	1.37

For the upper limb, only one representation (E228) had a percentage that was significantly less than that of humans. The majority of the representations fell within the human range only; E039, E054, E056, E057, E066, E068, E070, E071, E074, E075, E172, E211, E231, E236, E253, E305, E310, E060, E053, E055, E059, E063, E064, E252, E254, E295 (Neandertals), E210 (*H. ergaster*), E230, E306, E213 (*H. erectus*), E307, E209 (*H. habilis*), E173, E216, E214 and E215 (Australopithecine). Several of the representations had an upper limb percentage similar to that of gorillas and chimpanzees, these were E024, E062, E239, E061 (Neandertals), E207, E208 and E296 (Australopithecines). One representation (E309) only fell within the gorilla upper limb percentage, and it differed from the human and chimpanzees only at a 90% confidence level. Another representation (E308) differed from the orang–utans only at a 90% confidence level while E311 fell with the range for all three extant great apes.

The lower limbs of the representations generally fell within the ranges for the humans and greater apes. Those that were significantly different were the following. E060 differed from humans and chimpanzees to a 95% confidence level and gorillas at a 90% confidence level. E053 and E059 only fell within the human and chimpanzees averages. E254 only differed significantly from humans at a 90% confidence level, while E296 differed from humans and chimpanzees at a 90% confidence level.

Discussion and Conclusions

The special position of Neandertals in the earlier hominin sample leads to a range of variation in their representations. While there has been a consistency in the interpretations of Neandertal body proportions, this has not been shown in the Neandertal representations. While the majority of the Neandertal representations had human–like (as well as primate–like) lower limbs, and many had human–like upper limbs, their trunks showed the greatest variety and ranged from smaller than human to outside the range for both humans and extant primates. In none of the representations were all three body proportions outside the human range; only 12 of the 31 Neandertals had human or human and primate–like body proportions.

Of the early *Homo* species represented in this sample, the *H. ergaster* and *H. erectus* should have human–like proportions. *H. habilis,* however, may have more ape–like proportions. All three of these taxa were found to have human–like proportions and two of the three *H. erectus* representations had trunks that were less than human–like.

As human trunks are smaller than the trunks of the other primates, having trunks that are even smaller than human trunks is giving the viewer a false impression as to the body proportions of these earlier hominins. This may in fact be considered to be making these representations more human–like than human. This is a form of distortion, which, as discussed by Spivey (2005) in his chapter entitled 'More Human than Human', is a common human trait, the distortion of the human body in art. Ramachandran and Hirstein (1999) have linked this distortion to the 'Peak Shift' effect. This essentially means that if a response is elicited from a particular shape for example, and this response is rewarded, then exaggeration of this shape will elicit a stronger response (Terrace 1966). So by giving these earlier hominin representations trunk proportions that are not only smaller than extant primate examples but also smaller than humans the makers may be implying that they are human as smaller trunk proportions would make the lower limbs look longer, again giving the impression of a human shape. This would make these representations look more human–like than humans. The Neandertals and *H. erectus* representations with trunks smaller than human, all had human–like/primate–like lower limbs which with the smaller trunks would visually give the impression of human body proportions.

According to the literature, the Australopithecines should have more ape–like proportions than humans—that is, the upper limb should be long and the lower limb short. There were, however, four of the australopithecine representations that did not show this differentiation between upper and lower limbs. This was due to their limbs being the same length or the lower limbs were longer. The upper limbs of the australopithecines were either human–like or ape–like. There were two representations that had upper limbs long enough not to differ from orang–utans at the 95% confidence level. These representations also had visually noticeable longer upper limbs. Lower limbs overall were both human and ape–like, except for one individual that was only ape–like. There was variation in the trunk proportions with them ranging again from less than human to human and ape–like.

The use of an anharmonic ratio is an innovative approach to determine the body proportions of earlier hominin representations. There is a precedence for the use of photography to determine anthropometric measurements as a way of obtaining data (Barrón and Kakadiaris 2001; Geoghegan 1953). By using measurements from photographs of a volunteer replicating the stances found in the sampled representations and comparing them to the actual measurements of the volunteer meant that there was a large error range. The fact that there were still significant results means that the makers of the representations (artists and scientists) may not realise the importance that the body proportions of a representation has in imparting information to the viewer. When representations portray an unfamiliar hominin, the body proportions should reflect or be guided by the current level of knowledge that is available about the postcranial remains or at least by a scientific estimate. There is information available on the body proportions of many of the world's populations, including those extant primates upon which many hypotheses about our ancestors are based, from which to draw conclusions and estimates. The results of this study show that the science is not always apparent in these representations. This may be that information needed for these representations comes from a range of disciplines which are in many cases quite disparate from each other. There is no one source from which an artist might obtain the information required to build a 'scientific' hominin representation. Lack of knowledge about human body proportions and the differences found amongst the great apes may also lead to inaccurate proportions.

The findings of this study show that while postcranial remains are limited and interpretations of extinct hominin body proportions are gradually added to and adapted according to new finds, the representations are not consistent in their portrayal of the earlier hominins with regard to the existing scientific knowledge which is incomplete because if one accepts that there were multiple taxa among those hominins, there is still a lack of consistency in portraying those differences among putative taxa.

There are other features that also influence the viewer in the perceived realism of the representation that they are looking at. To have included these features, however, would have expanding this chapter a great deal, also there was no knowledge if the two samples were treated differently nor was the full extent of the information understood about the facial features that were included in this study realised until the time of writing.

This chapter and the preceding one (Chapter 4) give insight into features that influence the realism of the sampled representations with the more detailed faces considered to generally be more realistic, although, this is dependent upon the skill of the artist finishing the representation. The findings of this chapter also indicate that it is assumed that the public is unfamiliar with the external appearance of the earlier hominins. This then leads to the question; are the earlier hominin taxa portrayed differently from one another, to such an extent that they can be visually identified and placed into discrete categories equating with each taxon? This then, is the focus of the following chapter.

REFERENCES

Aiello L, and Dean C. 1990. An introduction to human evolutionary anatomy. London: Academic Press.

Barrón C, and Kakadiaris IA. 2001. Estimating anthropometry and pose from a single uncalibrated image. Computer Vision and Image Understanding 81:269-284.

Berge C, and Daynes E. 2001. Modeling three-dimensional sculptures of Australopithecines (Australopithecus afarensis) for the Museum of Natural History of Vienna (Austria): the post-cranial hypothesis. Comparative Biochemistry and Physiology Part A 131:145-157.

Bochenek A, and Reicher M. 2003. Anatomia Człowieka. Warsaw: PZWL.

Brooks KR, and Kemp RI. 2007. Sensitivity to feature displacement in familiar and unfamiliar faces: beyond the internal/external feature distinction. Perception 36:1646-1659.

Bruce AB. 1982. Ancient technology in contemporary surgery.

. Western Journal of Medicine 136(3):265-269.

Dixson AF. 1998. Primate sexuality: comparative studies of the prosimians, monkeys, apes, and human beings. Oxford: Oxford University Press.

Drell J. 2000. Neanderthals: a history of interpretation. Oxford Journal of Archaeology 19(1):1-24.

Geoghegan B. 1953. The determination of body measurements, surface area and body volume by photography. American Journal of Physical Anthropology 11(1):97-120.

Gray H. 2002. Anatomy: descriptive and surgical. Bath: Parragon.

Green DJ, Gordon AD, and Richmond B. G. 2007. Limb-size proportions in *Australopithecus afarensis* and *Australopithecus africanus*. Journal Of Human Evolution 52:187-200.

Gruss LT. 2007. Limb length and locomotor biomechanics in the genus *Homo*: an experimental study. American Journal Of Physical Anthropology 134:106-116.

Haeusler M, and McHenry HM. 2004. Body proportions of *Homo habilis* reviewed. Journal Of Human Evolution 46:433-465.

Hatton JLS. 1913. The principles of projective geometry applied to the straight line and conic. Cambridge: Cambridge University Press.

Johansen DC, Masao FT, Eck GG, White TD, Walter RC, Kimbel WH, Asfaw B, Manega P, Ndessokia P, and Suwa G. 1987. New partial skeleton of *Homo habilis* from Olduvai Gorge, Tanzania. Nature 327:205-209.

Johanson DC, Lovejoy CO, Kimbel WH, White TD, Ward SC, Bush ME, Latimer BM, and Coppens Y. 1982. Morphology of the Pliocene partial hominid skeleton (A.L. 288-1) from the Hadar Formation, Ethiopia. American Journal Of Physical Anthropology 57(4):403-451.

Johnston FE. 1982. Physical anthropology. Dubuque: William C. Brown Company Publishers.

Kherumian R. 1948. Technique de la morphologie cranio-faciale. Semaine des hopitaux de Paris 13:383-389.

King W. 1864. The reputed fossil man of the Neanderthal. Quarterly Journal of Science 1:88-97.

Lieberman DE. 2007. Homing in on early *Homo*. Nature 449:291-292.

Lovejoy CO, Suwa G, Simpson SW, Matternes JH, and White TD. 2009. The great divides: *Ardipithecus ramidus* reveals the postcrania of our last common ancestors with African apes. Science 326(73):100-106.

Lynch J, and Barrett L. 2002. Walking with cavemen: eye-to-eye with your ancestors. London: Headline Book Publishing.

McHenry HM. 1974. How large were the Australopithecines? American Journal Of Physical Anthropology 40:329-340.

McHenry HM. 1978. Fore- and hindlimb proportions in Plio-Pleistocene hominids. American Journal Of Physical Anthropology 49:15-22.

McHenry HM. 1992. Body size and proportions in early hominids. American Journal Of Physical Anthropology 87:407-431.

McHenry HM, and Brown CC. 2008. Side steps: the erratic pattern of hominin postcranial change through time. Journal Of Human Evolution 55:639-651.

Moser S. 1992. The visual language of archaeology: a case study of the neanderthals. Antiquity 66:831-844.

Norton KI, Olds TS, Olive S, and Dank S. 1996. Ken and Barbie at life size. Sex Roles 34(3/4):287-294.

Olivier G. 1969. Practical anthropology. Springfield, Illinois: Charles C Thomas.

Ramachandran VS, and Hirstein W. 1999. The science of art: a neurological theory of aesthetic experience. Journal of Consciousness Studies 6(6-7):15-51.

Richmond BG, Aiello LC, and Wood BA. 2002. Early hominin limb proportions. Journal Of Human Evolution 43:529-548.

Ruff C. 2008. Femoral/humeral strength in early African *Homo erectus*. Journal Of Human Evolution 54:383-390.

Ruff CB. 1994. Morphological adaptation to climate in modern and fossil hominids. Yearbook Of Physical Anthropology 37:65-107.

Schaaffhausen H. 1868. On the primitive form of the human skull. Anthropological Review 6(23):412-431.

Schultz AH. 1933. Die Körperproportionen der erwachsenen catarrhinen Primaten, mit spezieller Berücksichtigung der Menschenaffen. Anthropologischer Anzeiger 10:154-185.

Spivey N. 2005. How art made the world. London: BBC Books.

Stringer C, and Gamble C. 1993. In search of the Neanderthals: solving the puzzle of human origins. London: Thames and Hudson.

Terrace HS. 1966. Behavioral constrast and the peak shift: effects of extended discrimination training. Journal of the Experimental Analysis of Behavior 9(6):613-617.

Thomas DH. 1998. Archaeology. Fort Worth: Harcourt College Publishers.

Trinkaus E, and Shipman P. 1993. The Neandertals: changing the image of mankind. London: Pimlico.

van de Graaff K. 2002. Human anatomy. Boston: McGraw Hill.

White TD, Asfaw B, Beyene Y, Haile-Selassie Y, Lovejoy CO, Suwa G, and WoldeGabriel G. 2009. *Ardipithecus ramidus* and the paleobiology of early Hominids. Science 326(73):75-86.

Wolpoff MH. 1996. Human evolution. New York: McGraw-Hill.

Zihlman AL. 1982. The human evolution colouring book. New York: Barnes & Noble Books.

6

CONVEYING INTENDED INFORMATION

An Experiment on the Recognition of Hominin Species

This chapter differs from the preceding chapters as it describes an experiment using assessors to determine if there is a visual difference present in the faces of the various hominin species and if that difference is taxon specific. Chapter 3 gave an understanding of the types of representations that are found in museums, and what type of contextual displays they are found in. The earlier hominin representations are limited to facial reconstructions (with or without a complete body) or educational sculptures and are mainly displayed in a partial context or in a series. This indicates that they are thought to be sufficiently different from modern *H. sapiens* that only these types of representation are able to fully portray these differences. Chapters 4 and 5 introduced the concept of facial realism, and the analysis of the way the representations are finished again reinforced this concept of difference. The body proportions of the earlier hominin representations in Chapter 5 also indicated that these representations do not always convey the information that is known about the anatomy of these hominins. The purpose of this chapter is to determine if the information about taxonomic difference is as visible in the faces of hominin representations as it is assumed to be.

BACKGROUND

Part of the unique fascination that museums have for visitors is the display of the 'real' thing. Due to the rarity of specimens, display of actual hominin remains in human evolution exhibitions is not possible for the majority of museums. This has been solved in a way by using casts of skeletal and cultural materials as well as three–dimensional representations to assist the public in visualising these past hominin species. Placement of these hominin representations in museums and other contexts (such as documentaries) is a way of easily presenting understandable information on human evolution and the hominin taxa to the public (Moser 1998). Exhibition of representations in an evolutionary context enables the conveying of nonverbal information that can influence the understanding of various aspects of human ancestry. The representations and the nonverbal information embedded in them and their context are ascribed authenticity by the viewer, as a result of their display within the museum setting (Lord 2002). In reality, hominin representations are a mixture of primary information derived from actual remains and the comparison of anatomical features; secondary information based on studies from various fields such as environmental sciences, ethnography, anthropology, and geology, anatomical sciences as well as the context in which the remains and fossils are found; and, finally, artistic licence. This mixture of information is required in this form of non-verbal communication, as the entire physiognomy of the face needs to be presented even if there is no information available, for example about the form of the external nose. A nose-less face does not look normal and can be disconcerting which would change the messages conveyed to the viewer.

Primary information about hominin taxa has led to our evolutionary ancestors being conceptually organised into various 'species' who lived in diverse environments and whose existence spanned millions of years. The Latin word *specere* means "to look" or "to appear", or "to be of a particular kind". Thus multivariate perception is applied by palaeoanthropologists in order to assign a variety of individual fossils to different categories/species based amongst others on their appearance. Basing these categories on variables such as appearance has led to debate about the number of hominin taxa present during the last 4.5 Ma, with the number of taxonomic categories ranging from a few to over 20 (Frayer *et al.* 1993; Wood and Lonergan 2008).

Museum visitors observing the faces of hominin representations apply a similar process but in this case, it is not applied to actual individuals but to representations that already contain judgements by others as to which species this particular individual belongs. This judgement is expressed in the representation through the interpretive input of researchers and artists based on the knowledge of to which species a particular skull belongs. This prior determination, to a large extent, forms a basis of interpretation for those facial features that can not be directly read from the skull, for example the presence or absence of eyebrows and their colour and shape. It follows that each representation is intended by its creators to represent a particular taxon while an observer is trying to place the representation into his/her scheme of categories. Prior knowledge of the observer may also influence the way the observer perceives a particular representation. Cultural constructivism explains how this prior knowledge is used to understand the concept of human evolution (Cobern 1994). Our framework of knowledge, understanding, and belief is all influenced by the culture in which we live, the way we learn, the way we are taught and the environment which surrounds us. Our prior knowledge as well as our personal experiences also influence the way we respond to information, evaluate it and use it (Brem *et al.* 2003; Wisniewski and Medin 1994).

The intention of hominin representations is to pass on information about human evolution. Therefore, one would expect that, irrespective of formal education, museum visitors or viewers will be expected by display organisers (curators etc.) to form in their minds a general understanding of the changes that occurred to the face and head during human evolution; this is reinforced through the use of the specific context type–series–to enable comparison. Earlier hominins are often displayed in series. This obviously must take into account cognitive processes which are of a complex nature (Plotnik 1999). The constructed or prior knowledge of visitors may mean that the variation of forms existing at various times during this process may not be perceived as they are intended.

The differences in hominin faces are assumed to be large enough to distinguish between them, otherwise there would be no reason to show individual taxa. As there have been over 20 individual taxa identified, it is obviously thought that there is enough difference to be recognised. It must be remembered that the intention of these hominin representations is not to depict or recognise an individual but rather to illustrate a 'type' of a particular taxon. In that sense they are treated more like ethnographic casts as an example of a type rather than an archaeological facial reconstruction that is a reconstruction of a specific individual even thought the majority of the earlier hominin representations are facial reconstructions.

Fossils documenting recent events in human evolution are usually better preserved and certainly more numerous than those of millions of years ago. Also contextual information relevant to the understanding of the human face is richer for more recent time periods. Therefore, it can be expected that as we go back in time, the amount of direct and indirect information such as written records, remnants of clothing, jewellery will decrease, leaving more to artistic licence and guess work. Unlike written or verbal descriptions of past human taxa which may contain only information that has been judged by the academic community as reliable, three–dimensional representations of the face must present the entire physiognomy even if there is no information about, for example, the form of the external nose, available. A nose–less face does not look normal and can be disconcerting which would change the messages conveyed to the viewer. This is but one example of how the medium of three–dimensional representation differs from the traditional media that are used to convey scientific information. In this chapter an attempt has been made to assess whether three–dimensional facial representations of hominins generally convey the desired picture of hominin variety that represents current taxonomical and interpretive views about their life and external appearance. It can be hypothesised that this information will be more precise with regard to more recent times and less precise with regard to earlier times. Furthermore, it can be postulated that more educated people will be able to assess the taxonomy and the dating of various reconstructed hominins than those with less education, and specifically academics and students trained in biological anthropology will be able to make those assessments more precisely.

AIM

The aim of this experiment was to determine if reconstructed and sculpted faces of hominin representations from various taxa were recognisably different from or similar to each other to the extent of being placed into intended by display (or museum defined) taxonomic categories based on the inspection of their photographs by a number of people who may represent museum visitors. Theoretically the hominin faces should convey characteristics which as taxon specific; as all Neandertals for example should have the same facial characteristics ensuring that they would all be placed in the same group.

EXPERIMENTAL DESIGN

A selection of photographs of the faces of hominin representations, were chosen to be evaluated as to their taxonomic status by independent assessors. Photographs were used to limit the amount of information viewed by the assessors; as labels for example have been found to influence the way that we view objects (Wisniewski and Medin 1994).

THE HOMININ REPRESENTATIONS USED IN THIS EXPERIMENT

The hominin representations (n=107) used in this experiment were from 15 different European museums visited in 2006 (Table 6.1). They represent a range of taxa as identified in Chapter 3. Due to the large sample of anatomically

TABLE 6.1 A list of the representations used in this study with their allocated number, a brief description or name for each representation and the score used in this study (see text for explanation of score).

Number	Representation name or description	Arbitrary score	Number	Representation name or description	Arbitrary score
E001	Bushman, HDNS	*1*	E243	Female mourning, NM	*3*
E022	Ötzi, NHMV	*1*	E244	1925 La Chapelle–aux–Saints, NM	*3*
E153	Khnum the Egyptian, MMM	*1*	E245	1956 gold Neandertal, NM	*3*
E156	1770, MMM	*1*	E246	1950 Monte Circeo, NM	*3*
E157	Worsley Man, MMM	*1*	E247	1950 La Chapelle–aux–Saints, NM	*3*
E229	Modern male, NM	*1*	E248	1935 Neandertal, NM	*3*
E242	Forensic head, NM	*1*	E249	Gibraltar Neandertal 1935, NM	*3*
E285	Harmonised face, MTMB	*1*	E250	Female Neandertal bust, NM	*3*
E294	Art head, GML	*1*	E251	Male Neandertal bust, NM	*3*
E335	Janus, UMG	*1*	E252	1962 standing Neandertal, NM	*3*
E023	Cro-Magnon man, NHMV	*2*	E253	1994 female Neandertal, NM	*3*
E212	Cro-Magnon male, Musee	*2*	E254	Neandertal in suit, NM	*3*
E232	Cro-Magnon male, NM	*2*	E255	Squatting Neandertal, NM	*3*
E233	Female, NM	*2*	E256	Female kneeling Neandertal, NM	*3*
E024	Hunched Neandertal, NHMV	*3*	E269	Neandertal, MTMB	*3*
E027	Boxed Neandertal, NHMV	*3*	E270	Child, MTMB	*3*
E028	Neandertal squatting, NHMV	*3*	E271	Neandertal female, MTMB	*3*
E029	Old Neandertal male, NHMV	*3*	E295	Neandertal male, LCML	*3*
E030	Child Neandertal, NHMV	*3*	E301	Child – Teshik Tash, Museon	*3*
E039	Wooden Neandertal, MNSB	*3*	E302	Man – La Chapelle, Museon	*3*
E053	Yorik male, DMA	*3*	E305	Neandertal female, Museon	*3*
E054	Male with boar, DMA	*3*	E310	Neandertal, Museon	*3*
E055	Male flintknapper, DMA	*3*	E304	*H. heidelbergensis*, Museon	*3.5*
E056	Pointing child, DMA	*3*	E230	*H. erectus, NM*	*4*
E057	Hyena near child, DMA	*3*	E268	*H. erectus, MTMB*	*4*
E058	Standing with spear, DMA	*3*	E306	*H. erectus,* Museon	*4*
E059	Crouching with spear, DMA	*3*	E213	*H. erectus*, Musee	*4*
E060	Child dragging rocks, DMA	*3*	E210	*H. ergaster, Musee*	*4.5*
E061	Stepping with spear, DMA	*3*	E303	*H. ergaster*, Museon	*4.5*
E062	Male with meat, DMA	*3*	E225	*H. rudolfensis*, HLMD	*4.5*
E063	Child with meat, DMA	*3*	E209	*H. habilis, Musee*	*5*
E064	Wounded child, DMA	*3*	E224	*H. habilis*, HLMD	*5*
E065	Worried male, DMA	*3*	E307	*H. habilis,* Museon	*5*
E066	Male at fire, DMA	*3*	E297	*H. habilis*, HMG	*5*
E067	Old male, DMA	*3*	E025	Male australopithecine, NHMV	*6*
E068	Standing female, DMA	*3*	E026	Female australopithecine, NHMV	*6*
E069	Bare–breasted female, DMA	*3*	E041	Gracile australopithecine, MNSB	*6*
E070	Sitting female, DMA	*3*	E173	*Australopithecus*, NHML	*6*
E071	Mourning male, DMA	*3*	E207	Australopithecine 1, Musee	*6*
E072	Mourning female, DMA	*3*	E208	Australopithecine 2, Musee	*6*
E073	Dead female, DMA	*3*	E214	Australopithicine, Musee	*6*
E074	Shaman, DMA	*3*	E215	Australopithicine, Musee	*6*
E075	Reclining child, DMA	*3*	E216	Australopithicine, Musee	*6*
E172	Female Neandertal, NHML	*3*	E221	*Au. anamensis*, HLMD	*6*
E211	Neandertal, Musee	*3*	E222	*Au. afarensis*, HLMD	*6*
E218	Neandertal, HLMD	*3*	E223	*Au. africanus*, HLMD	*6*
E228	Neandertal, NM	*3*	E296	Australopithecine, LCML	*6*
E231	Neandertal, NM	*3*	E309	*Au. africanus,* Museon	*6*
E234	Old Female, NM	*3*	E311	*Au. afarensis,* Museon	*6*
E235	Child, NM	*3*	E220	*Kenyanthropus platyops*, HLMD	*6.5*
E236	Female gatherer, NM	*3*	E040	Robust australopithecine, MNSB	*7*
E237	Male hunter, NM	*3*	E219	*Au. boisei*, HLMD	*7*
E238	Male flint knapper, NM	*3*	E308	*Au. boisei,* Museon	*7*
E239	Feldhofer, NM	*3*			

E designation is for European representations. Haus Der Natur, Salzburg (HDNS), Naturhistorisches Museum, Vienna (NHMV), Manchester Museum, Manchester (MMM), Neanderthal Museum, Mettmann (NM), Magyar Természettudományi Múzeum, Budapest (MTMB), Geology Museum, Lisbon (GML), Universiteitsmuseum, Groningen, Netherlands (UMG), Musee de l'Homme, Paris (Musee), Museum of Natural Sciences, Brussels (MNSB), Drents Museum, Assen, Netherlands (DMA), Natural History Museum, London (NHML),Leira Castle Museum, Leira (LCML), Museon, Den Haag (Museon), Hessisches Landes–Museum, Darmstadt (HLMD), Hunterian Museum, Glasgow (HMG).

modern *H. sapiens* in the original sample of 860, only a randomly selected smaller sample of Holocene Moderns were chosen in conjunction with all of the representations identified as Pleistocene anatomically modern *H. sapiens*. The rest of the sample of 107 consisted of the majority of the representations identified as other hominin taxa. The hominin representations used in this experiment comprised a mix of facial reconstructions (with and without a body), educational sculptures and casts as defined in Chapter 3, in the section on representation types.

Taxa

For the purpose of this study the sampled hominins were allocated to the following categories:

- Holocene Modern *H. sapiens*;
- Pleistocene Modern *H. sapiens*;
- Neandertals;
- *Homo erectus*;
- Early *Homo sp.,* group (for all other Early *Homo* species excepting *H. erectus* and *H. habilis*) ;
- *Homo habilis*;
- gracile australopithecines;
- non–specific australopithecines; and
- robust australopithecines.

These categories were based on the taxonomic classification applied by the museums themselves to the representations in the museum exhibitions in which they displayed. These were not disputed or modified here. Due to low numbers, the Early *Homo* taxa that fall temporally between *H. erectus* and *H. habilis* were combined into an Early *Homo species* group.

Arbitrary Numerical Values

In order to be able to quantitatively analyse how people assessed the photographs of the hominin representations, they were asked to place them within categories. These categories were given arbitrary numerical values. These values are intended to represent the degree of dissimilarity from modern humans on the ordinal rather than interval scale. In some analyses, however, they were treated as interval scale values for ease of representation because they approximate the amount of dissimilarity. The following taxonomic categories were allocated a numerical value from 1 to 8:

- (1) Holocene Modern *Homo sapiens*, (n=10);
- (2) Pleistocene Modern *Homo sapiens*, (n=4);
- (3) Neandertals, (n=62);
- (4) *H. erectus,* (n=4);
- (5) *H. habilis,* (n=4);
- (6) Gracile Australopithecines, (n=15);
- (7) Robust Australopithecines, (n=3); and
- (8) Ape or ape–like.

The category of 'ape or ape–like' was included for those assessors who considered some representations to not be a part of the human lineage.

Those categories that were perceived as transitional or difficult to decisively place were allocated half scores. An example is *Homo rudolfensis,* which based on prior discussion in the literature and in the popular media and on its appearance, may be classified as *H. erectus, H. habilis* or *Homo rudolfensis,* depending upon the prior knowledge of the assessor. Where species were clearly members of a single well–known form such as Holocene Moderns or Neandertals, full scores were allocated. The allocated half scores were:

- (3.5) *H. heidelbergensis*, (n=1);
- (4.5) Early *Homo sp.*, (n=3); and

- (6.5) *K. platyops*, (n=1).

Giving each representation an arbitrary score which reflects the intention of creators of the representation means that these scores can be compared to the assessors' judgements to determine if the intention was achieved.

Photographic Documentation

Colour digital photographs of these representations were used in this experiment as the representations themselves were located in 15 different European museums. The photographs were taken during a research trip in 2006. This enabled analysis in the laboratory as well as the comparison of representations from other institutions. The photographs also served as a visual record of each individual representation and as a memory aid throughout this study. As was noted in Chapter 3, the photographs were taken with a Canon PowerShot A540, 6.0 mega pixel digital camera. These photographs were taken with a handheld camera in order to replicate the visitor's view of the representation.

The photographs used in this experiment consisted of a full face, 3/4 face or profile shot of each representation in full colour. In order to replicate life–size faces, A4 sized photographs were used in this experiment. Three–quarter or full–face photographs were used where possible to minimise the use of attributes such as flatter faces and orbital ridges to distinguish between various taxa by the more knowledgeable of the assessors. Only photographs of faces were used as very few of the earlier hominin representations had complete bodies. The majority of the Neandertal and modern representations, however, had complete bodies. The photographs of the representations were influenced by exhibition lighting, the use of the flash and positioning of the representation. This meant that in some cases the view obtained was not quite of the full–face or 3/4 view.

METHODS

The photographs were chosen from the European sample only. This was to limit the amount of familiarity that the Australian assessors might have had with the representations. The photographs of the representations were then assessed as to their taxonomic identity by a variety of assessors (n=25) of different levels of education and profession (Table 6.2). The assessors were known to the author and were chosen as representative of a cross-section of the population due to differences in their level of education and interest in human evolution. All of them were residents of Australia but from different backgrounds. All assessors were shown the same photographs. Assessors were not informed about the scheme of categories as listed in table 6.1, nor were they questioned about their understanding of hominin taxonomy. They were simply instructed to group the photographs into several categories reflecting their understanding of hominin diversity. Each assessor was presented with the stack (n=107) of randomly ordered photographs. The assessor was asked to inspect each photograph and allocate it to one of the categories that reflected his/her understanding of hominin taxonomy. If the assessor was unsure of the type of categories that could be used, examples were given such as; Modern, apelike, Early *Homo* species, Australopithecines, Neandertal. A timeframe of up to 30 minutes was given to encourage the use of the assessors' first impressions of the photographs. The educational level of the assessors varied from high (academic with doctorate degrees) to low (had not completed secondary education).

Once all photographs were allocated to a category by the assessor, questions were asked of the assessor to ascertain the positioning of their chosen categories within the ordinal numbering system of the study. Their categories were then given the appropriate numerical value–a score–from 1 to 8 (including half scores) to correspond with the authors' previously defined categories for this study. The categories used took into account the differences in the levels and kind of prior knowledge of the assessors. Assessors were also given the option of 'I don't know'; when this option was taken, the particular specimens were then excluded from any further calculations, for this assessor.

ANALYSIS

Analysis of the results was quantitative. The scores were processed in several ways. The assessor's scores were compared to the arbitrary scores assigned to each representation (Appendix E). This meant that each representation had 25 assessor's scores and each assessor judged the 107 representations. The average, minimum and maximum scores for each representation and each assessor were determined as well as the standard deviation of the averaged scores.

TABLE 6.2 The list of assessor's showing their educational level, their level of interest in human evolution and their sex. Assessor's designated name reflects their profession. The table is sorted by education level from lowest to highest.

Assessor's	Highest level of education attained	Level of interest in human evolution	Sex
Amateur	Secondary	Very high	M
Artist	Secondary	High	F
Lab tech 2	Secondary	Low	M
Quilter	Secondary	Very low	F
Student 1	Undergrad	Medium	F
Student 2	Undergrad	Medium	M
Student 6	Undergrad	Very low	M
Student 8	Undergrad	Medium	F
Accountant	Graduate	Low	M
Lab tech 1	Graduate	Very low	F
Nurse	Graduate	Low	F
Policeman	Graduate	High	M
Student 5	Graduate	Medium	F
Student 7	Graduate	Low	F
Theatre Director	Graduate	Low	F
Author	Honours graduate	High	M
Lab tech 3	Honours graduate	Very low	M
Student 3	Honours graduate	High	F
Student 4	Honours graduate	High	F
Vet	Honours graduate	Low	F
Academic 1	Doctorate	Very high	F
Academic 2	Doctorate	Very high	M
Academic 3	Doctorate	Low	M
Academic 4	Doctorate	Low	M
Academic 5	Doctorate	Very high	M

Furthermore, the arbitrary scores and assessment scores were compared by determining the average difference in order to calculate correlations between those two sets of scores. The average differences were calculated for each assessor and each representation. This was done by comparing the arbitrary scores to each of the assessor's scores by subtracting the assessed score from the original score. For example, if the original score were 1 and the assessor's score were 2 the difference would be –1. Average differences were also analysed in terms of their absolute values:

- the average of absolute differences and maximum absolute difference were determined for the individual taxa;
- absolute difference ranges for each assessor were analysed to determine individual accuracy in relation to arbitrary scores;
- average differences and averages of absolute differences and maximum absolute differences were also calculated for groups of representations and groups of assessors, grouped by education, by sex and by interest in human evolution; and
- parametric tests of significance were not used. Instead confidence intervals of percentage values were determined to analyse differences between distributions at a P=0.05 level.

Results of all these calculations are presented below.

RESULTS

Arbitrary scores

The assessor's scores for all of the representations, when combined, indicated that the representations fell into just two categories (Figure 6.1). These categories have been labelled "Human" and "Prehuman". Holocene Moderns to *Homo erectus* generally received a score of 3 or less indicating that they were judged to be in the same category of "Human", while the earlier *Homo* taxa and the australopithecines' scores were concentrated between 5 and 8 and were judged the "Prehuman" group.

Average scores and standard deviation

The total average score for all representations was 3.3 (Figures 6.2). When comparing the average scores for all representations to the total average, the majority of the representations (69%) were found to have an average score of 3.1 or less, 1 representation (1%) had the same average score as the total average and the remaining 30% had an average score of 3.4 or more. This was similar to the arbitrary scores for the representations where 71% of the sample had 3 or less.

The range of average scores found within each taxon varies (Figure 6.3):

- Anatomically Modern *H. sapiens* in general ranged from 1.0 to 1.6 with one Holocene Modern Human which had an average score of 2.4;
- Neandertals were scattered from 1.0 to 4.3;
- the *H. erectus* group were scored at 1.4, 2.7, 3.0 and 5.2;
- the Early *Homo* group were scored at 3.8, 5.6, 6.0;
- the *H. habilis* scores were 3.8, 5.0, 6.3, 6.6;
- Australopithecines (including the gracile australopithecines) ranged from 5.2 to 6.3; and
- the Robust Australopithecines ranged from 6.9 to 6.1.

When comparing the average score against the arbitrary score the coefficient of determination R^2 value was 0.82 indicating that 82% of variance in the average scores was explained by the variance of arbitrary scores. When comparing all of the assessor's scores to the arbitrary score the R^2 value was 0.29 so only 29% of the variance of the arbitrary scores was explained by the arbitrary scores.

When the representations are sorted according to their average scores a linear progression is seen with a sharp increase between 3.5 and 6.5 (Figure 6.2 and 6.4). The anatomically Modern *H. sapiens* through to the Neandertals were generally judged on average correctly as were the Australopithecines. The *H.*

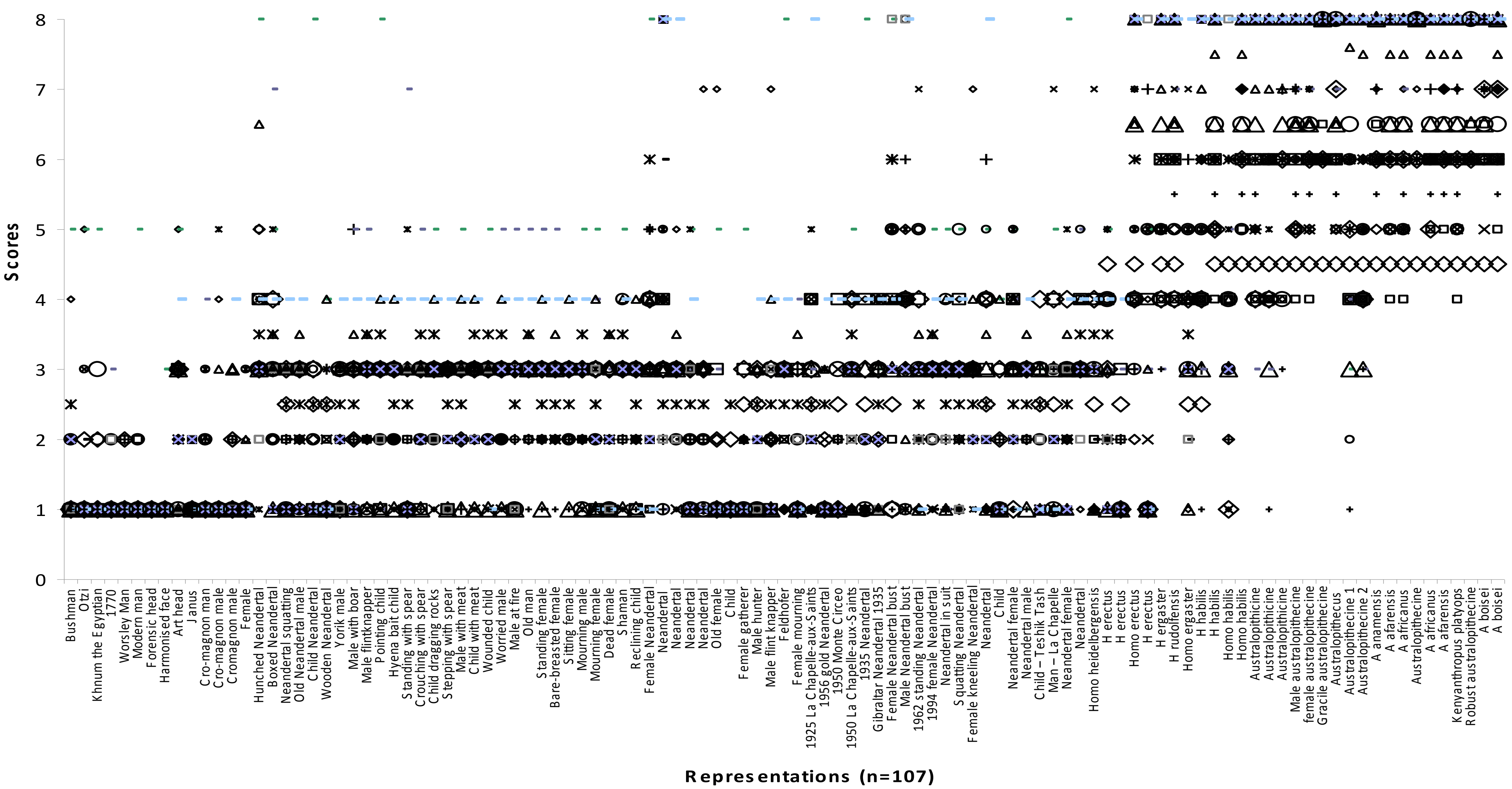


FIGURE 6.1 A scattergram showing all of the 25 assessor's scores for each representation. The representations are sorted into taxa defined by the arbitrary scores with Holocene Modern *H. sapiens* on the right through to Robust Australopithecines on the left.

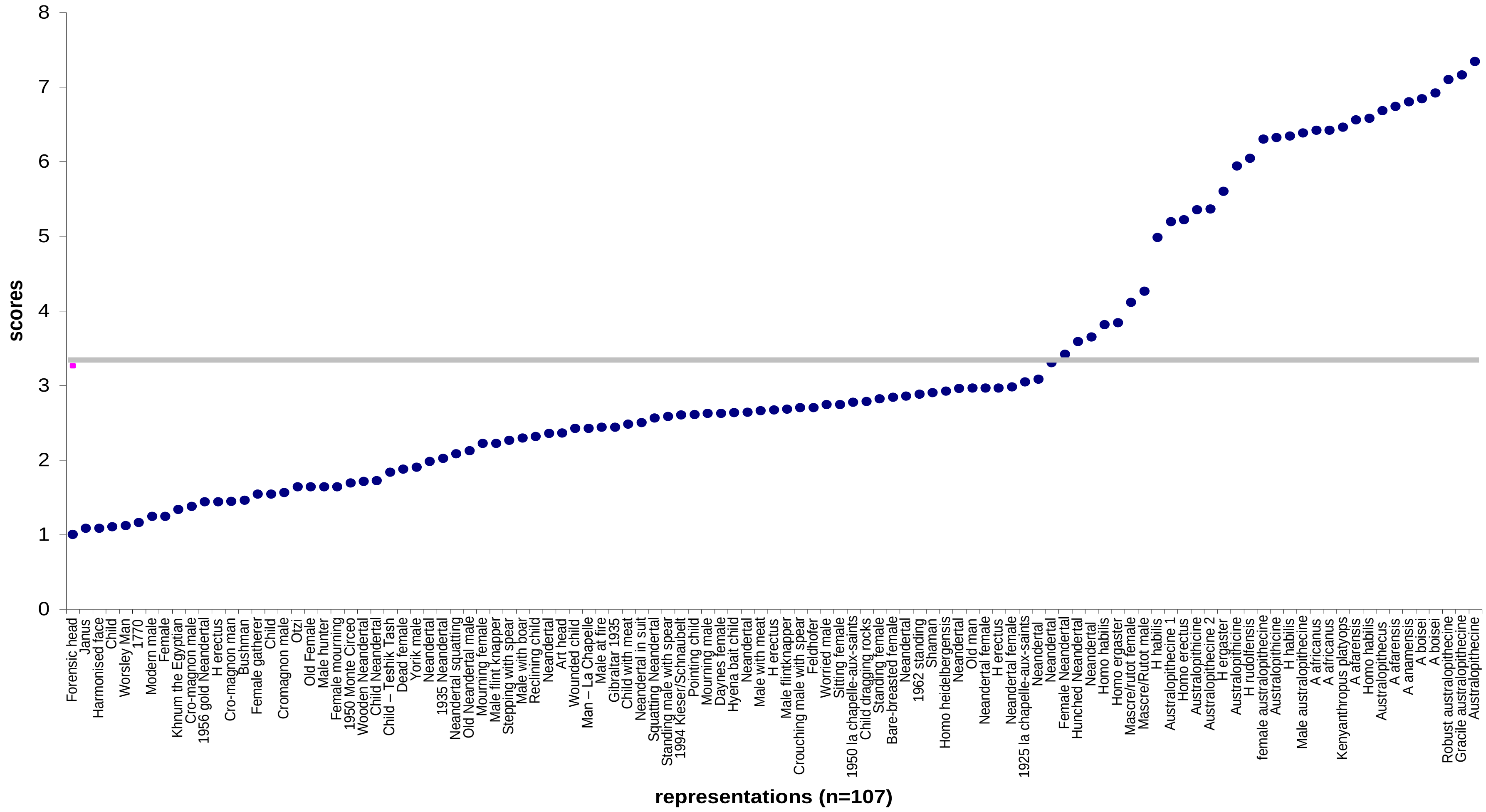


FIGURE 6.2 The average score for each representations and the total average score for all representations shown as a grey line.

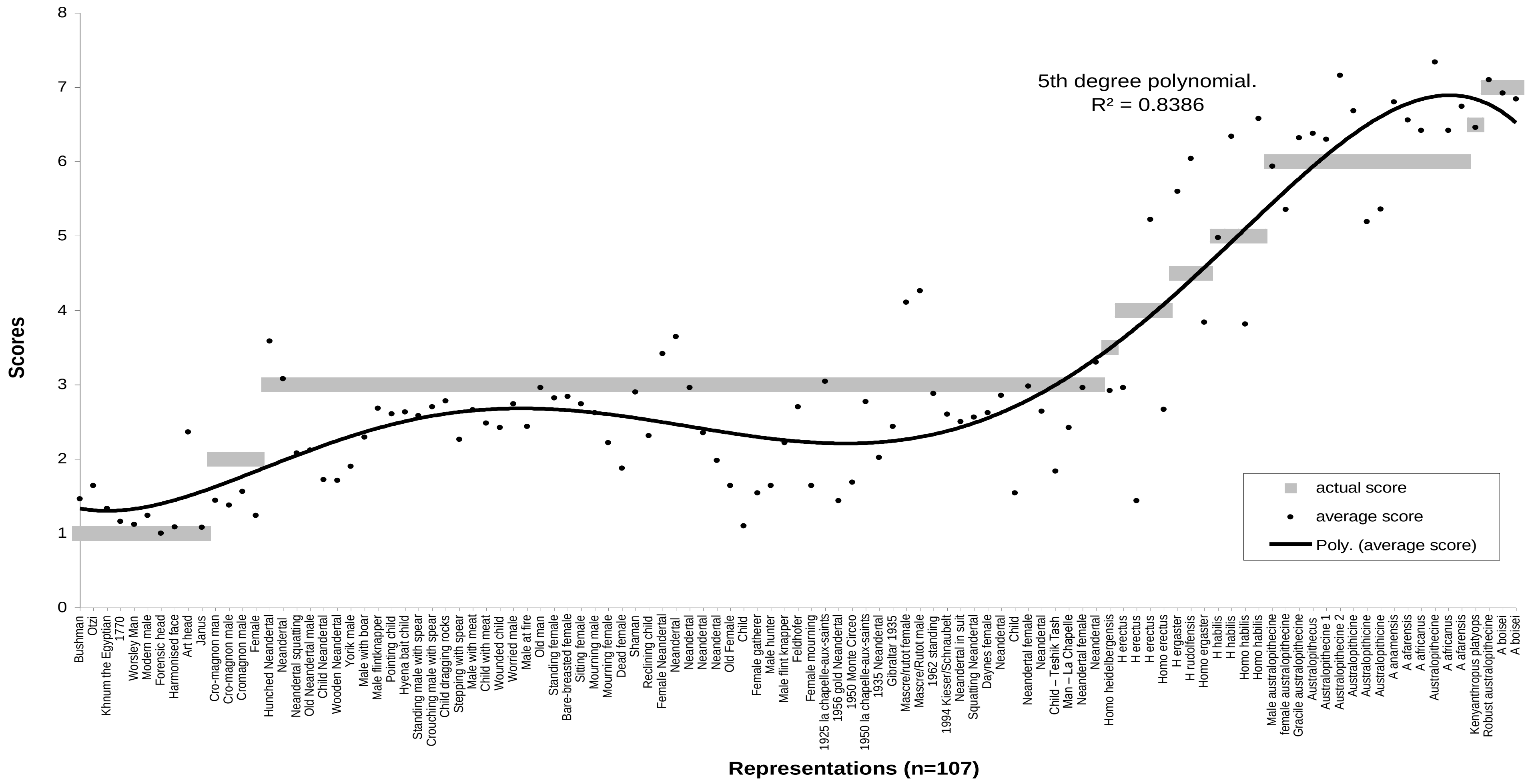


FIGURE 6.3 The arbitrary score and the average score for each representation with the addition of a 5th degree polynomial trendline.

erectus, H. habilis and Early *Homo sp.* group were more varied in their scores than the other groups.

The averaged scores for the assessors ranged from 2.2 to 4.9 (Table 6.3), indicating that some assessors considered the sample overall to be of the more recent *Homo* taxa than the earlier *Homo* taxa. The standard deviation of the assessors' scores ranged from 1.0 to 2.8.

Although the average scores range from 2.2 to 4.9 the standard deviation for each assessor indicates individual variability (Figure 6.4).

- The Amateur with an average score of 3 had the smallest judgement range, only allocating taxa from Pleistocene Modern *H. sapiens* to *H. erectus.*
- The next smallest judgement range was that of Student 1 with an average score of 2.5, and allocating the representations to groups from Holocene Modern *H. sapiens* through to *H. erectus.*
- The lowest average score of 2.2 scored by Academic 4 was in the mid range of the standard deviation. This assessor judged the representations to range from Holocene Modern *H. sapiens* through to *H. habilis.*
- The 5 assessors with the largest standard deviation showed a range of variation in their scores; The Quilter considered the representations to range from Pleistocene Modern *H. sapiens* to more than Robust Australopithecines.
- Lab Tech 2 with the same range overall judged the representations to be slightly more modern.
- Lab Tech1, Academic 3 and Student 2 judgements ranged from 1.0 to 6.5.

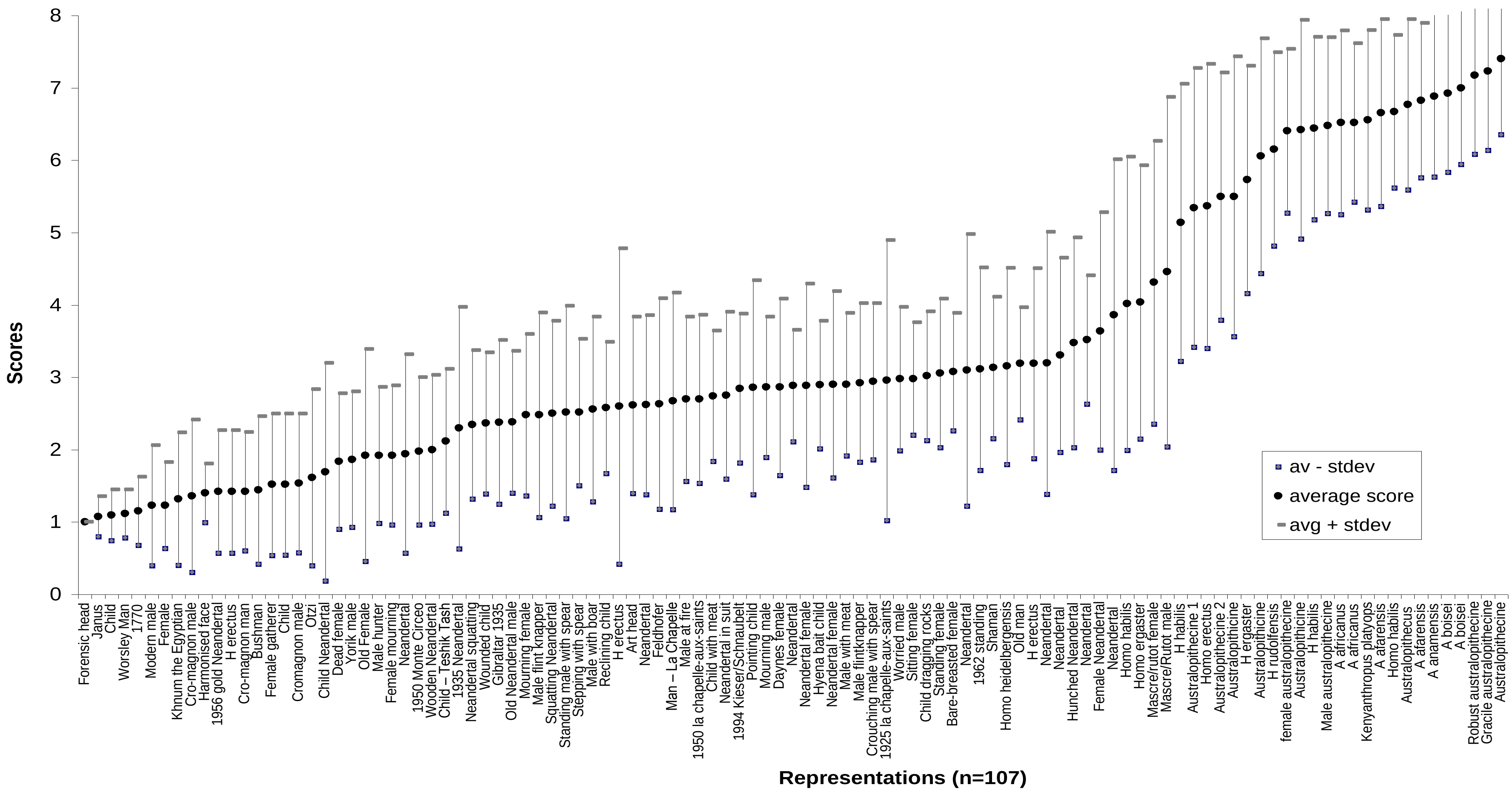


FIGURE 6.4 The averaged score and the standard deviation for each representation sorted by the averaged score.

TABLE 6.3 The average scores and the standard deviation as well as the total average difference and absolute difference between the assessor's judgements and the representations' arbitrary scores for each assessor (n=25), as well as their maximum absolute difference. Ordered by the education level for the assessors from secondary through to higher degree.

Assessor	Average score	Standard deviation	Average difference	Average absolute difference	Maximum absolute difference	Education level
Amateur	3.0	1.0	0.3	0.6	3.5	Secondary
Quilter	4.9	2.7	–1.4	2.2	5.0	Secondary
Artist	3.0	1.8	0.5	0.9	3.0	Secondary
Lab tech 2	4.3	2.7	0.4	1.6	5.0	Secondary
Student 1	2.5	1.5	–0.1	1.1	4.0	Undergrad
Student 2	3.6	2.8	0.4	1.3	5.0	Undergrad
Student 6	3.9	2.2	–0.4	1.0	3.5	Undergrad
Student 8	2.9	2.0	0.6	0.9	3.5	Undergrad
Accountant	3.3	2.2	0.2	1.3	5.0	Graduate
Lab tech 1	3.4	2.7	–0.8	1.3	5.0	Graduate
Nurse	2.9	2.1	0.6	1.2	3.0	Graduate
Policeman	3.1	2.1	0.7	0.9	5.0	Graduate
Student 5	3.4	2.2	0.1	1.0	3.5	Graduate
Student 7	3.4	1.9	0.5	0.8	5.0	Graduate
Theatre Director	3.7	2.3	–0.2	1.3	5.0	Graduate
Author	2.6	1.7	0.9	1.1	3.5	Honours graduate
Lab tech 3	2.8	2.2	0.7	1.2	3.5	Honours graduate
Student 3	3.1	1.9	1.3	0.7	3.5	Honours graduate
Student 4	3.1	2.0	0.4	0.9	3.0	Honours graduate
Vet	3.5	2.2	0.0	0.9	3.5	Honours graduate
Academic 1	3.2	2.4	0.2	1.2	4.0	Doctorate
Academic 2	3.3	1.8	1.0	0.7	2.0	Doctorate
Academic 3	3.5	2.8	0.1	1.2	6.0	Doctorate
Academic 4	2.2	2.0	0.2	1.5	5.0	Doctorate
Academic 5	3.2	1.6	0.3	0.6	3.5	Doctorate

Minimum and Maximum Scores

The minimum and maximum scores for the representations and for the assessors were analysed.

Representations

Considering the individual taxa by both minimum and maximum scores indicated that four of the taxa, Holocene and Pleistocene modern, Neandertals and *H. erectus* were judged as moderns whereas the Early *Homo*, *H. habilis*, gracile and robust australopithecines were not judged as modern humans (Figure 6.5 and 6.6). The maximum scores for the Early *Homo*, *H. habilis*, gracile and robust australopithecines were all 8 (ape or ape–like) indicating that these taxa were sometimes not judged to be part of the human lineage.

Assessors

When considering the minimum and maximum scores for the representations (Figure 6.7):

- all assessors considered there to be Holocene Modern *H. sapiens* to be in the sample;
- the majority of assessors (n=18) considered the representations to encompass the full range of scores from Modern Holocene to Ape–like;
- the other 7 assessors limited themselves to only the *Homo* and *Australopithecus* taxa; and
- only one of these assessors considered all of the representations to be part of the *Homo* lineage.

Absolute Difference in Scores

Overall, representations were mostly judged correctly, especially those of the more recent finds: Modern (Holocene and Pleistocene) and Neandertal (Table 6.4). The Modern representations were more likely to be judged as Modern rather than Neandertal or *Homo erectus* and were never judged as Australopithecines. Pleistocene Modern forms were more likely to be judged as Holocene Modern rather than Pleistocene and were rarely judged as Neandertals or *Homo erectus.* Neandertals were more likely to be correctly judged as Neandertals or as

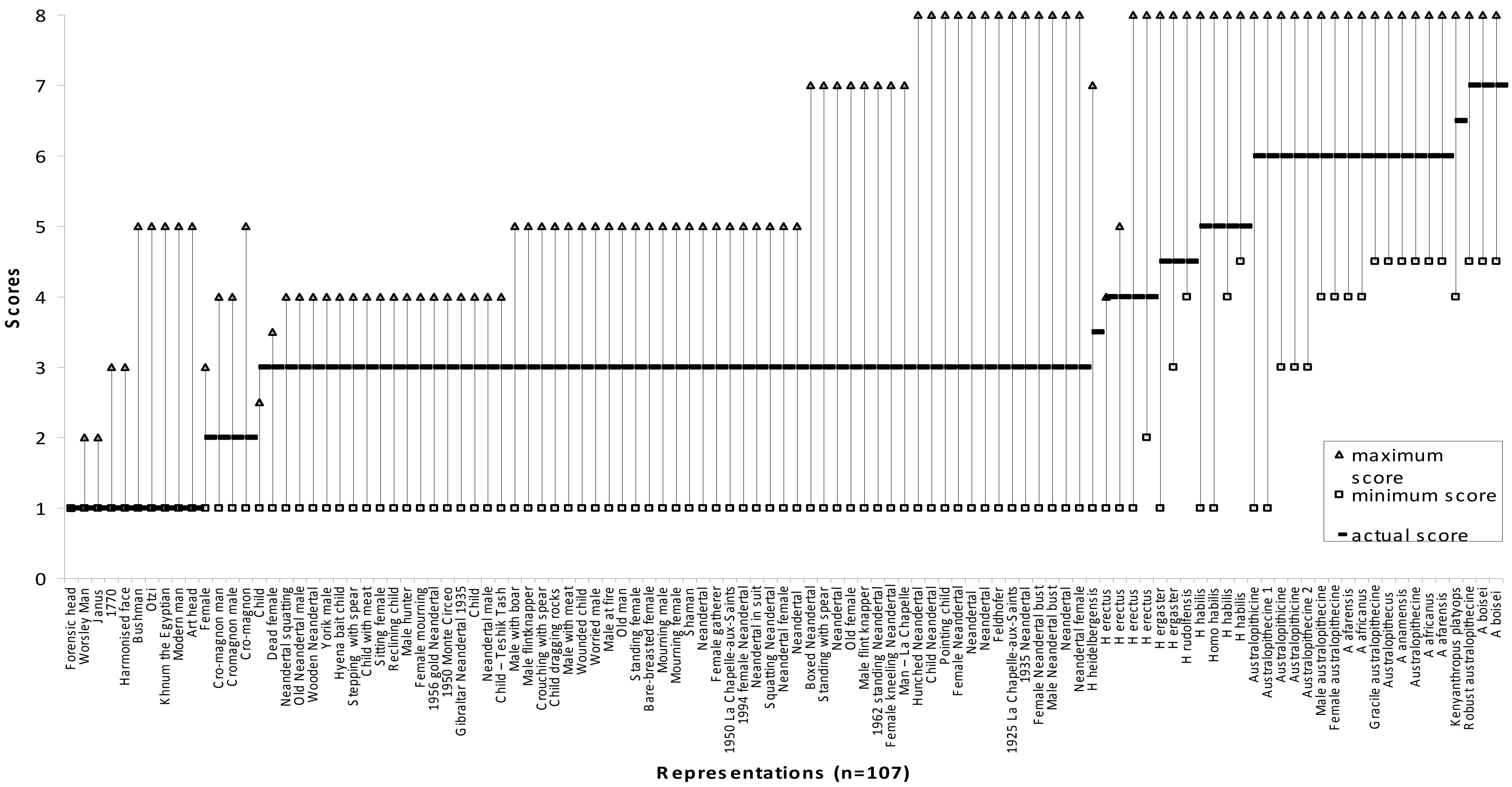


FIGURE 6.5 The minimum and maximum score for each representation and the arbitrary score shown for each taxon.

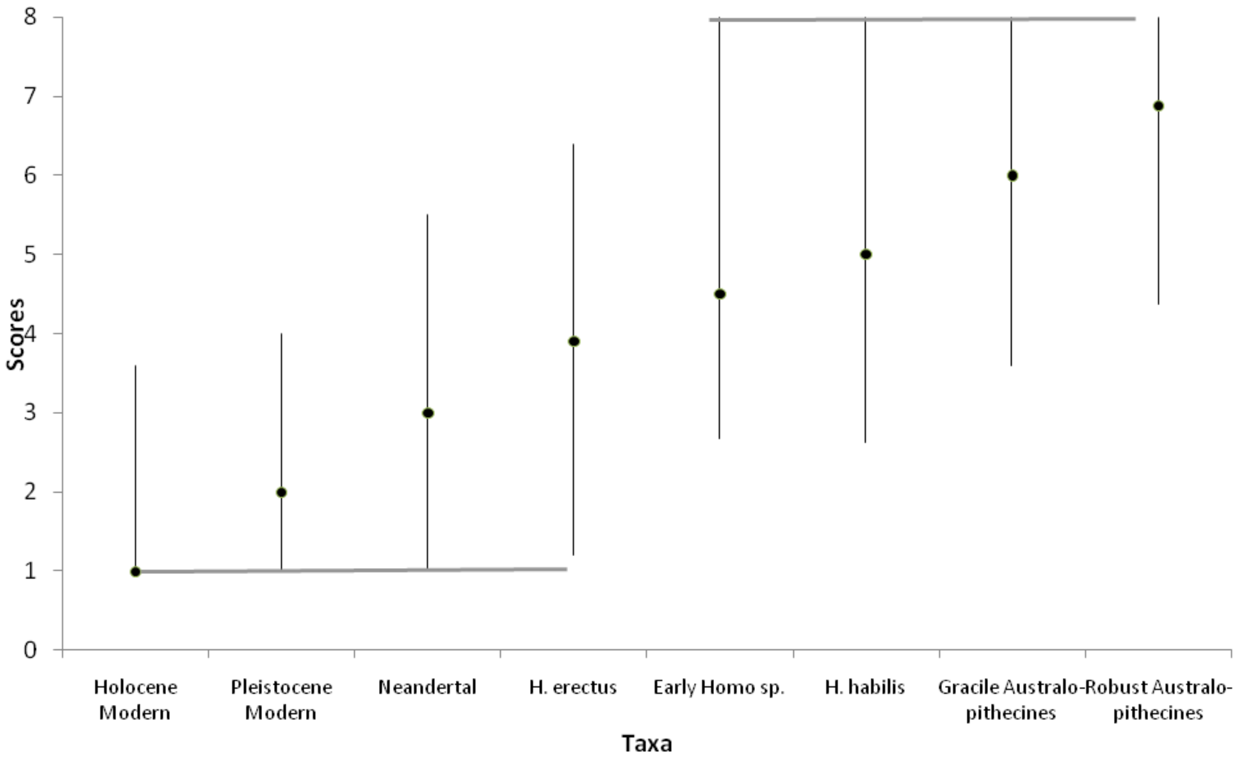


FIGURE 6.6 The minimum and maximum scores for each taxon.

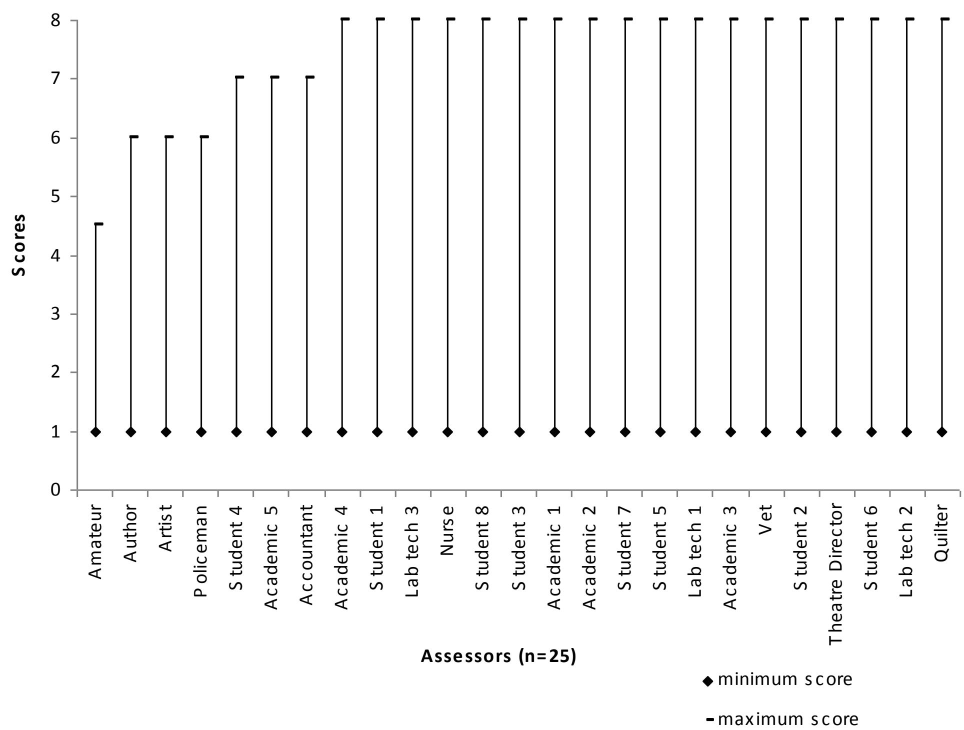


FIGURE 6.7 The minimum and maximum scores for each assessor sorted by their maximum score.

Moderns and they were rarely considered one of the earlier forms. Assessment of the Early *Homo* forms had a greater range of variation from Modern to Ape/Ape–like while the Australopithecines were more likely to be judged in a narrower range as Ape–like, Australopithecines or Early *Homo* forms.

TABLE 6.4 The taxa used in this study and the number of representations for each taxon as well as the total average difference and absolute difference of each taxon from the designated score.

Taxon	n	%	Total average difference	absolute average difference
Holocene Modern	10	9.3	–0.4	0.4
Pleistocene Modern	4	3.7	0.6	0.6
Neandertal	62	56.9	0.5	0.6
Early *Homo species*	14	13.1	–0.2	1.3
Australopithecines	17	15.9	–0.1	0.6

As can be seen in Table 6.5, the absolute difference in scores for each assessor indicates the accuracy of each assessor through the comparison of differences to the arbitrary scores:

- the frequency with which the assessor's scores matched the arbitrary scores ranged from 8% to 59%;
- when these matched (correct) scores were added to the judgements that were out by only 1 category the assessors' ranged from 26% to 83%;
- 21 (84%) of the assessors had over 51% accuracy within 1 category difference from arbitrary score;
- the 4 assessors that had less than 50% correct or within 1 category of the correct score were the quilter (26%), academic 4 (39%), lab tech 3 and academic 3 (both at 48%); and
- academic 2 was the only assessor to have all assessments within 2 categories of the actual assessment.

TABLE 6.5 Cumulative totals from 0 to 2 categories, as well as the percentage of assessor's answers in the 3–6 categories and the percentage of those photographs that were not scored, in order of correct scores from largest to smallest.

Assessors	Education Level	0	0+/– 1	0+/–2	+/– 3–6	Not scored	Total %
Academic 5	Doctorate	58.9	83.2	96.2	2.8		100.0
Student 7	Graduate	51.4	72.0	94.4	5.6		100.0
Student 3	Honours graduate	50.5	72.0	96.2	2.8		100.0
Amateur	Secondary	46.7	79.5	94.5	5.6		100.0
Academic 2	Doctorate	46.7	76.6	100.0			100.0
Student 5	Graduate	41.1	56.9	96.2	3.7		100.0
Academic 3	Doctorate	40.2	46.7	79.5	10.3	10.3	100.0
Student 8	Undergrad	38.3	78.5	95.3	4.7		100.0
Student 4	Honours graduate	36.4	72.8	95.2	4.7		100.0
Academic 1	Doctorate	35.5	56.9	92.5	6.5		100.0
Policeman	Graduate	33.6	51.4	69.2	2.8	28.0	100.0
Lab tech 3	Honours graduate	32.7	46.7	91.6	8.4		100.0
Theatre Director	Graduate	30.8	52.3	91.6	8.4		100.0
Artist	Secondary	29.9	75.7	99.1	0.9		100.0
Student 2	Undergrad	29.9	56.0	86.8	12.1		100.0
Lab tech 1	Graduate	29.9	56.1	88.8	11.2		100.0
Author	Honours graduate	24.3	63.6	96.2	2.8		100.0
Student 6	Undergrad	23.4	72.0	93.5	6.5		100.0
Accountant	Graduate	23.4	61.7	89.7	10.3		100.0
Nurse	Graduate	19.6	66.3	95.3	4.7		100.0
Academic 4	Doctorate	19.6	39.2	91.5	8.4		100.0
Vet	Honours graduate	15.0	75.7	94.4	5.6		100.0
Student 1	Undergrad	11.2	74.8	96.2	2.8		100.0
Lab tech 2	Secondary	10.3	53.3	86.0	14.0		100.0
Quilter	Secondary	6.5	26.2	76.7	23.4		100.0

Education level made no difference to the averaged scores (Table 6.3) or the cumulative percentages (Table 6.5). No significant difference was found between the scores when they were evaluated by sex (Table 6.6). The two assessors that used the option of "don't know" were both male.

TABLE 6.6 The differences between assessors when assessed by sex, expressed in percentages. There was no significant difference.

Sex	n=	0	+/– 1	+/– 2	+/– 3 or more	Not identified	Total percent
Females	13	29	34	30	6.4		100
Males	12	31	32	28	6.5	2.5	100

Some representations were more often judged correctly than others, some were consistently misjudged. One representation (E242) was judged correctly by 24 assessors and not able to be judged by one assessor (policeman). This representation E242 was a Holocene Modern Human (Figure 6.8). A further two representations, E157 and E335, both Holocene Modern *H. sapiens* were judged as either Holocene or Pleistocene Modern *H. sapiens* by all the assessors (Figure 6.9a and b). None of the other representations had this consistency of judgement by the assessors. In addition to these three representations, ten others had an average absolute difference of 0.5 or less (Table 6.7). These representations comprised eight Holocene Modern *H. sapiens* and five Neandertals.

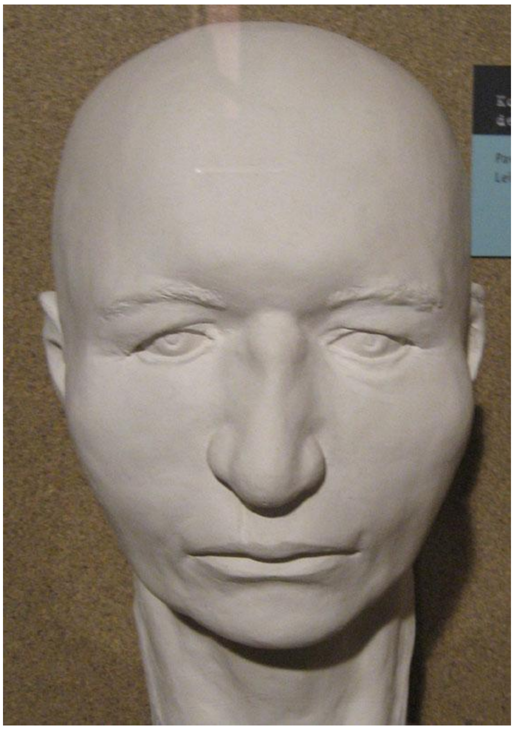


FIGURE 6.8 The representation E242, a Holocene Modern Human was correctly judged by 24 of the assessors; one assessor was not able to judge this representation.

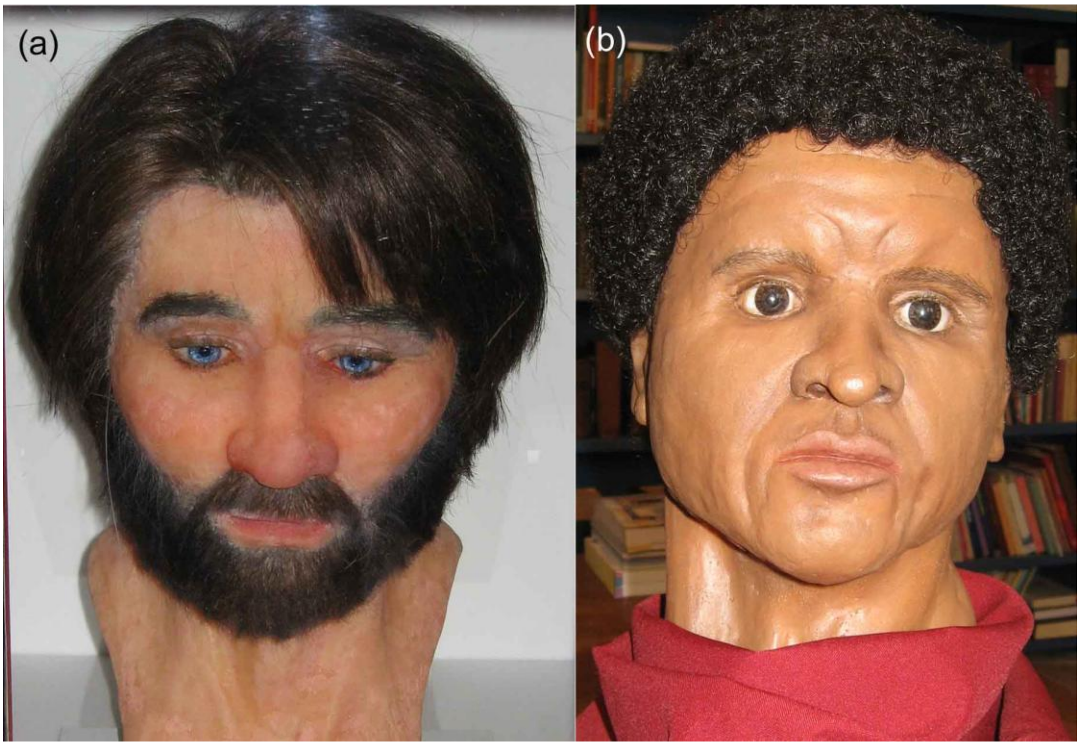


FIGURE 6.9 Two Holocene Modern *H. sapiens*, E157, Worsley Man and E335, Janus were judged correctly or as Pleistocene Modern *H. sapiens*.

TABLE 6.7 Thirteen representations had an average absolute difference of 0.5 or less. These representations were either *Homo sapiens* (1) or Neandertals (3). Ordered by average absolute difference scores.

Number	Representation name or description	Actual score	Average absolute difference score
E242	Forensic head, NM	1	0.0
E335	Janus, UMG	1	0.1
E285	Harmonised face, MTMB	1	0.1
E157	Worsley man, MMM	1	0.1
E156	1770, MMM	1	0.2
E229	Modern man, NM	1	0.3
E153	Khnum the Egyptian, MMM	1	0.4
E067	Old man, DMA	3	0.4
E295	Neandertal male, LCML	3	0.5
E001	Bushman, HDNS	1	0.5
E070	Sitting female, DMA	3	0.5
E069	Bare–breasted female, DMA	3	0.5
E310	Neandertal, Museon	3	0.5

Neanderthal Museum, Mettmann, Germany (NM), Universiteitsmuseum, Groningen, Netherlands (UMG), Magyar Természettudományi Múzeum, Budapest (MTMB), Manchester Museum, Manchester, London (MMM), Drents Museum, Assen, Netherlands (DMA), Leira Castle Museum, Leira, Portugal (LCML), Haus Der Natur, Salzburg (HDNS), Museon, Den Haag, Netherlands (Museon).

Of the 107 representations only four representations were consistently judged incorrectly (Table 6.8). These were E235, a Neandertal child; E210, *H.* ergaster; E307, *H.* habilis; and E040, a robust australopithecine (Figure 6.10). Only four representations had an average absolute difference of over 2 only one of which was consistently judged incorrectly, this was E307, a *Homo habilis* (Figure 6.11).

DISCUSSION

The taxonomic classification of our hominin lineage has been the subject of many debates since the identification of the first fossil as human. One of the major debates pertains to the number of possible hominin taxa with scientists divided into two camps. Splitters have identified over 20 taxa to date whereas Lumpers have limited the number of taxa to a few (Frayer *et al.* 1993; Wood and Lonergan 2008). As the majority of the criteria for defining these taxonomic categories are based on skull morphology it can be assumed that hominin representations which are based on skeletal remains would reflect taxonomic distinctions.

This, however, was not the case as taxonomic differences were not found to be visible in the faces of the sampled hominin representations. The assessors separated the representations into what was essentially two categories, that of 'Human' and 'Prehuman'. The 'Human' category included the representations from *H. erectus* to Holocene Modern *H. sapiens* while the 'Prehuman' category contained the Australopithecines to the Early *Homo* species. These results reflect the long–running debate about whether *H. habilis* should be included within the *Homo* or the *Australopithecus* genera (Lieberman 2007; Robinson 1965; Wood 2009).

FIGURE 6.10 The eleven representations that had an average absolute difference of 0.5 or less: (a) E242, Forensic head[1]; (b) E285, Harmonised face; (c) E156 ,1770; (d) E229, Modern man; (e) E153, Khnum the Egyptian; (f) E067, Old man; (g) E295 Neandertal male; (h) E001 Bushman; (i) E070, Sitting female; (j) E069, Bare-breasted female; and (k) E310, Neandertal.

[1] The representations are from the following museums: (a and d) Neanderthal Museum, Mettmann, Germany; (b) Magyar Természettudományi Múzeum, Budapest; (c and e) Manchester Museum, Manchester, England; (f, i and j) Drents Museum, Assen, Netherlands; (g) Leira Castle Museum, Leira, Portugal; (h) Haus Der Natur, Salzburg; and (k) Museon, Den Haag, Netherlands.

TABLE 6.8 Four representations had an average absolute difference of 2.1 or more. These were ordered by average absolute difference scores.

Number	Representation name or description	Actual score	Average absolute difference score
E307	*H. habilis*, Museon	5	2.1
E297	*H. habilis*, HMG	5	2.3
E213	*H. erectus*, Musee	4	2.4
E268	*H. erectus,* MTMB	4	2.5

Museon, Den Haag, Netherlands (Museon), Hunterian Museum, Glasgow (HMG), Musee de l'Homme, Paris (Musee), Magyar Természettudományi Múzeum, Budapest (MTMB).

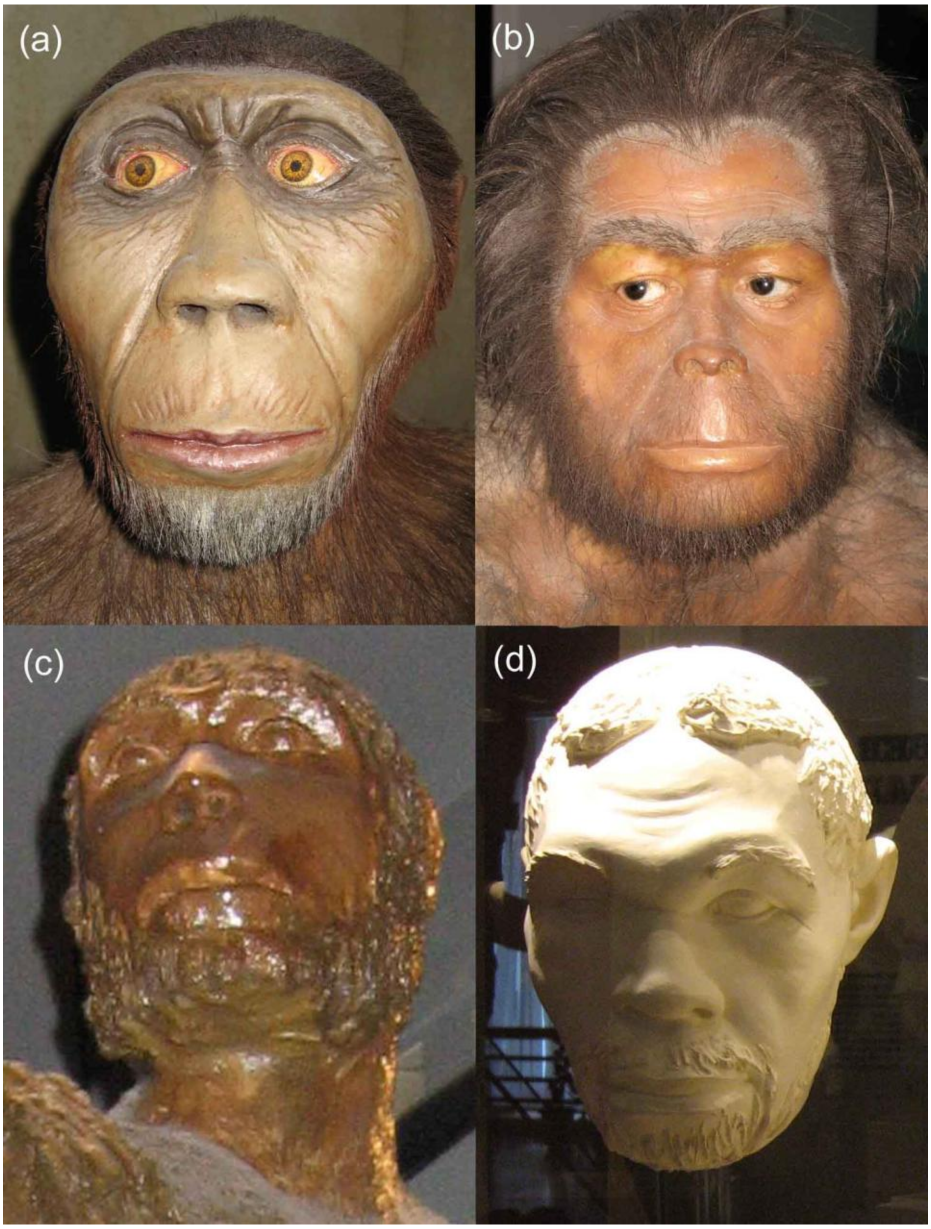


FIGURE 6.11 The four hominin representations in this sample that had the highest average absolute difference: (a) E307, *H. habilis*, Museon, Museon, Den Haag, Netherlands; (b) E297, *H. habilis*, Hunterian Museum, Glasgow; (c) E213, *H. erectus*, Musee de l'Homme, Paris; and (d) E268, *H. erectus,* Magyar Természettudományi Múzeum, Budapest.

The issue is, however, that this experiment was based on the faces of hominin representations which have been in the majority of cases based on skeletal evidence. This means that during the manufacturing process information has been included by various people, all of which have preconceived ideas about what the representation should look like. As discussed in–depth in Chapter 4 a representation with missing features is generally judged as less realistic[2] than those with all their features; this differs from other types of objects as illustrated in the repaired Grecian urn example on page 349 in Chapter 5. This means that the results from this experiment may be more about how the artists and scientists making these representations perceive these taxa than about what they actually look like based on our current level of scientific knowledge. That is if a *H. habilis* representation is made by someone who considers them to belong in the *Homo* genus rather than the *Australopithecus* genus than their biases/preconceptions will be transmitted to the viewer who will perceive the representation to be a part of our ancestral lineage. This would explain the variability in the assessor's scores for the *H. habilis.* This is interesting as it shows how an individual's constructed knowledge about a topic and the labelling of objects can impact on how a representation is perceived. By giving the assessors unlabelled photographs to assess the influence of naming a taxon was removed. The judgements that they made were based on their own constructed knowledge in reaction to the way the representations had been portrayed. The assessors were a heterogeneous group, chosen to represent a range of people similar to that of museum visitors: coming from different backgrounds, of varying educations and levels of interest in human evolution. As these hominin representations were in museum displays, a heterogeneous group of assessors was thought to mimic actual museum visitors rather than choosing assessors from one specific area of interest, education or occupation.

The Neandertals were the largest group represented 58% of this sample. This excess of Neandertals is a well known phenomenon (Trinkaus and Shipman 1993)

[2] As defined in Chapter 4, "realistic" is used in this thesis to mean that the representation looks to be biologically life–like or legitimate and while it may not necessarily be an accurate portrayal, some of these representations do look as if they could start to breath and walk away.

and is due to a range of factors. The sample used in this study was European in origin which is one of the geographical areas of Neandertal concentration so one would expect to see displayed a higher percentage of Neandertal examples than African taxa. In addition, Neandertal remains are the most commonly found of our hominin ancestors (Stringer and Gamble 1993). Finally, as they were also the first fossil hominin to be identified, they were the first to have their appearance 'reconstructed' and as such have a long and varied visual history.

The question of what Neandertals looked like has been debated ever since Boule's 1909 primitive portrayal was compared to Keith's (1911) noble savage (Moser 1992). Neandertal representations tend to reveal more about our interpretations and where we place Neandertals within our family tree rather then what they looked like. A large number of representations were from the Neanderthal Museum, Mettmann, Germany, which had an additional number of historical examples of Neandertal representations due to the 150th Jubilee exhibition of the Feldhofer Neandertal which was on display during the museum visit. A second museum also had a large number of Neandertals on display. The Drents Museum, Assen, Netherlands, had a touring exhibition "Neanderthalers in Europa", on display during the museum visit (2006). Many of these representations were of similar appearance and were included to see if there was a consistency to their scores. The average scores for these particular representations was either a 2 or a 3, and they all had a minimum score of 1, although their maximum scores ranged from 3.5 to 8. This indicates that while there is consistency in average scores, the range of maximum scores may mean that the assessors are looking at a number of different features and are drawing on their constructed knowledge in order to categorise these faces.

The taxonomic classification and categories used in this experiment were based on the specific museums designated classification. Other designations, such as the arbitrary scores, resulted from specific factors related to this study or to general knowledge available to the public. The *Homo sapiens* group were split into two Modern Human categories to determine if the assessors saw a visual difference between the two groups and if animal skins and messy hair would influence the assessors.

Neandertals were given their own designation even though there is a long–standing debate about their positioning in our ancestral tree and if they are directly related to us or are a side branch. This debate can be seen in the differences between their two possible taxonomic classifications of *Homo neanderthalensis* or *Homo sapiens neanderthalensis.* Their original classification was of *Homo neanderthalensis* by King in 1864. The Neandertal label also comes with a range of attached preconceptions not only about their appearance but also about their culture and their intelligence. Popular culture in the form of cartoons, television programs and literature continues to link them to animals and savages (Stringer and Gamble 1993). This popular culture link means that Neandertals as a group of earlier hominins are seen as recognisably distinct by the general public.

The *Au. boisei* representations have been classified as australopithecines in this study as this has been the taxonomic classification used by the museums in which they are displayed. *Paranthropus* is more commonly used in the United States of America and no representations from that country were included in this study.

The taxonomic designation *Homo habilis* was used even though it is controversial (Wood and Collard 1999). Four of the representations were identified specifically as *H. habilis.* It is also a well known term which was thought to be more familiar to the general public and therefore familiar to more assessors.

Unfortunately, there were no representations of Miocene apes so there was not an extinct non–hominine primate that could have been used in addition to the other representations. It would have been interesting to have a comparison between Miocene apes and Australopithecines. Extant non–hominine primates were not included as these consisted of taxidermic specimens and not representations of the primates.

Two further assessors took part in this experiment but were not included in the results. The first was a science student and his categories were not able to be converted into the categories used in this experiment. The second was a devout Christian whose categories were based on her religious beliefs rather than evolutionary categories (Appendix H). Although, her categories consisted of "Human" and "Not Human", she did not consider her "Not Human" category to be animals but rather representations of things that did not exist. This adds to an interesting long running debate about what or who can be defined as human. Her "Human" category did not contain all of the Holocene Modern *H. sapiens*, it did however; include some of the Neandertal and *H. erectus* representations.

Conclusions

This study explores biases introduced by scientists/artists that created the faces of the various hominin taxa. The more human one thinks particular taxa are the more human the resultant representation becomes. This is clearly illustrated by Vendramini (2009) who has cast Neandertals as the ultimate boogie man for *H. sapiens* with his 'Neanderthal Predation Theory'. This theory is based on the premise that Neandertals hunted *H. sapiens* for food as well as sex. The accompanying illustrations suggest Neandertals where hairy and gorilla–like with feline slit–like pupils and human–like teeth (Figure 6.12).

The results from this experiment show that the differences in the individual hominin taxa are only recognisable between two groups; the Australopiths (including *H. habilis* and *K. platyops*) and the various *Homo* species grouped together.

NOTE:
This figure is included on page 410 of the print copy of the thesis held in the University of Adelaide Library.

FIGURE 6.12 Vendramini (2009) vision of a Neandertal as a predator, illustrating how our perceptions, beliefs and theories impact of the way that the earlier hominins are portrayed. Note the slitted pupils, human–like teeth, hirsuteness and colour of the hair and skin as well as the use of technology.

REFERENCES

Brem SK, Ranney M, and Schindel J. 2003. Perceived consequences of evolution: college students perceive negative personal and social impact in evolutionary theory. Science Education 87(2):181-206.

Cobern WW. 1994. Point: belief, understanding, and the teaching of evolution. Journal of Research in Science Teaching 31(5):583-590.

Frayer DW, Wolpoff MH, Thorne AG, Smith FH, and Pope GG. 1993. Theories of modern human origins: the paleontological test. American Anthropologist 95(1):14-50.

Lieberman DE. 2007. Homing in on early *Homo*. Nature 449:291-292.

Lord B. 2002. The purpose of museum exhibitions. In: Lord B, and Lord GD, editors. The manual of museum exhibitions. Walnut Creek: Altamira Press. p 11-25.

Moser S. 1992. The visual language of archaeology: a case study of the neanderthals. Antiquity 66:831-844.

Moser S. 1998. Ancestral images: the iconography of human origins. Ithaca, New York: Cornell University Press.

Plotnik R. 1999. Introduction to psychology. Belmont, CA: Wadsworth Publishing Company.

Robinson JT. 1965. *Homo 'habilis'* and the Australopithecines. Nature 205(4967):121-124.

Stringer C, and Gamble C. 1993. In search of the Neanderthals: solving the puzzle of human origins. London: Thames and Hudson.

Trinkaus E, and Shipman P. 1993. The Neandertals: changing the image of mankind. London: Pimlico.

Vendramini D. 2009. Them+Us: how Neanderthal predation created modern humans. Armidale, NSW: Kardoorair Press.

Wisniewski EJ, and Medin DL. 1994. On the interaction of theory and data in concept learning. Cognitive Science 18:221-281.

Wood B, and Collard M. 1999. The human genus. Science 284:65-71.

Wood B, and Lonergan N. 2008. The hominin fossil record: taxa, grades and clades. Journal of Anatomy 212:354-376.

Wood BA. 2009. Where does the genus *Homo* begin, and how would we know? In: Grine FE, Fleagle JG, and Leakey RE, editors. The first humans: origin and early evolution of the genus *Homo*. Dordrecht: Springer. p 17-28.

7

SUPPLEMENTARY HYPOTHETICAL INFORMATION embedded in hominin representations

INTRODUCTION

The objectives of this chapter are to determine the type of supplementary information that is embedded in the hominin representations displayed in museums and to assess a sample of representations in relation to specific areas of supplementary hypothetical information. Museums are accustomed to exhibiting 'real' objects that do not change over time. Hominin representations, whilst they are an object ascribed with a 'reality' due to their museum context, differ from other artefacts in museum displays. These other artefacts are produced in archaeological, ethnographic or fine arts contexts and are brought to the museum to be displayed as examples of human activities without interpretative alteration. Whereas, many of the hominin representations contain interpretations as they are used to illustrate theories, and these interpretations do change[1]. The point is that hominin representations, especially those of extinct species, are interpretations portrayed as fact. Hominin representations contain three types of information: first, factual information, secondly, well–considered current scientific knowledge which may be hypothetical and finally supplementary information which may be prejudicial. Factual information is directly related to

[1] Costume dummies and standard mannequins are included in this point as they are an interpretation of a fashionable body shape which has changed over time. Portrait figures, however, are a record of a particular person at a particular moment in time although one could argue that they are an interpretation of how that individual sees themself as well as how the artist sees them, rather than they actually are as there are examples of portrait figures that do not look like their celebrity (e.g., the Miley Cyrus representation at the Madrid Wax Museum (Museo de Cera) (Alicia 2010)).

skeletal evidence, for example the size of the skull dictates the size of the representation's head. The second type of information is more of a conceptual issue for the earlier hominins for which there is less known information and it may be hypothetical rather than for modern human representations or *Homo sapiens* and is addressed in Chapter 5, *"The Overall Finish and Body Proportions of the Earlier Hominin Representations".* The speculative and erroneous information is addressed by the chapters concerning the finishing techniques of the representations which were Chapter 4 for the *H. sapiens* and Chapter 5 for the extinct species. This chapter will address the supplementary information embedded in these representations.

Supplementary information is embedded in hominin representations in order to 'finish' or 'complete' the representation. This makes the representations understandable to the viewer and able to be 'read' especially when placed within a context. For example a representation dressed as a medieval knight can be 'read' as being a male and a noble who can ride a horse and joust; the more an individual knows about medieval history, the more information can be inferred. As previously discussed in the background chapter (Chapter 2), humans send and receive both subconscious and conscious messages through their body language and facial expression. These messages can be read from or ascribed to hominin representations even as they present this information in a static way. They may also be inferred by the viewer based upon prior knowledge or the use of their imagination. The transmitted messages and/or information can relate to biological sex characteristics, gender indicators, pigmentation, occupation, the hirsuteness of an individual, their height as well as the behaviours that they are portrayed as participating in. This range of information is embedded into hominin representations to varying degrees and may be a result of either conscious or unconscious decisions made by the multitude of people responsible for creating a museum exhibition. As Lavine and Karp (1991:1) so aptly put it:

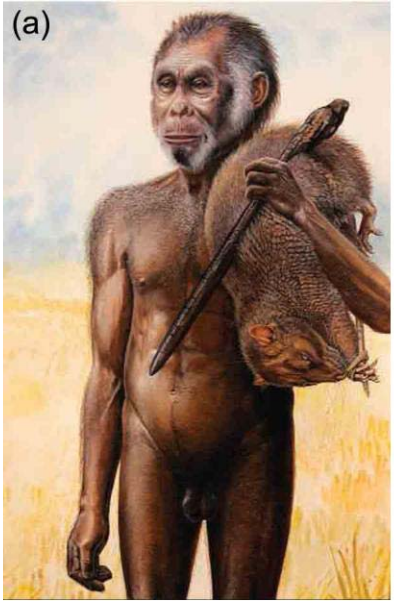
> Every museum exhibition, whatever its overt subject, inevitably draws on the cultural assumptions and resources of the people who make it. Decisions are made to emphasize one element and

> to downplay others, to assert some truths and to ignore others. The assumptions under–pining these decisions vary according to culture and over time, place, and type of museum or exhibit.

Added to these messages embedded into the representations and their exhibits is the fact that the visitors to the museum also have their own pre–conceptions, objectives and expectations (Leinhardt and Knutson 2004). So although, hominin representations project an aura of scientific facticity as a result of their display in an authenticating institution such a as a museum, they contain layers of interpretive information supplied by the artist, scientists and display designers. This information is also subject to change, especially in palaeoanthropology as new finds and new analyses are continually changing or reshaping interpretations.

A recent example of how the differences in interpretation can be depicted in a hominin representation is with skeletal remains ascribed to the species *Homo floresiensis* (Figure 7.1). The original find (LB1) was identified as a female (Brown *et al.* 2004) and yet the first representation of the 'Hobbit' was male (Gibbons 2007; Mayell 2004). Subsequent representations present an array of very different faces, bodies, sexes and contexts in several media to the viewer.

While it is understandable to those in the field that variation will occur in hominin representations due to different interpretations and the historical period in which manufactured, these differences are not always apparent to the individual visitor encountering them in the museum context for the first time in her/his experience. For the visitor, however, these representations are not necessarily the only ones that they will see in their lifetime as these representations (facial reconstructions especially) are used by museums to increase visitor numbers (J. Mills 2006: pers. comm.; M. Henneberg 2007: pers. comm.; V. van Vilsteren 2006: pers. comm.). They are also commonly used in popular science magazines such as National Geographic, Scientific American and Discovering Archaeology as well as being featured in newspapers and television



NOTE:
These figures are included on page 415 of the print copy of the thesis held in the University of Adelaide Library.

FIGURE 7.1 Various examples of what *Homo floresiensis,* nicknamed the Hobbit, may have looked like: (a) the first example of the female remains was shown as male by the artist Peter Schouten (Gibbons 2007; Mayell 2004); (b) another early example was by environmental archaeologist and artist Carol Lentfer (Salleh 2004); (c) the most recent example is on display at the Smithsonian, by artist John Gurche and the image is by Chip Clark, (Wong 2010); (d) other examples are by artist Elisabeth Daynès (Balter 2009); (e) an earlier example by artist John Gurche (Balter 2009); and (f) a second earlier example by artist Elisabeth Daynès (Cook 2007).

shows. Therefore, the likelihood of visitors seeing numerous hominin representations during visits to a variety of institutions is high, especially during their holidays. This means that they are not viewed as a single representation in isolation but rather may be compared to those previously seen in other museums or featured in magazines, newspapers and documentaries. Moreover as a visual experience, they may be easily memorised to serve as a reference point for future encounters with other human representations. Thereby becoming a part of an individual's constructed knowledge.

This point does not seem to be acknowledged or understood and hominin representations continue to be treated, displayed or unconsciously viewed as museum artefacts rather than interpretive objects. As the longevity of representations, proven by the continued use and reconditioning of representations (e.g., Coffee 1991), means that scientifically out–of–date representations are seen by what might be generations of visitors, which in turn perpetuates the inaccuracies. They become fixed because the visitors do not understand how or why the interpretations have changed and they cannot evaluate their importance. Museum exhibits are not updated regularly due to monetary, resource, time and/or space constraints. The economic cost of manufacturing representations or their replacement is high. Their draw in visitor numbers also increases the museum's income. For these two reasons the same representations remain on display for a long time being seen by generations of visitors. This longevity is linked to their memorability, examples of which are given in Chapter 3 "*This Study; Museums Visited and Hominin Representations Observed"*, such as the famous facial reconstructions, Yde Girl and Marcus van Eindhoven (Pages 129–130) and the Everybody Family being redisplayed in another museum due to public demand (Pages 140–141). The longevity and memorability of these representations means that they will in some way influence how our future scientists, teachers, authors, cartoonists [2] perceive hominins due to the preconceptions they acquired during museum visits and by viewing representations displayed in popular science magazines, newspapers and documentaries (see also Moser 1998; Scott 2007).

> *Forgive me, father, for I have sinned. I have drawn dinosaurs and hominids in the same cartoon.*
>
> *—Gary Larson*

[2] Who, in turn will influence many others, perpetuating possible misinformation.

Bias and Errors

We categorise what we see in order to understand the world and as soon as that occurs, the categories become loaded with preconceptions based upon prior experience. These preconceptions may be shaped by culture, personal experience and exposure to ideas through various media. This in turn means that these preconceived notions, cultural/religious/scientific bias or sensitivities, as well as actual knowledge are imposed on the viewed representations (Scott 2007; Teslow 1998). There have been several studies conducted on prior knowledge and museum displays (see for example Symington *et al.* 1986). It is thought that these biases differ between countries and change over time and may or may not reflect current scientific theories. The type of display that the representation is in may also bias the way representations are perceived. For example, representations are used to inspire empathy, to illustrate what hominins looked like, to place people within a context, to show a snapshot of a moment in time, and to illustrate a story.

Visitors remember details about the representation's such as their clothes or their blue eyes (P. Semal 2006: pers. comm.; L. Cammaert 2006: pers. comm.) but these attributes, especially in relation to the earlier hominins, are unknown. The results presented in Chapters 4 and 5 indicate that details, particularly of the face, are important to the viewer and influence the perceived realism of a representation. This realism in turn influences the perceived accuracy of the information contained within the representation. The results presented in Chapter 6 show that the intended information conveyed by the representation is not always the same information understood by the viewer, otherwise it would be easy to visually separate the individual species of early hominins.

Some curators/artists state they want representations (facial reconstructions in particular) to be neutral; but are they really neutral? Especially, when they are shown within a context or coloured or clothed, because as soon as one adds details, they cannot remain neutral. Even a face that is considered neutral can be read or ascribed as showing an emotion even if it is distain, arrogance, boredom. Add this to the range of behaviours that a representation can be shown portraying, and there is a plethora of information for the viewer to read. There are, however, behaviours that would not be portrayed such as defecation, urination and procreation. These are considered private or even disgusting behaviours even though they are perfectly natural. The portrayal of these behaviours would also give the viewer the feeling of voyeurism to the point of being uncomfortable beyond the low–level voyeurism that is participated in when people are observed in public situations.

This chapter will be separated into four sections allowing background, methods, results and discussion subsections, where applicable, for each of the identified areas of interest. These sections are:

1. determining the types of supplementary information;
2. the importance of sex;
3. age groupings; and
4. clothing.

MATERIALS: HOMININ REPRESENTATIONS

The representations chosen due to criteria identified in previous chapters. These were: that they were on display within a museum; that they were 'complete representations' as defined in Chapter 3; and that they consisted of representation types that contained hypothetical supplementary information such as facial reconstructions, casts, educational sculptures, museum and standard mannequins as well as the miscellaneous representations as defined in Chapter 3.

Not included in this study were the three remaining representation types. Portrait figures such as those from Madame Tussauds in London, where features such as skin/eye/hair colour are known. Costume dummies as the focus is on clothes and not on the representation, the only implied information possible is an indication of breasts which are generally determined by the gender specific clothes placed on them. Medical models were also excluded as they are more likely to be a body part than a complete representation.

Photographic Documentation

Analysis was carried out on photographs of the face, body and also the context of the sampled representations in this chapter which differs from the studies done in the preceding chapters 4–6. The use of a range of photographs showing the complete representation and its context enabled representations from various galleries, different museums and different countries to be compared to each other. The photographs were either printed in A4 or A5 size or viewed on the computer to enable zooming capabilities.

DETERMINING THE TYPES OF SUPPLEMENTARY INFORMATION

In order to determine the types of supplementary information present in the hominin representations sampled, photographs of the representations and their context were studied systematically. The first observation noted is that of sex, determining whether the representation is male or female. This observation is important because it will be embellished by an individual viewer's prior knowledge with features such as:

- Male – hunter, warrior, tall, strong, hairy, maker of technology, protector, provider; and
- Female – gatherer, mother, nurturing, caring, weak, soft, hairless, maker of food, teacher.

These will depend upon the viewers' previous experiences, cultural mores, religion, knowledge, and interests.

The second observation is the number of representations on view as this will suggest family groups, social interaction, roles and behaviours. This can then be expanded with other observations. For example what they are doing will give information on their age, sex, dominance, social role and occupation. How old they appear will influence what they are perceived to be doing in terms of occupation and how they are shown to interact with other representations. The way they are dressed will give clues to their age, sex, occupation, social and economic status as well as what era they are meant to illustrate. The way their bodies are positioned will indicate occupation, mood, age, sex, social behaviour and interaction with other representations.

These types of observations can be categorised into two principal focus areas identified as possible sources for any supplementary information occurring in hominin representations. These focus areas are based on the anatomy of the representations and embedded cultural indicators.

Anatomical Features

1. **Sex characteristics** identifying the representation as male or female or if the representation is neutral in terms of sex characteristics. These characteristics consist of visible genitalia (breasts, vulva or penis/testicles), breasts indicated under clothes, the presence or absence of facial and chest hair, the shape of the face and nature of facial features as well as the body shape and build.
2. **Age indicators** that identify the representation as an adult or child. These can include the height of the representation in relation to other representation or to the viewer; the presence or absence of sex

characteristics; and whether older adults were able to be identified through indicators such as grey hair and the presence of wrinkles.

3. **Surface anatomy,** including pigmentation of the skin, hair and eyes, and the height of the representation:
   a. pigment;
      i. skin colour;
      ii. hair colour;
      iii. iris colour;
   b. facial expression–a neutral expression vs. a realistic or emotive expression;
   c. the posture and pose of the representation;
   d. hirsuteness and other traits considered ‘primitive’ or indicative of the ‘other’;
   e. pregnancy; and
   f. physical abnormalities.

Cultural indicators

1. Body modification:
   a. temporary body modifications;
      i. clothing, this includes the presence or absence of clothing, the type of clothing;
      ii. hair style, the presence or absence of an actual style;
      iii. makeup;
      iv. body painting;
      v. gender indicators such as the type of clothes, hairstyles, jewellery and occupations of the representations;
   b. permanent body modifications;
      i. tattoos;
      ii. scarification; and
      iii. wounds.
2. Lifestyle:

a. the occupation, role or behaviour that the representation is portrayed as performing or participating in, or which may be inferred from the context in which it is displayed;
b. an association with animals, for example, the presence of domestic animals, such as dogs, cats, chickens or horses;
c. evidence of nomadic or settled lifestyle, in the form of housing or portable items;
d. relation to other individuals and objects in the same display; and
e. role or status of an individual shown though clothing, jewellery, hair styles makeup, associated grave goods.

3. Physical appearance:
   a. level of attractiveness;
   b. presence or absence of diseases and deformities; and
   c. poor hygiene.

A range of indicators and features were identified as areas of possible bias and supplementary information. There is some overlap with the identified areas, as the information that can be ascribed to from a representation is complex. In order to make these results understandable three of them will be assessed in more detail: sex, age and clothing.

To give an overview of the supplementary information within the hominin representations, they were divided into the following groups:

1. Modern *Homo* (*Homo sapiens*), which consisted of the representations that either embodied modern or historical personalities or those that were from a well known archaeological context, exhibiting complex behaviours and were of recent date (sampled representations are of individuals from 30 Ka to present only);
2. Neandertals, who were classified as a separate group as there is still debate over their taxon (see for example Saniotis and Henneberg 2010) and the dating of remains separates them from the Modern group even

though the archaeological record is abundant in their artefacts and indicates that they had complex behaviours;

3. Earlier *Homo* as a distinct group as they incorporate the remaining *Homo* taxa from the Pleistocene: *habilis, heidelbergensis, erectus, ergaster* and *rudolfensis*; and
4. Early *Homininae* as the final group. This group contains *Australopithecus* and *Kenyanthropus* and those classified as *Paranthropus, Sahelanthropus* and A*rdipithecus* if there were any representations in this sample identified as such.

ANATOMICAL FEATURES

THE IMPORTANCE OF SEX

Identification of faces and an individual's sex by infants (Cornell 1974) shows the importance of the categorisation of the social information to our species. We refine these abilities as we mature, through the incorporation of other information such as body shape (Johnson *et al.* 2010; Wild *et al.* 2000) into our interpretations of the sexual identity of others. The categorisation of social information to identify gender[3] and ultimately sex is essential and due to the young age at which we learn it, means that gender/sex is one of the first categories into which we place an individual (see Fagot and Leinbach 1993). This has implications for the other social information that we read from an individual. For example the definition of an individual's sex influences how we read their facial expression, body language and ultimately mood (Barrett and Bliss-Moreau 2009), and dominance (Main *et al.* 2009). Women are more likely to read social information (such as sex) from faces than males (Sun *et al.* 2010). As this is a complicated area of research, only an overview of the literature has been included

[3] There is a difference between gender and sex even though they are often used as interchangeable concepts. Gender is personally ascribed and is psychological, so an individual born a male for example may choose to be considered a female, whereas sex refers to the biological sex of an individual (Walker and Cook 1998).

to give some insight into the importance placed upon sex assessment and the way that it shapes our categorisation of representations. It is our ability to categorise–sorting out what we see and defining it–and placing it into pre–existing categories which allows us to make sense of what we see and experience (Henneberg 2009).

Sex Assessment

To assess the sex of the representations they were first separated into four samples as previously defined; *Homo sapiens*, Neandertals, earlier *Homo* and early *Homininae* samples. All four sample groups were assessed using anatomical sex characteristics. The *H. sapiens* sample was then assessed using cultural or gender indicators because of the inclusion of the 'blanks' finish type as described in Chapter 3, as well as the range of cultural and gender information which was found only in this group. The sex characteristics used consisted of: visible genitalia (breasts, vulva or penis); indicated genitalia (e.g., breasts under clothes); presence or absence of facial hair; and presence of chest hair in the *H. sapiens* representations; shape of the face; and facial features (see for example Enlow 1982); as well as body shape/proportions, for example the width of the shoulders in relation to the hips. The representations were identified as male, female or indeterminate—where the representation was neutral—in terms of sex characteristics. The gender indicators in the Modern *Homo* sample consisted of contextual clues gained from the occupation or role of the representation, as well as the clothing and hairstyle.

RESULTS

The combined sample of 547 was classified as being male, female or indeterminate (Table 7.1 and Figure 7.2). The Modern *Homo* group (n=455) when based on sex characteristics alone consisted of 61.1% males, 21.1% females and 17.8% that were indeterminate. When gender and cultural indicators were also used, the male category formed 76.3% of the sample, females 25.5% and the indeterminate category was reduced to 7.9%. The early *Homininae* sample (n=16) was composed of 62.5% males, and 18.8% in each of the female and indeterminate categories. Earlier Homos (n=14) had the highest proportion of males with 71.4%, while females represented 21.4% of the sample and the remaining 7.1% were indeterminate as to sex. Neandertals (n=62) had 61.3% males, 27.4% females and 11.3% were indeterminate. The total sample (n=547) based only on sex characteristics had 61.4% males, 21.8% females and 16.8% indeterminate. These numbers changed when *Homo sapiens* group were judged using the gender indicators were used, with males (66.0%) and females (25.4%) increasing while the indeterminate (8.6%) category decreased.

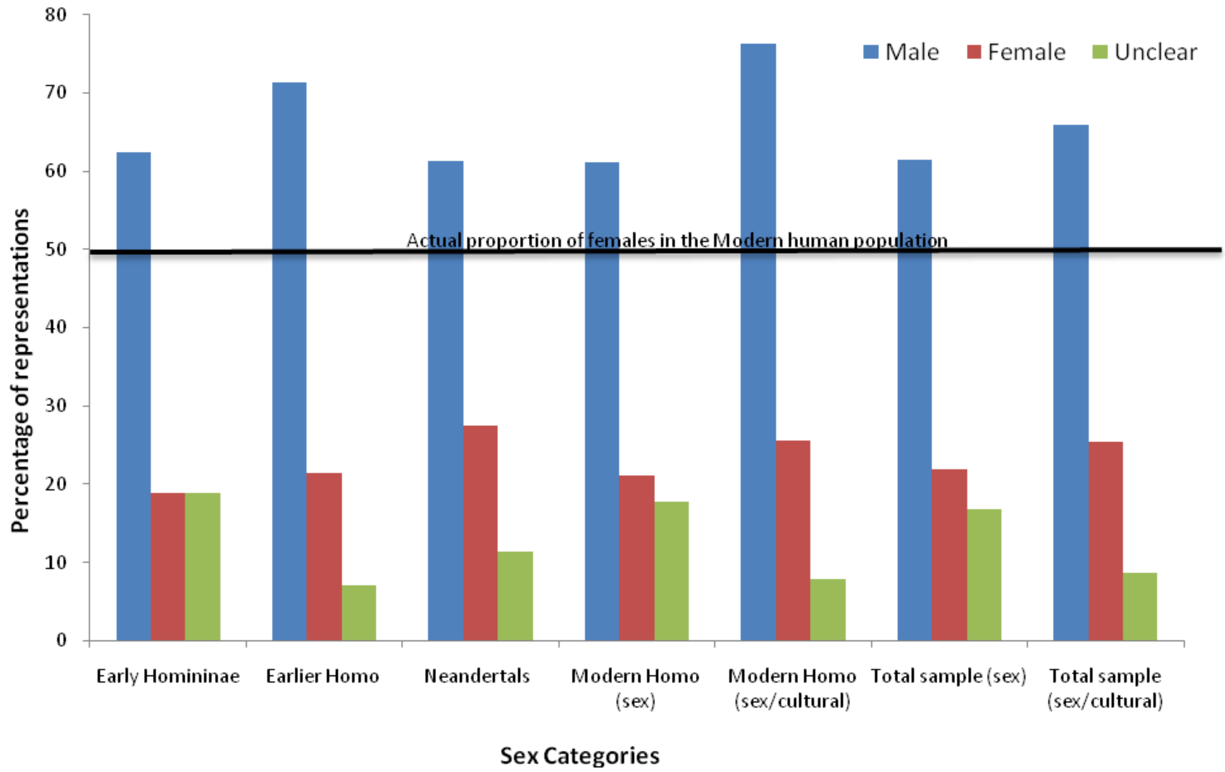


FIGURE 7.2 Sex assessment of the sampled representations in each taxon based on sex characteristics for all four samples, with the *H. sapiens* representations also assessed using cultural/gender indicators. The total sample is also shown based on sex characteristics and sex and cultural characteristics. The black line indicates the actual proportions of females in the modern human population.

TABLE 7.1 Sex assessment of the sampled representations based on sex characteristics for all four samples, with the *H. sapiens* representations also assessed using cultural/gender indicators (shown as percentages).

Taxon	n=	Male	Female	Indeterminate	n as a %
Modern *Homo* (sex characteristics only)	455	61.1	21.1	17.8	100.0
Modern *Homo* (gender indicators)	455	76.3	25.5	7.9	100.0
Neandertals	62	61.3	27.4	11.3	100.0
Earlier *Homo*	14	71.4	21.4	7.1	100.0
Early *Homininae*	16	62.5	18.8	18.8	100.0
Total sample (sex characteristics only)	547	61.4	21.8	16.8	100.0
Total sample (gender indicators)	547	66.0	25.4	8.6	100.0

DISCUSSION

There was a clear sex bias with over two thirds of all representations in each group portrayed as male in *all* sampled groups. This differs from the sex ratios found in the actual human population. Australia has a population split of 49% males and 51% females (Australian Bureau of Statistics 2006), while for the world population there is a projected population split of 50.4% males and 49.6% females for 2011 (United Nations 2010). Moreover, this equilibrium is consistently found except when there are cultural forms of sex ratio manipulation, for example, infanticide (sexual selection), warfare/feuding, and specific marriage practices (Coale 1991; Denham 1974; Divale 1972; Henneberg and Henneberg 1998 ; Hesketh and Xing 2006; Jacobsen *et al.* 1999). This sex bias in the museum displays does not reflect actual sex ratios, thus giving the impression that there were more men both historically and prehistorically and that they were/are considered to be more important.

This has a range of implications. Gilman's (1911) thesis was that our world (culture, mores etc) has been created by men and that effectively men have shaped the way we think by writing our history, controlling education, politics and the law. She also states that we are so caught up with the idea of male and female that we forget that we are human and that while there are differences ascribed to the sexes, there are also similarities that *all* humans share. While much of her dialogue is dated by the era in which it was set (e.g., emancipation for women, the suffragette movement), she highlights the issue that ideas which have been perpetuated by generations become firmly embedded within cultures and it takes a concerted and continued effort in order to remove or change these ideas. This is shown with the androcentric focus of the early 20th century. In the field of anthropology, this focus culminated in the 'Man the Hunter' model (Lee and DeVore 1968). This model was highly influential with males responsible for every significant step forward in our evolution except for giving birth and rearing children. Females are rarely mentioned as the focus is on 'man', 'man the hunter', 'australopithecine man', 'man–made' objects as well although there is the occasional reference to humans (see for example Laughlin 1968; Washburn and Lancaster 1968). This language, as well as the sentiment behind it, implies that males are more important in the evolutionary process. This was so firmly entrenched that when the 'Woman the Gatherer' paradigm (Dahlberg 1981) was introduced–based on data and archaeological evidence–it was dismissed or ignored incorrectly as a feminist reaction (Hager 1997). Although women are gradually being seen as a part of our evolutionary history the androcentric focus continues to be perpetuated (see Hager 1997; Zihlman 1997 for background and an overview on this debate). Gifford–Gonzalez's (1993) research found that there was a sex and age bias as well as a role bias in two–dimensional depictions of early *Homo sapiens*. These biases consisted of a high proportion of adult males (50%) in dominant positions participating in a range of activities whereas only 24% were found to be adult females shown in subservient poses. Even in this era of political correctness and equal opportunity, it is not surprising that this male bias continues as it still reflects the underlying androcentric bias found in western cultures. While Gilman (1911) posited that it takes generations to change cultural ideas, it would be thought that after the feminist movement of the 1970s and the push towards equality that some change would be visible within the museum context. This, however, is not the case as the male domination in the sampled representations shows. As noted previously the public are influenced by what they see in the media as well as in documentaries and in textbooks. This androcentric bias is being perpetuated by this male bias found in museum displays. The other implications of these misrepresented sex ratios are that the focus is on a male version of history, giving the viewer an inaccurate view of history, prehistory and science. This in turn taints scientific interpretation as seen in the reaction to the woman the gatherer paradigm and continues to give the males dominance and power over human history. A further implication is that when sexually dimorphic species are only represented by one sex, the information transmitted to the visitor is limited and the reality distorted. This display of both sexes can also be used as a discussion point amongst visitors as well as providing comparisons.

There are however, reasons for only one sex to be displayed. The Museon, Den Haag, Netherlands, for example chose to have a selection of earlier hominins made that were all males in order for ease of comparison especially in relation to the musculature (A. van Berge Henegouwen 2006: pers. comm.). While a valid reason for the choice of a particular sex is acceptable scientifically, it should be stated why this choice was made. The choice of sex should not be based only on males or a cultural preference for male representations.

There were also representations that were difficult to sex as there were no clear anatomical indicators of sex visible. In some instances in the *H.* sapiens sample there were no gender clues either. This meant that these representations were judged to be indeterminate as to their sex. The use of sex characteristics as well as other body clues helped limit the observer adaptation that can occur when viewing a series of faces (Webster *et al.* 2004). Observer adaptation occurs when an individual can be biased by the faces seen previously; for example, if very masculine faces are viewed followed by an ambiguous face, the ambiguous face will then be interpreted as female rather than as ambiguous. In the earlier hominin samples, the representations that were heads or busts also had limited anatomical sex information. Wild and colleagues (2000) found it difficult to determine the sex of a child's face when there are only anatomical clues, and this was also certainly true for this sample. The sexing of the child representations was made easier in some instances where the representation was nude, had gender clues or where the face was sufficiently feminine or masculine to make a sex determination.

AGE GROUPINGS

Determining the age of an individual is another form of categorisation that is commonly used. The use of age groupings allows us to 'place' people within a category which indicates social role, status, social or community value, biological value. The assessment of age, within a population, both archaeologically and anthropologically, assists in obtaining demographic information. This information aides in determining population dynamics (i.e., the reproduction process through mortality, fertility and migration) and mortality rates, which in turn gives clues to the social structure, health, quality of life and diet of a society (Henneberg *et al.* 1992; Henneberg and Henneberg 1998 ; Henneberg and Henneberg 2002; Henneberg and Steyn 1994) .

Age is also used to place an individual in terms of other forms of assessment such as dominance, potential mate or rival. It allows for the placement of individuals into categories so that we can adjust our behaviours towards them. Furthermore, age is used to assess individuals with regard to relationship expectations as well as placing individuals within social/cultural roles in order to create a relationship with an individual whether they are an actual individual, or a representation. An example of how our perception of individuals is influenced by age may be found in the research by Berry and McArthur (1986). They found that childlike features meant that individuals were perceived to be physically weaker, submissive, naive, honest, and warmer than those with more mature facial features.

People are able to judge age reasonably accurately especially within their own ethnic group (Burt and Perrett 1995). Although Dehon and Brédart (2001) determined that there was some ethnic bias in judging age but this was reduced if the viewer was familiar with the ethnic groups being assessed. In order to limit bias in this study age groupings would be used for classification as Zhao and Bentin (2008) found that age categorization rather than specific age estimation is easier perceptually.

As representations are used in part to foster empathy between them and the viewer in order to make it easier to understand the exhibit they are in as discussed in Chapter 3, the perceived age of the representation would therefore be important in creating a relationship between the viewer and the representation.

Age Categories

The following categories have been used to classify the biological age of the representations: Infans I (0 – 6 months); infans II (6 months – 6 years); infans III (7 – 13 years); juvenis (14 – 19 years); adultus (20 – 40 years); maturus (40 – 60 years); and senilis (60 years and over). These are categories commonly used in archaeological literature (for example Smrčka *et al.* 2011; Sulgostowska 2006; Vargová *et al.* 2003; Wiercinska 1996) and are a similar age break down to those used in demographic life tables (Henneberg *et al.* 1992; Henneberg and Henneberg 1998 ; Henneberg and Henneberg 2002; Henneberg and Steyn 1994). An indeterminate category was also included for those representations where their age was unable to be linked to one specific category.

In order to categorise the sample into the above categories, the representations were first separated into adult and sub–adult categories. Visual indicators were then used to judge the age of the representations. These consisted of: the height of the representations; the presence/absence of the previously identified sex characteristics; texture of the skin (such as wrinkles); scalp hair changes (colouring, receding hairline, quantity); and the presence/absence of subcutaneous fat, especially along the jaw line; and the texture and thickness of eyebrows (see for example Berry and McArthur 1986; Enlow 1982). Sexual ambiguity was also characteristic for the child representations (Wild *et al.* 2000).

RESULTS

The sampled representations (n=547) were placed into eight categories (Figure 7.3 and Table 7.2). *Homo sapiens* representations were most prevalent in the adult categories; adultus (72.1%) and maturus (13.8%) although only 2.0% were designated senilis. Of the subadult categories, infans III had the most (6.4%) and infans II had the least (0.7%) with the remaining representations found in the infans I (1.5%) and juvenis (1.3%) categories. 2.2% were unable to be placed definitively as either adultus or maturus and so were placed in the indeterminate category. The early *Homininae* and earlier *Homo* groups only had representations in the adultus and maturus categories. Adultus representations were the most common with 75.0% in the early *Homininae* group and 71.4% in the earlier *Homo* group with the remaining 25.0% and 28.6% respectively in the maturus category. The Neandertal group were found to represent a range of ages. In the adult categories, 50.0% were judged adultus, 25.8% as maturus and 8.1% as senilis. There were only two identified sub–adult categories: these were infans II (4.8%); and infans III (11.3).

These results were further broken down to show the age categories by sex. In the *H. sapiens* group–when determined by sex characteristics only– males were found in all age groups except the juvenis category. The majority of males were found in the adult age categories: adultus (46.6%), maturus (10.8%) and senilis (1.3%), while the remainder were in the infans categories–I (0.4%), II (0.2% or III (0.7%)–or were judged as indeterminate (1.1%). When cultural characteristics were included, males were found in all of the categories with changes to the percentages in the following categories; infans III (2.2%), juvenis (0.4%), adultus (49.2%) and maturus (11.6%).

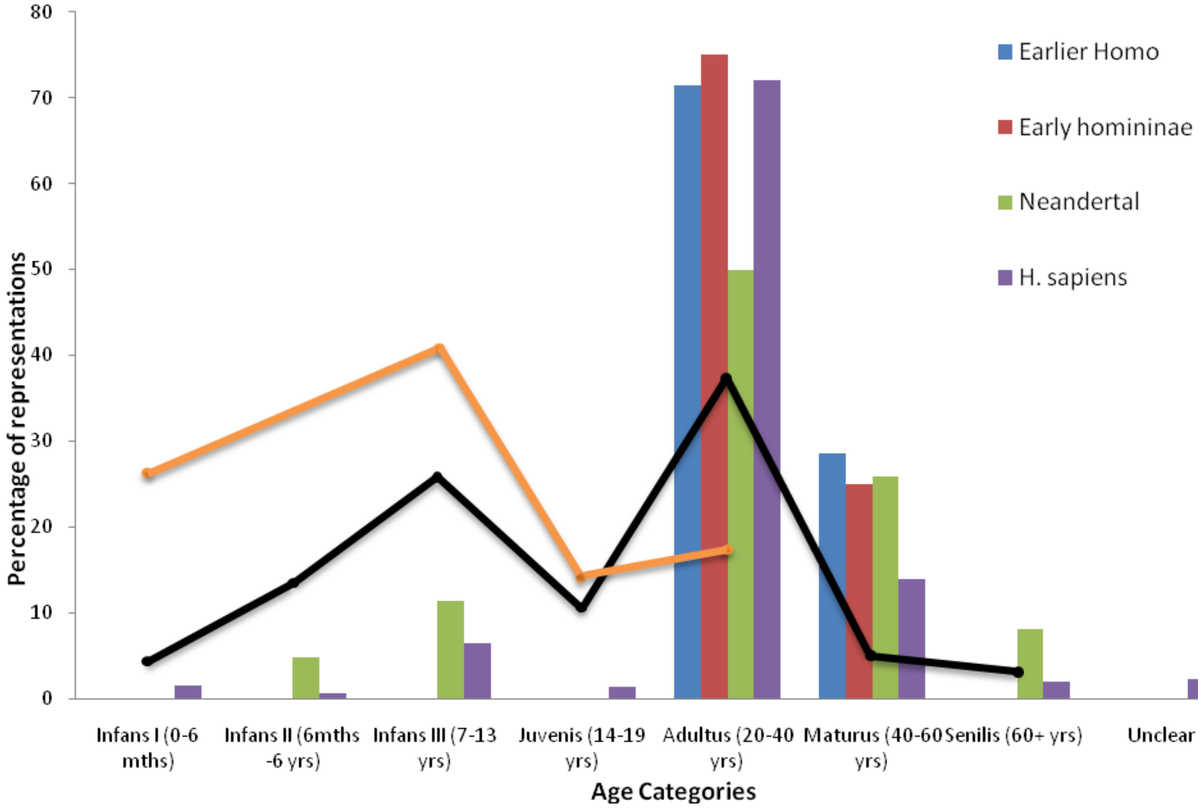


FIGURE 7.3 A breakdown of each taxon into the identified age categories. The black line indicates the proportion of living individuals in each category, found in life–tables for actual human populations, while the orange line indicates the proportion of living australopithecines based on mortality information.

The female *H. sapiens* representations (sex characteristics only) were found in all of the age categories except infans I and the indeterminate category. The majority of the females were found in the adult age categories; adultus (17.4%), maturus (1.3%) and senilis (0.7%), while the younger categories consisted of infans II (0.2%), infans III (1.1%) and juvenis (0.4%). When cultural indicators were also used to judge sex, the percentage of females increased in four age categories as well as the indeterminate category; infans III (3.1%), juvenis (0.7%), adultus (18.9%), maturus (1.8%) and indeterminate (0.2%). 17.8% of the representations were judged to be indeterminate as to sex when based on sex

TABLE 7.2 The sample was broken down into age categories and the results are shown by taxon group which is further delineated by sex. The results are shown as a percentage of each sampled taxon group.

Taxon	Sex	Infans I (0–6 mths)	Infans II (6mths –6 yrs)	Infans III (7–13 yrs)	Juvenis (14–19 yrs)	Adultus (20–40 yrs)	Maturus (40–60 yrs)	Senilis (60+ yrs)	Indeterminate	N as a %
H. sapiens n=(455)*	male	0.4	0.2	2.2	0.4	49.2	11.6	1.3	1.1	66.6
(sex characteristics and gender indicators)	female		0.2	3.1	0.7	18.9	1.8	0.7	0.2	25.5
	indeterminate	1.1	0.2	1.1	0.2	4.0	0.4		0.9	7.9
	Total	**1.5**	**0.7**	**6.4**	**1.3**	**72.1**	**13.8**	**2.0**	**2.2**	**100.0**
Neandertal (n=62)	male		3.2			32.3	19.4	6.5		61.3
	female			1.6		17.7	6.5	1.6		27.4
	indeterminate		1.6	9.7						11.3
	Total		**4.8**	**11.3**		**50.0**	**25.8**	**8.1**		**100.0**
Earlier *Homo* (n=14)	male					50.0	28.6			78.6
	female					21.4				21.4
	indeterminate									
	Total					**71.4**	**28.6**			**100.0**
Early *Homininae* (n=16)	male					37.5	25.0			62.5
	female					18.8				18.8
	indeterminate					18.8				18.8
	Total					**75.0**	**25.0**			**100.0**
Total sample (n= 547)		1.3	1.1	6.6	1.1	69.7	15.9	2.6	1.8	100.0

* The totals remain the same whether they are determined by sex characteristics only or if gender indicators are included.

characteristics alone and these were found in all age categories expect senilis, as well as in the indeterminate category; infans I (1.1%), infans II (0.2%), infans III (4.6%), juvenis (0.9%), adultus (4.0%), maturus (1.8%) and indeterminate (1.1%). This was reduced to 7.9% when cultural indicators were also used. The percentage of indeterminate sex was reduced in the following categories; infans III (1.1%), juvenis (0.2%), adultus (4.0%), maturus (0.4%) and indeterminate age (0.9%).

In the early *Homininae* taxon, the adultus age category consisted of 37.5% males, 18.8% females and a further 18.8% were of indeterminate sex the remaining 25.0% were males in the maturus category. The earlier *Homo* groups had males in the adultus (50.0%) and maturus (28.6%) categories while the females were only identified in the adultus (21.4%) age category. There was more variation in the Neandertal group. Males were found in four age categories; infans II (3.2%), adultus (32.3%), maturus (19.4%) and senilis (6.5%). Female Neandertals were also found in four age categories; infans III (1.6%), adultus (17.7%), maturus (6.5%) and senilis (1.6%). The remaining 11.3% were judged as indeterminate in regard to sex and were found in the infans II (1.6%) and infans III (9.7%) age categories.

DISCUSSION

As these representations are illustrating hominins, a comparison can be made to numbers of individuals found in these age groupings in actual populations. This is done using life tables. They have also been determined for australopithecines using mortality data. These life tables show the proportion of living people within a population, which are similar across populations (see for example Henneberg and Steyn 1994; Weiss and Wobst 1973). The examples provided for comparative purposes in Figure 7.3 are from Henneberg and Henneberg (1998) and Saniotis and Henneberg (2011). Using these examples for comparative purposes indicate that there was an over–abundance of representations in the adultus and maturus categories in all taxa and an under–representation in the sub–adult categories. There was also an over–abundance of senilis representations in the Neandertal group. This type of bias was also found in a study of pictorial representations of Palaeolithic life by Gifford–Gonzalez (1993). This excess of adults, especially in the adultus age group, shows a strong cultural bias, once again giving a false impression of hominin populations.

CULTURAL INDICATORS

CLOTHING

What constitutes clothing? A relatively easy question to answer perhaps until one is faced with photographs of a variety of representations from different ethnic groups, eras, geographic locations, cultures, and even species. It then becomes a complex issue that is influenced by fashion, religion, ethnicity and cultural conditioning, which has ties to identity, symbolism and community and can be linked to sexuality, gender and age issues, beauty, power, rape, and protest (see Roach-Higgins *et al.* 1995). Therefore, an appropriate definition that limits the complexity of this issue and can integrate the disparity between the identified variables (ethnic groups, eras, species, etc.) is essential.

What then is the importance of clothing in relation to the way representations are perceived? Clothing is one of the first things noticed about an individual when seen from a distance and gives clues to the identity, personality, status, occupation, religion, age and sex of the individual in question (Flugel 1950; Roach-Higgins and Eicher 1992). Clothing was an important consideration when sexing the representations and was one of the gender indicators that were used to assist in the determination of sex in the *H. sapiens* sample in the sex assessment section of this chapter.

The definition of dress by Eicher and Roach–Higgins (1992) includes various temporary body modifications (identified earlier in this study as cultural indicators on pages 404–405) which they expand to include scented breath and supplements into which are placed items that are added to the body (for example jewellery, garments and accessories). While dress is used as an all encompassing term they differentiate it from clothing, limiting it to body coverings which tend to enclose the body (Roach-Higgins and Eicher 1992). Clothing, then from this perspective, with the additional caveat that it is focused on the trunk, especially the genital region, will be the definition used in this section of the study. This definition then enables comparison between clothed and nude representations. It does, however, lead to a discussion on the difference between nudity and nakedness. Clark (1956) defines nude as being artistic, with no uncomfortable overtone whereas being naked does, implying as it does embarrassment at being caught without clothing. Saunders (1989), writing about a similar subject from a different perspective, uses nude and naked interchangeably. Her focus is on the different ways that males and females are portrayed and this focus implies a mainly masculine audience. As the representations in this sample are displayed with a mixed audience in mind, Clark's (1956) distinction will be used to determine if representations are treated differently when they lack clothes.

As the sampled representations cover a time period of approximately 3.5 Ma it is appropriate to ascertain what type of evidence there is relating to clothing during this time. Laughlin (1968) states there have been many indigenous peoples that did not have clothing and lived in climatically stressful areas including the Kalahari Desert, Australia, the Congo and Tierra del Fuego. Gilligan (2007) discusses the use of simple and complex clothing in relation to thermal physiology using a Tasmanian case study. This example implies that there would have been climatic conditions where complex or fitted clothing would have been essential for survival. These conditions would need to be extreme. Darwin (2005, 1839), however, gives insight into the Fuegians (from Tierra del Fuego) who lived in a cold climate and some of them wore nothing even when it was sleeting. They did, however, make use of body paint and feathers as a form of body modification. He also noted that some had grease on their bodies, and they also used windbreaks as shelter. This link between climate and clothing has been documented elsewhere, although culture plays an important part as some people add clothing in hot climates while others wear nothing at all in colder climates (Gladwin 1947). Gilligan's findings (2007), with a focus on technology as a indication of clothing in the archaeological record, coincide with those of Soffer and colleagues (2000) who used a form of portable art known as 'Venus' figurines to indicate the presence of textiles and weaving in the Upper Palaeolithic in Europe. Similarity has also been found between Palaeolithic clothing from grave sites and that found on Siberian Sculptures (Bader and Laurushin 1998). Decorative beads are another source used as an indication of clothing. Examples were found in the Levant (41–43 Ka) (Kuhn *et al.* 2001), associated with Neandertals in Iberia 50 Ka (Zilhão *et al.* 2010), in South Africa (~75 Ka) (Henshilwood *et al.* 2004; Jacobs *et al.* 2006) and Skhul dated to 100–135 Ka (Vanhaeren *et al.* 2006). This form of ornamentation may be an indicator of clothing as more recent examples have been used to infer specific types of garments due to placement of beads within burials (Bader and Laurushin 1998). Soffer and colleagues (2000) also make the valid point that if the features on these figurines are indicative of plant–based textiles then there would be no other artefactual evidence in the archaeological record. Ötzi (~5 Ka), for example, had a cloak of woven grasses (Acs *et al.* 2005).

The findings by Toups and colleagues (2011) give a different perspective on the clothing debate as they found that clothing lice diverged from head lice between 170Ka and 83Ka, which possibly coincided with the continued use of clothing. The loss of body hair—also a possible indicator of clothing—has been determined through genetic research to have occurred at least 1.2 million years ago (Rogers *et al.* 2004). This clothing timeline is based on current knowledge but does it reflect what is found in a sample of museum representations?

CLOTHING ASSESSMENT

There were four categories that related to clothing: clothed, nude, naked or indeterminate. The representation was considered to have clothing if what they were wearing enclosed their bodies, especially if it covered the torso and genital region. Those representations determined to have no clothes were separated into either nude or naked, depending upon the context and the view that the visitor had of the representation. The difference between nude and naked is that nude implies the artistic image with no uncomfortable overtones, while naked implies embarrassment both for the one who is naked and the one who sees the nakedness. Representations with limited information such as those determined to be busts were placed in the not applicable category.

RESULTS

The sampled representations (n=547) were placed into the four identified clothing categories (Figure 7.4 and Table 7.3). Of the *Homo sapiens* sample (n=455), 60.7% were clothed, 7.0% were nude, 0.7% were naked, and the remaining 31.6% were placed in the not applicable category. The 'not applicable' category contained those representations that did not have enough information to determine if the representation had clothes. Many of the bust representations for example were placed in this category. Individuals in the Neandertal sample (n=62) were also clothed (69.4%) or nude (8.1%). Earlier *Homo* representations (n=14) were either nude (28.6%) or clothed (14.3%). Of the early *Homininae* (n=16) that were able to be judged, all were (56.3%) nude. When combined, the majority (58.7%) of the total sample were clothed as only 9.1% were nude and 0.5% naked. When the undetermined are excluded the vast majority of representations are clothed.

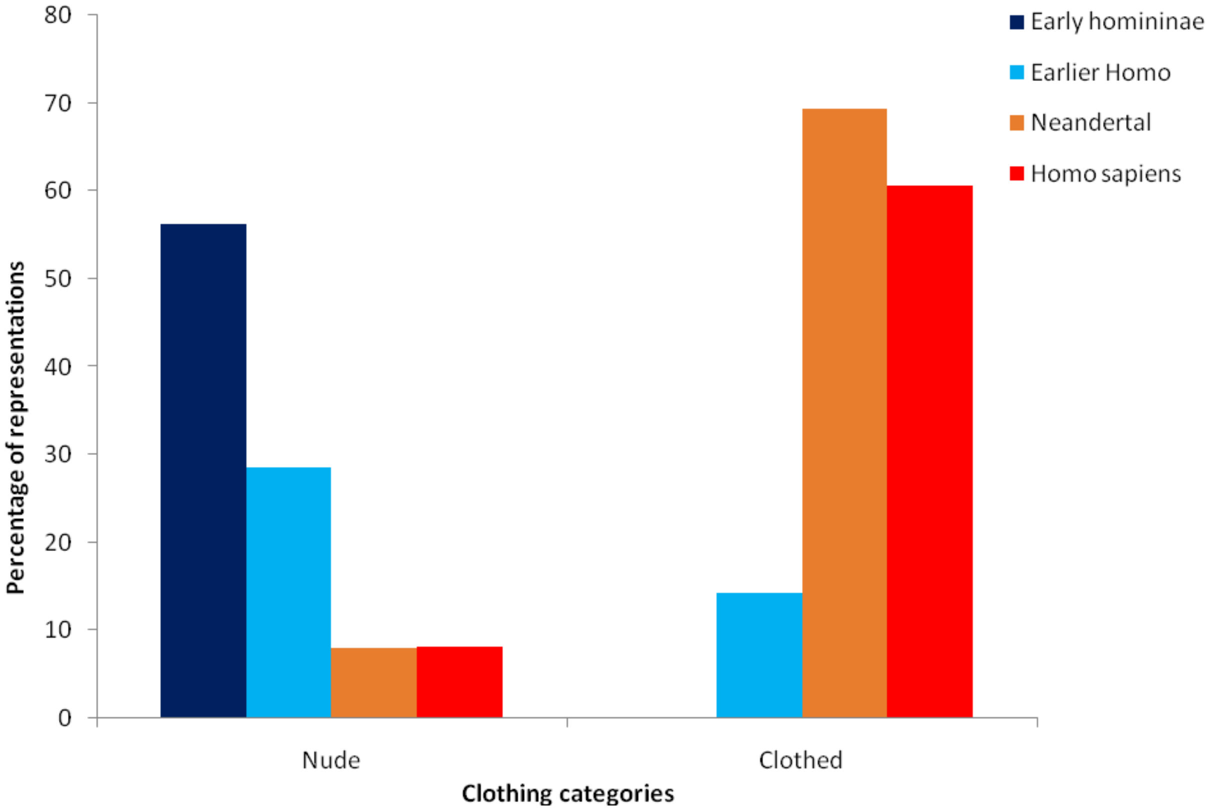


FIGURE 7.4 The percentage of representations in each taxa group that where displayed as nude or as clothed.

TABLE 7.3 The sample was broken down into clothing categories and the results are shown by taxon group. The results are shown as a percentage of each sampled taxon group.

Taxon	n=	Nude	Clothed	Naked	n/a*	Total %
Homo sapiens	455	7.0	60.7	0.7	31.6	100.0
Neandertal	62	8.1	69.4		22.6	100.0
Earlier *Homo*	14	28.6	14.3		57.1	100.0
Early *Homininae*	16	56.3			43.8	100.0
Total sample	547	9.1	58.7	0.5	31.6	100.0

*These representations consist of those that are just busts or do not give enough evidence of clothing in other ways .

The sample was then analysed by sex of the representation in relation to clothing category (Table 7.4). In every category there were a higher percentage of males than females. In the *H. sapiens* (sex characteristics) sample, the clothed representations consisted of 35.2% males, 13.4% females and 12.1% of representations of indeterminate sex. When the gender indicators are included in this sample, males (39.6%) and females (17.6%) increased and the indeterminate sex representations were reduced to 3.5%. In both *H. sapiens* samples the nude and naked category percentages were the same. This meant the 4.0% of males, 2.6% of females and 0.4% of indeterminate representations were nude while 0.7% of males were naked. The indeterminate *H. sapiens* representations consisted of a baby, which was positioned in such a way that sex was not determinable, and a child mannequin that consisted of a female upper body and male lower body.

In the Neandertal taxon clothed representations also consisted of males (40.3%), females (21.0%) and those of indeterminate sex (8.1%). The nude Neandertals were either male (4.8%) or female (3.2%). The earlier *Homo* group consisted of nudes (21.4% males and 7.1% females) or clothed males (14.3%). In the early *Homininae* sample the nudes were either male (43.8%) or females (12.5%). The total sample (n=547) when based on sex characteristics, clothed representations were male (34.2%), female (13.5%) or of indeterminate sex (11.0%). This changed when based on gender indicators as the males (37.8%) and females (17.0%) increased and those of indeterminate sex (3.8%) decreased. There was no difference, however, in the nude or naked categories where 5.7% of males, 3.1% of females and 0.4% of indeterminate sex were found to be nude and 0.5% of males were considered naked.

TABLE 7.4 The sample was broken down into clothing categories and the results are shown by taxon group which is further delineated by sex. The results are shown as a percentage of each sampled taxon group.

Taxon	Sex	Nude	Clothing	Naked	na	%
Homo sapiens (n=455)	male	4.0	35.2	0.7	21.3	61.1
(Sex characteristics only)	female	2.6	13.4		5.1	21.1
	indeterminate	0.4	12.1		5.3	17.8
	Total	**7.0**	**60.7**	**0.7**	**31.6**	**100.0**
Homo sapiens (n=455)	male	4.0	39.6	0.7	22.4	66.6
(Gender indicators)	female	2.6	17.6		5.3	25.5
	indeterminate	0.4	3.5		4.0	7.9
	Total	**7.0**	**60.7**	**0.7**	**31.6**	**100.0**
Neandertal (n=62)	male	4.8	40.3		16.1	61.3
	female	3.2	21.0		3.2	27.4
	indeterminate		8.1		3.2	11.3
	Total	**8.0**	**69.4**		**22.5**	**100.0**
Earlier *Homo* (n=14)	male	21.4	14.3		35.7	71.4
	female	7.1			14.3	21.4
	indeterminate				7.1	7.1
	Total	**28.6**	**14.3**		**57.1**	**100.0**
Early *Homininae* (n=16)	male	43.8			18.8	62.5
	female	12.5			6.3	18.8
	indeterminate				18.8	18.8
	Total	**56.3**			**43.8**	**100.0**
Total sample (n=547)	male	5.7	34.2	0.5	21.0	61.4
(Sex characteristics)	female	3.1	13.5		5.1	21.8
	indeterminate	0.4	11.0		5.5	16.8
	Total	**9.1**	**58.7**	**0.5**	**31.6**	**100.0**
Total sample (n=547)	male	5.7	37.8	0.5	21.9	66.0
(Gender indicators)	female	3.1	17.0		5.3	25.4
	indeterminate	0.4	3.8		4.4	8.6
	Total	**9.1**	**58.7**	**0.5**	**31.6**	**100.0**

The sample was then analysed in relation to age categories (Table 7.5). The *Homo sapiens* sample had clothed representations in all age categories and these accounted for 60.7% of the sample. The majority of these were found in the adult categories: adultus (43.3%), maturus (8.1%), senilis, and indeterminate (1.3% each). In the child categories, 4.6% were found in Infans III, 0.9% in infans I and juvenis, and only 0.2% in infans II. The nude representations were found in all age categories except juvenis and the indeterminate category; 4.4% were adultus, 1.3% infans III, 0.7% infans I, 0.4% senilis and 0.2% in infans I. The only naked representations found in the total sample were in the *H. sapiens* taxon and these were either adultus (0.4%) or indeterminate as to age (0.2%). The *H. sapiens* in the not applicable clothing category (31.6%) consisted of: adultus (24.0%), maturus (5.7%), indeterminate (0.7%), juvenis and infans III (0.4%), and senilis and infans II (0.2% each).

In the early *Homininae* taxon, 56.3% of the sample was in the nude category and the remaining 43.8% was in the not applicable category. Of those that were nude, 37.5% were adultus and 18.8% were maturus. These age categories were also found in the not applicable category, 37.5% and 6.3% respectively. In the earlier *Homo* taxon 57.1% were in the not applicable category with the remaining representations split between nude (28.6%) and clothing (14.3%) categories. 21.4% were nude adultus while 7.1% were nude maturus. The clothed representations were only found to be adultus. In the not applicable category 35.7% were adultus and 21.4% were maturus.

Neandertals had the highest percentage of clothed representations (69.4%). This taxon also had nude representations (8.1%) and 22.6% were not applicable. There were a range of ages in the clothed representations, 32.3% of which were adultus, 19.4% maturus, 11.3% infans III and 6.5% were senilis. The nude representations were only in the adultus (4.8%) and maturus (3.2%) categories. In the not applicable category, 12.9% were adultus, 3.2% in both the infans III and maturus categories and 1.6% in both the infans II and senilis categories.

TABLE 7.5 The sample was broken down into clothing categories and the results are shown by taxon group which is further delineated by age. The results are shown as a percentage of each sampled taxon group.

Taxon	Age Groupings	Nude	Clothing	Naked	na	%
Homo sapiens (n=455)	Infans I (0–6 mths)	0.7	0.9			1.5
	Infans II (6mths –6 yrs)	0.2	0.2		0.2	0.7
	Infans III (7–13 yrs)	1.3	4.6		0.4	6.4
	Juvenis (14–19 yrs)		0.9		0.4	1.3
	Adultus (20–40 yrs)	4.4	43.3	0.4	24.0	72.1
	Maturus (40–60 yrs)		8.1		5.7	13.8
	Senilis (60+ yrs)	0.4	1.3		0.2	2.0
	Indeterminate		1.3	0.2	0.7	2.2
	Total	7.0	60.7	0.7	31.6	100.0
Neandertal (n=62)	Infans I (0–6 mths)					
	Infans II (6mths –6 yrs)				1.6	1.6
	Infans III (7–13 yrs)		11.3		3.2	14.5
	Juvenis (14–19 yrs)					
	Adultus (20–40 yrs)	4.8	32.3		12.9	50.0
	Maturus (40–60 yrs)	3.2	19.4		3.2	25.8
	Senilis (60+ yrs)		6.5		1.6	8.1
	Indeterminate					
	Total	8.1	69.4		22.6	100.0
Earlier *Homo* (n=14)	Infans I (0–6 mths)					
	Infans II (6mths –6 yrs)					
	Infans III (7–13 yrs)					
	Juvenis (14–19 yrs)					
	Adultus (20–40 yrs)	21.4	14.3		35.7	71.4
	Maturus (40–60 yrs)	7.1			21.4	28.6
	Senilis (60+ yrs)					
	Indeterminate					
	Total	28.6	14.3		57.1	100.0
Early *Homininae* (n=16)	Infans I (0–6 mths)					
	Infans II (6mths –6 yrs)					
	Infans III (7–13 yrs)					
	Juvenis (14–19 yrs)					
	Adultus (20–40 yrs)	37.5			37.5	75.0
	Maturus (40–60 yrs)	18.8			6.3	25.0
	Senilis (60+ yrs)					
	Indeterminate					
	Total	56.3			43.8	100.0
Total sample (n=547)	Infans I (0–6 mths)	0.5	0.7			1.3
	Infans II (6mths –6 yrs)	0.2	0.2		0.4	0.7
	Infans III (7–13 yrs)	1.1	5.1		0.7	6.9
	Juvenis (14–19 yrs)		0.7		0.4	1.1
	Adultus (20–40 yrs)	5.9	40.0	0.4	23.4	69.7
	Maturus (40–60 yrs)	1.1	9.0		5.9	15.9
	Senilis (60+ yrs)	0.4	1.8		0.4	2.6
	Indeterminate		1.1	0.2	0.5	1.8
	Total	9.1	58.7	0.5	31.6	100.0

In the total sample, 40.0% were adultus, 9.0% maturus, 5.1% infans III, 1.8% senilis, 1.1% indeterminate, 0.7% in infans I and juvenis and 0.2% were infans II. Nude representations were found in all ages except juvenis: 5.9% were adultus, 1.1% in both infans II and maturus, 0.5% infans I, 0.4% senilis and 0.2% infans II. Naked representations were only found in the adultus (0.4%) and indeterminate categories (0.2%). In the not applicable category representations were found in the following categories; adultus (23.4%), maturus (5.9%), infans III (0.7%), and indeterminate (0.5% each), infans II, and juvenis and senilis (0.4% each).

DISCUSSION

The majority of representations in the total sample were clothed. There were, however, a substantial number of representations that did not provide enough information to determine if they were clothed or not. Those representations were mainly of the bust type, although there were complete representations that were covered (e.g., by bedding) and a determination could not be made. Of the representations where a determination could be made, in certain taxa groups, there were a high percentage of nude representations. In the early *Homininae* group all representations that could be judged were nude. Of the other taxa groups there was a mix of nude and clothed representations, with *H. sapiens* also having three representations judged as naked. The earlier *Homo* group had more nude than clothed representations while the Neandertal and *H. sapiens* group had more clothed than nude representations.

Saunders (1989) states that the male nude is depicted less in art and other visual media than the female nude and that the sexes are portrayed differently. The findings of this study follow this trend. Although there were more males than females in each of the nude categories, this was due to the significantly higher percentage of males found in the sample, as revealed in the sex assessment section of this chapter. When looking at the percentage of female nudes in relation to the total percentage of females the disparity between the sexes becomes clear. In art, the nude is used as a way to learn human anatomy and male nudes are more likely to emphasise musculature in order to depict strength and physical power through dynamic and active poses. Females though, were found to be in mainly passive, demure poses, thus becoming essentially erotica through the implication that they are both receptive and available to the (assumed male) audience voyeuristic gaze. The only example of this active/passive sex disparity was a puberty display at the Natural History Museum in London (Figure 7.5). In this display there were an adult and prepubescent child of each sex showing the anatomical differences between the child and adult bodies. Both female representations are shown with heads bowed and looking away from visitors.

FIGURE 7.5 The puberty display at the Natural History Museum London, note the demure postures of the female representations especially the adult. The male postures differ significantly, the boy confronts the viewer while the man is positioned percentage of representations in each taxa group that where displayed as nude or as clothed.

There were only 3 representations that were judged to be naked and these were all *H. sapiens*. While the representation may not be able to exhibit embarrassment (unless consciously made to), the viewer was placed in the position of a voyeur in these examples. Two of the representations were placed in a context where their nakedness was not expected by the viewer and the person portrayed by the representation would not intentionally be nude. The third representation's posture was that of a victim giving the viewer the uncomfortable impression that the representation was naked. The whole experience of viewing a representation is to some extent voyeuristic as the visitor is included or placed in a position where it is acceptable to view the representation or the representation itself invites the visitor to observe. There was one exception which is not included in this sample as it was at a Visitor Attraction, at Ripley's Believe it or not?, Surfers Paradise, Australia. This was where a female representation was placed in such a way the viewer is invited to be a voyeur as she appears to be half naked on the beach.

One reason for the earlier hominins, especially the Neandertals, to be nude is so that their specific anatomy is visible. An example of this is a series of hominin representations that were made for the Museon in Den Haag, Netherlands, which were intentionally made male in order to show the musculature better (A. van Berge Henegouwen 2006: pers. comm.,). This, however, assumes that the viewer is familiar enough *Homo sapiens* to discern these anatomical differences. It must also be remembered that we are routinely seeing and accepting distorted views of the human figure with the increase of Photoshopped photographs in magazines and advertising as well as computer–generated imagery (CGI) in movies and the use of standard mannequins in shops. These may be anatomically inaccurate but have become so commonplace that their inaccuracies are not always recognised as such. They can, however, skew our understanding and perception of anatomy in relation to what is actually within the range of human variation. Without having an accurate modern human for comparison purposes, the type of information gained from anatomical representations of the earlier taxa groups is limited. We know our own bodies through touch and from our own viewpoint or from mirrors or photographs and are therefore familiar with the human body, though not necessarily in the specifics. This means that when a body has inaccuracies an overall feeling of wrongness may be identified but the specific inaccuracy may not be recognised. Brooks and Kemp's (2007) displacement theory indicates that the gaps in our knowledge, especially in something that is familiar, are filled in by our brains so the question may be, are we seeing what the museums/makers/curators want us to understand or are we only seeing what we have been biologically and culturally trained to see?

Clothing or the lack thereof has implications for notions of civilisation or primitiveness as well as the level of humanity and ascription of otherness (Moser 1998). Although it must be remembered what would be considered nakedness in one culture may be perfectly natural in another. This means that representations portrayed as nude in order to show anatomical features may be perceived to be technologically incapable of clothing. This notion of 'primitiveness' is a construction that is more likely to be assumed by the viewer than any other as this is a cultural misconception that is firmly entrenched in our western psyche (see Moser 1998 for further background into this topic). It is these type of misconceptions that take generations to change (Gilman 1911). A further point is that those representations that are wearing early forms of clothing are all wearing furs. There was a lack of beading present and the only representation to have a garment of woven plant fibre was one of Ötzi and he was sitting on it rather than wearing it. Rather than give the museum visitors options about past peoples (based on archaeological evidence) to make them think and query the knowledge they already have, many of the representations perpetuate the same basic notions; that of adult males having more importance placed upon them, and that clothing symbolising the difference between humans and our 'primitive' ancestors.

Conclusions

Hominin representations are used to portray past peoples and cultures. They are also used to create empathy between the viewer and the representation in order to give more understanding about the past and to elicit a feeling of familiarity about some aspect of the display. This study has shown, however, that the representations do not necessarily portray actual hominin populations, instead they consistently have: a male bias; an overabundance of adults; and clothing is used to define the change from pre–human (animal) to human.

REFERENCES

Acs P, Wilhalm T, and Oeggl K. 2005. Remains of grasses found with the Neolithic Iceman "Ötzi". Vegetation History and Archaeobotany 14:198-206.

Bader NO, and Laurushin JA. 1998. Pozdnepaleoliticheskoe poselenie Sungir. Moskva: Nauchnyi Mir.

Balter M. 2009. Bringing hominins back to life. Science 325:136-139.

Barrett LF, and Bliss-Moreau E. 2009. She's emotional. He's having a bad day: attributional explanations for emotion stereotypes. Emotion 9(5):649-658.

Berry DS, and McArthur LZ. 1986. Perceiving character in faces: the impact of age-related craniofacial changes on social perception. Psychological Bulletin 100(1):3-18.

Brooks KR, and Kemp RI. 2007. Sensitivity to feature displacement in familiar and unfamiliar faces: beyond the internal/external feature distinction. Perception 36:1646-1659.

Brown P, Sutikna T, Morwood MJ, Soejono RP, Jatmiko, Wayhu Saptomo E, and Awe Due R. 2004. A new small-bodied hominin from the Late Pleistocene of Flores, Indonesia. Nature 431(7012):1055-1061.

Burt DM, and Perrett DI. 1995. Perception of age in adult caucasian male faces: computer graphic manipulation of shape and colour information. Proceedings: Biological Sciences 259(1355):137-143.

Clark K. 1956. The nude: a study of ideal art. London: John Murray.

Coale AJ. 1991. Excess female mortality and the balance of the sexes in the population: an estimate of the number of "missing females". Population and Develpment Review 17(3):517-523.

Coffee K. 1991. The restoration of the Haida canoe life group. Curator 34(1):31-43.

Cook L. 2007. Vive le Hobbit. Science 318:1531.

Cornell EH. 1974. Infants' discrimination of photographs of faces following redundant presentations. Journal of Experimental Child Psychology 18:98-106.

Dahlberg F, editor. 1981. Woman the gatherer. New Haven Yale University Press.

Darwin C. 2005, 1839. The voyage of the Beagle. In: Watson JD, editor. Darwin: the indelible stamp The evolution of an idea. Philadelphia: Running Press

Dehon H, and Brédart S. 2001. An 'other-race' effect in age estimation from faces. Perception 30:1107-1113.

Denham WW. 1974. Population structure, infant transport, and infanticide among Pleistocene and modern hunter-gatherers. Journal Of Anthropological Research 30(3):191-198.

Divale WT. 1972. Systemic population control in the Middle and Upper Palaeolithic: inferences based on contemporary hunter-gatherers. World Archaeology 4(2):222-243.

Eicher JB, and Roach-Higgins ME. 1992. Definition and classification of dress: implications for analysis of gender roles. In: Barnes R, and Eicher JB, editors. Dress and gender: making and meaning in cultural contexts. Providence: Berg. p 8-28.

Enlow DH. 1982. Handbook of facial growth. Philadelphia: W. B. Saunders Company.

Fagot BI, and Leinbach MD. 1993. Gender-role development in young children: from discrimination to labeling. Developmental Review 13:205-224.
Flugel JC. 1950. The Psychology of clothes. London: The Hogarth Press Ltd.
Gibbons A. 2007. Hobbit's status as a new species gets a hand up. Science 316:34.
Gifford-Gonzalez D. 1993. You can hide, but you can't run: representation of women's work in illustrations of Palaeolithic life. Visual Anthropology Review 9(1):22-41.
Gilligan I. 2007. Clothing and modern human behaviour: prehistoric Tasmania as a case study. Archaeology In Oceania 42:102-111.
Gilman C. P. 1911. The man-made world or our androcentric culture. London: T. Fisher Unwin.
Gladwin T. 1947. Climate and Anthropology. American Anthropologist 49(4):601-611.
Hager LD. 1997. Sex and gender in paleoanthropology. In: Hager LD, editor. Women in human evolution. London: Routledge. p 1-28.
Henneberg M. 2009. Two interpretations of human evolution: Essentialism and Darwinism. Anthropological Review 72:66-80.
Henneberg M, Henneberg R, and Carter JC. 1992. Health in colonial Metaponto. . National Geographic Research & Exploration 8(4):446-459.
Henneberg M, and Henneberg RJ. 1998 Biological characteristics of the population based on analysis of skeletal remains. In: Carter J. C, editor. The chora of Metaponto: the necropoleis, volume II. Austin University of Texas Press p503-559.
Henneberg M, and Henneberg RJ. 2002. Reconstructing medical knowledge in ancient Pompeii from the hard evidence of bones and teeth. In: Renn J, and Castagnetti G, editors. Homo Faber: studies on nature, technology, and science at the time of Pompeii. Roma: "L'Erma" di Bretschneider. p 169-187.
Henneberg M, and Steyn M. 1994. Preliminary report on the paleodemography of the K2 and Mapungubwe populations (South Africa). Human Biology 66(1):105-120.
Henshilwood C, d'Errico F, Vanhaeren M, van Niekerk K, and Jacobs Z. 2004. Middle Stone Age shell beads from South Africa. Science 304:404.
Hesketh T, and Xing ZW. 2006. Abnormal sex ratios in human populations: causes and consequences. Proceedings of the National Academy of Sciences of the United States of America 103(36):13271-13275.
Jacobs Z, Duller GAT, Wintle AG, and Henderson CS. 2006. Extending the chronology of deposits at Blombos Cave, South Africa, back to 140ka using optical dating of single and multiple grains of quartz. Journal Of Human Evolution 51:255-273.
Jacobsen R, Møller H, and Mouritsen A. 1999. Natural variation in the human sex ratio. Human Reproduction 14(12):3120-3125.
Johnson KL, Lurye LE, and Tassinary LG. 2010. Sex categorization among preschool children: increasing utilization of sexually dimorphic cues. Child Development 81(5):1346-1355.
Kuhn SL, Stiner MC, Reese DS, and Güleç E. 2001. Ornaments of the earliest Upper Paleolithic: new insights from the Levant. Proceedings of the

National Academy of Sciences of the United States of America 98(13):7641-7646.

Laughlin WS. 1968. Hunting: An integrating biobehavior system and its evolutionary importance. In: Lee RB, and DeVore I, editors. Man the hunter. Chicago: Aldine Publishing Company. p 304-320.

Lavine SD, and Karp I. 1991. Introduction: Museums and Multiculturalism. In: Karp I, and Lavine SD, editors. Exhibiting cultures: the poetics and politics of museum display Washington: Smithsonian Institution Press p1-9.

Lee RB, and DeVore I, editors. 1968. Man the hunter. Chicago: Aldine Publishing Company.

Leinhardt G, and Knutson K. 2004. Listening in on museum conversations. Walnut Creek CA: Altamira Press.

Main JC, Jones BC, DeBruine LM, and Little AC. 2009. Integrating gaze direction and sexual dimorphism of face shape when percieving the dominance of others. Perception 38:1275-1283.

Moser S. 1998. Ancestral images: the iconography of human origins. Ithaca, New York: Cornell University Press.

Roach-Higgins ME, and Eicher JB. 1992. Dress and identity. Clothing and Textiles Research Journal 10:1-8.

Roach-Higgins ME, Eicher JB, and Johnson KKP, editors. 1995. Dress and identity. New York: Fairchild Publications.

Rogers AR, Iltis D, and Wooding S. 2004. Genetic variation at the MC1R locus and the time since loss of human body hair. Current Anthropology 45(1):105-108.

Saniotis A, and Henneberg M. 2010. Rehabilitating Neandertals*: anthropological constructions of Neandertals in the process of 'othering'. Before Farming 4:article 3, 1-11.

Saniotis A, and Henneberg M. 2011. Medicine could be constructing human bodies in the future. Medical Hypotheses 77(4):560-564.

Saunders G. 1989. The nude: a new perspective Cambridge: Harper & Row, Publishers.

Scott M. 2007. Rethinking evolution in the museum: envisioning African origins. London: Routledge.

Smrčka V, Edriss A, Korunová V, Dobisíková M, and Zocová J. 2011. Selenium in skeletal remains. International Journal of Osteoarchaeology 21(4):456-463.

Soffer O, Adovasio JM, and Hyland DC. 2000. The “Venus” Figurines: Textiles, Basketry, Gender, and Status in the Upper Paleolithic. Current Anthropology 41(4):511-537.

Sulgostowska Z. 2006. Mesolithic mobility and contacts on areas of the Baltic Sea watershed, the Sudety, and Carpathian Mountains. Journal Of Anthropological Archaeology 25:193-203.

Sun Y, Gao X, and Han S. 2010. Sex differences in face gender recognition: An event-related potential study. Brain Research 1327:69-76.

Symington D, Boundy K, Radford T, and Taylor R. 1986. Prior knowledge and primary pupils' interaction with a museum display. Research in Science Education 16:55-62.

Teslow TL. 1998. Reifying race: science and art in *Races of Mankind* at the Field Museum of Natural History. In: Macdonald S, editor. The politics of display: museums, science, culture. London: Routledge. p 53-76.

Toups MA, Kitchen A, Light JE, and Reed DL. 2011. Origin of clothing lice indicates early clothing use by anatomically modern humans in Africa Molecular Biology and Evolution 28(1):29-32.

Vanhaeren M, d'Errico F, Stringer C, James SL, Todd JA, and Mienis HK. 2006. Middle Paleolithic shell beads in Israel and Algeria. Science 312:1785-1788.

Vargová L, Horáčková L, and Menšíková M. 2003. Some interesting findings in an abolished Brno cemetery in Antonínská street. Scripta Medica (Brno) 76(4):229-240.

Walker PL, and Cook DC. 1998. Gender and sex: Vive la difference. American Journal Of Physical Anthropology 106(2):255-259.

Washburn SL, and Lancaster CS. 1968. The evolution of hunting. In: Lee RB, and DeVore I, editors. Man the hunter. Chicago: Aldine Publishing Company. p 293-303.

Webster MA, Kaping D, Mizokami Y, and Duhamel P. 2004. Adaptation to natural facial categories. Nature 428(6982):557-561.

Weiss KM, and Wobst HM. 1973. Demographic models for anthropology. Memoirs of the Society for American Archaeology(27):i-186.

Wiercinska A. 1996. The paleobiological characteristics of the population from the Bell-Grave culture burial ground in Warsaw-Zerzen (Poland). Variability and Evolution 5:101-106.

Wild HA, Barrett SE, Spence MJ, O'Toole AJ, Cheng YD, and Brooke J. 2000. Recognition and sex categorization of adults' and children's faces: examining performance in the absence of sex-stereotyped cues. Journal of Experimental Child Psychology 77(4):269-291.

Zhao L, and Bentin S. 2008. Own- and other-race categorization of faces by race, gender, and age. Psychonomic Bulletin & Review 15(6):1093-1099.

Zihlman A. 1997. The Paleolithic glass ceiling: women in human evolution. In: Hager LD, editor. Women in human evolution. London: Routledge. p 91-113.

Zilhão J, Angelucci DE, Badal-García E, d'Errico F, Daniel F, Dayet L, Douka K, Higham TFG, Martínez-Sánchez MJ, Montes-Bernárdez R *et al.* . 2010. Symbolic use of marine shells and mineral pigments by Iberian Neandertals. Proceedings of the National Academy of Sciences of the United States of America 107(3):1023-1028.

Online References

Alicia (2010) Madrid Wax Museum unveils Miley Cyrus figure. StyleBistro. [on–line] November 5 2010. Available from: http://www.stylebistro.com/News+and+Pics/articles/mcIbSHE9Ajn/Madrid+Wax+Museum+Unveils+Miley+Cyrus+Figure [Accessed 23 November 2010, 20 July 2011]

Australian Bureau of Statistics. 2006. Population estimates by age and sex, Australia. [on–line]. Available from: http://www.censusdata.abs.gov.au/ABSNavigation/prenav/ViewData?action=404&documentproductno=0&documenttype=Details&order=1&tabname=Details&areacode=0&issue=2006&producttype=Census%20Tables&javascript=true&textversion=false&navmapdisplayed=true&breadcrumb=TLPD&&collection=Census&period=2006&productlabel=Age%20by%20Sex&producttype=Census%20Tables&method=Place%20of%20Usual%20Residence&topic=Age%20&%20Population%20Distribution& [Accessed 25 July 2001].

Mayell H. 2004. Hobbit–Like human ancestor found in Asia. [on–line]. Available from: http://news.nationalgeographic.com/news/2004/10/photogalleries/homo_floresiensis_1/photo4.html [Accessed 1 October 2006, 25 November 2010].

Salleh A. 2004. Hobbit wielded big tools, clay model shows. [on–line]. Available from: http://www.abc.net.au/science/news/ancient/AncientRepublish_1262467.htm [Accessed 19 June 2006, 24 November 2010].

United Nations. 2010. World Population Prospects: The 2010 Revision. [on–line]. Available from: http://esa.un.org/unpd/wpp/unpp/p2k0data.asp [Accessed 25 July 2011].

Wong K. 2010. Your (very) extended family history [slide show]. [on–line]. Available from: http://www.scientificamerican.com/slideshow.cfm?id=smithonian–museum–hall–human–origins&photo_id=3FEFB5FC–A276–CF29–19161E7D88CEAD19 [Accessed 18 May 2010, 24 November 2010].

8

SUMMARY AND A CONCLUSION

Hominin representations are both a presentation technique and a scientific publication which conveys theories and information in a life–sized three–dimensional form; unfortunately they take the information too far visually. Artefacts and natural objects displayed within a museum context do not have this additional information.

Ten different representation types were identified in the sample of 860 representations from ten European countries and Australia. These representation types consisted of: facial reconstruction (with and without a body); educational sculptures; casts; portrait figures; museum mannequins; standard mannequins; anatomical models; costume dummies; and a miscellaneous category. These representations were found in various display contexts; complete context, partial context, a series or in a solo display, although, not all representation types were found in each display context. Inconsistency in the terminology used to define representations and their display context impacts upon research. The categorisation of representations and context in this study aims to assist future researchers and to assist in the choice of representation type in order for them to be used in the most effective way possible.

The *Homo sapiens* representations were found to come in three different facial finish types: blanks (a generic shape), basic faces and detailed faces. These finish types covered a wide scale of facial realism, from unrealistic yet still recognisable as human shapes (blanks) to highly realistic representations (detailed faces) that look as if they could walk away. The facial realism of these representations is more dependent on the types of details included than the skill level of the creator/artist. All levels of realism are applicable to the use of these representations in museum displays as the intention of these representations depends on the exhibit which features them. Anonymity is not necessarily confined to the blank face representations as repetition of the same standard mannequin can for example, also imply this.

Earlier hominin representations were found to be treated differently from the modern *Homo sapiens* representations. The earlier hominins are only found to be facial reconstructions or educational sculptures. They are more detailed, indicating more time is spent on the actual creation of these representations however, the details used on them are generally those that there is no evidence to substantiate them; such as hair colour, skin colour, hirsutness, amount of visible sclera. Some of these details also imply 'primitiveness' or animal–like qualities. The body proportions were also found to be inconsistent with current anatomical knowledge. These inaccuracies influence the museum visitor and may make the representations look more human–like or more ape–like depending on the proportions of the upper and lower limbs. The length of the trunk can also influence the visual proportions of the representations as smaller trunk proportions can make the lower limbs look longer giving a more human–like appearance.

The earlier hominins are used in such a way that they represent a 'type of taxon' rather than an individual as the archaeology facial reconstructions do. These various taxa do not differ substantially from each other in the eyes of observers, nor are there particular facial characteristics that are confined to an individual taxon. This means that they do not convey the differences between taxa in such a way that is visually obvious. They do, however, show that the opinions of the makers as to which taxon is human–like or ape–like are presented in the faces of these representations. The range of taxa were effectively judged to be either human–like (all *Homo* species except for *Homo habilis*) or ape–like (*H. habilis*, the australopithecines and *K. platyops*). Therefore, they do not convey a type of taxon effectively without supplementary information in the form of descriptive or informative text.

In addition to the scientific knowledge that may be portrayed in these representations there is also a range of supplementary hypothetical information. This information was found in the anatomical features of the representations as well as in the cultural indicators. It was found that there was a male bias as well as an overabundance of adults in the sample giving a false impression as it does not reflect the actual sex ratios or age ranges within hominin populations. Nakedness is rarely portrayed, however, nudity is and female representations are more likely to be nude than the male ones. Clothing is also used to define the change from pre–human (animal) to human.

A Conclusion

The information conveyed by representations is only partially correct so they transmit hypothetical inaccurate information which is different from the 'real' objects/artefacts displayed in museums. Hominin representations need to be used cautiously in order that misleading information is not perpetuated through their use. There may be embedded cultural bias that is not consciously realised by the museum staff and scientists and which can be read by the public. Additional information added to the object is inversely related to the amount of display manipulation.

APPENDIX A

The institutions visited, listed alphabetically by country, then institution. The institution types consisted of museums (M), visitor attractions (VA) and associated institutions (A).

Country	Institution	Institution type
Australia	Australian Museum, Sydney	M – national, natural history
Australia	Australian National Maritime Museum, Sydney	M – national, specific interest
Australia	Australian Stockman's Hall of Fame and Outback Heritage Centre, Longreach	VA and M – national and specific interest
Australia	Australian Tennis Museum, Sydney	M – national, specific interest
Australia	Bangerang Cultural Centre, Shepparton	M – specific interest
Australia	History Trust Gallery, Adelaide	M – specific interest, temporary exhibition
Australia	Cairns Museum, Cairns	M – local
Australia	Cairns Police District Headquarters, Cairns	A – specific interest
Australia	Chinese Museum, Melbourne	M – local and specific interest
Australia	Cooks' Cottage, Melbourne	VA and M – specific interest
Australia	Henry Forman Atkinson Dental Museum, Melbourne	M – specific interest
Australia	Hyde Park Barracks Museum, Sydney	M – specific interest
Australia	Justice & Police Museum, Sydney	M – specific interest
Australia	Melbourne Museum, Melbourne	M – state
Australia	Museum of Tropical Queensland	M – local
Australia	Qantas Founders Outback Museum, Longreach	M – specific interest
Australia	Queensland Police Museum, Brisbane	M – specific interest
Australia	Ripley's Believe it or not, Surfers Paradise	VA
Australia	Shot Tower Museum, Melbourne	M – specific interest
Australia	South Australian Museum, Netley Store, Adelaide	M – regional
Australia	Victoria Police Museum, Melbourne	M – specific interest
Australia	Victorian State Library, Melbourne	A – Library
Australia	Waltzing Matilda Centre, Winton	M – local, specific interest
Austria	Haus Der Natur, Salzburg	M – natural history
Austria	Museum of the History of Medicine, Vienna	M – specific interest
Austria	Naturhistorisches Museum, Vienna	M – natural history
Belgium	Africa Museum, Tervuren	M – specific interest
Belgium	Flanders Field Museum, Ypres	M – specific interest
Belgium	Municipal Museum Vander Kelen–Mertens, Leuven	M – regional, closed for redisplay
Belgium	Museum of Natural Sciences, Brussels	M – natural history

Country	Institution	Institution type
England	Ashmolean Museum, Oxford	M – specific interests
England	British Museum, London	M – national
England	Cast Gallery, Oxford	M – specific interest, closed for redisplay
England	Colchester Castle Museum, Colchester	M – local
England	Corinium Museum, Cirencester	M – local
England	Dover Museum, Dover	M – local
England	Hollytrees Museum, Colchester	M – local
England	Jorvik Viking Centre, York	M – local, specific interest
England	Madame Tussauds, London	VA – wax museum
England	Manchester Museum, Manchester	M – natural history
England	Museum of London, London	M – local
England	Natural History Museum, Colchester	M – natural history
England	Natural History Museum, London	M – natural history
England	Pitt Rivers Museum, Oxford	M – specific interest
England	The Oxford Story, Oxford	VA – local
England	The Oxford University Museum of Natural History, Oxford	M – natural history
France	Catacombs, Paris	VA – Ossuary
France	Eiffel Tower, Paris	VA
France	Musée du Louvre, Paris	M – national
France	Musee De L'homme, Paris	M – specific interest
Germany	Archaeology Museum, Frankfurt	M – local, specific interest
Germany	Hessisches Landes–Museum, Darmstadt	M – regional, natural history
Germany	Neanderthal Museum, Mettmann	M – specific interest
Germany	Senckenberg Forschungsinstitute Und Naturmuseum, Frankfurt	M – natural history
Hungary	Budapesti Torteneti Muzeum, Budapest	M – local
Hungary	Magyar Természettudományi Múzeum, Budapest	M – natural history
Netherlands	Drents Museum, Assen	M – art, state (province)
Netherlands	Eindhoven	A – Not yet opened
Netherlands	Manimal Works, Rotterdam	A – artist's studio
Netherlands	Museon, Den Haag	M – science
Netherlands	National Antiquities Museum, Leiden	M – special interest
Netherlands	Universiteitsmuseum, Groningen	M – closed during visit
Portugal	Coimbra University, Coimbra	A – specific interest
Portugal	Ethnology Museum, Lisbon	M – specific interest
Portugal	Evora Ossuary, Evora	VA – Ossuary
Portugal	Geology Museum, Lisbon	M – special interest (geology)
Portugal	Leiria Castle Museum, Leiria	M – special interest
Scotland	Caroline Wilkinson's Studio, University of Dundee, Dundee	A – Facial reconstruction artist's studio
Scotland	Hunterian Museum, Glasgow	M – natural history
Scotland	McManus Galleries and Museum, Dundee	M – local and natural history, closed for redisplay
Wales	Cardiff National Museum, Cardiff	M – national, natural history

APPENDIX B

QUESTIONS FOR MUSEUM CURATORS

1. Human figures in the museum
   - Do you have any facial reconstructions, facial approximations or human body reconstructions on display in your museum?
   - Do you use human figures or mannequins in your museum?
   - (if no) Why are there no 3D facial reconstructions included in the museum?
   - (If so) What galleries, exhibits or displays are they in?
   - When were these galleries, exhibits or displays first opened?
   - Why have you included 3D reconstructions in the galleries/exhibits/displays?
   - How many do you have in total?
2. Artists
   - What artists have you used to make the reconstructions?
   - How did you hear about that/those particular artist/s?
   - Have you seen their work in other museums?
   - (If so) Which museums?
   - What type of brief or information did you give the artist prior to them commencing work on the reconstruction?
   - Was the final look of the gallery/exhibit/display discussed with the artist/s?
   - Was/were the artist/s involved in the design of the gallery/exhibit/display?
   - (if so) Why were they included in the discussion/design?
   - (if no) Why were they not included in the discussion/design?
   - What company made the figures for you?
3. Gallery design
   - Who was responsible for the overall design of the gallery, exhibit or display?
   - How has the exhibit evolved over time?
   - What was the original idea for the exhibit and how much has the final product differed from the original idea?
   - Are there any plans to change or redesign the gallery?

- Do you update the information in the displays and/or have a procedure in place in which to do so?
- How many times has the exhibit been updated since it opened? And can you supply me with those dates?

4. Design process
   - Who was involved in the design process? (eg front of house staff, educational officer)
   - And what level of input did these people have into the display?
   - What type of constraints did you have on the design of the exhibit? (eg space, budget, personnel)
5. Exhibit theme
   - Is there a particular theme to the display or a particular message that the exhibit was intended to convey to the public viewing the display?
   - Have you received any feedback about this theme/message?
   - In your opinion does the exhibit convey this theme/message to your satisfaction?
6. 2D representations
   - Are there 2D representations of people in the exhibit?
   - Who is the artist that drew the pictures for the display?
   - Why have you used this format
   - (If there are no facial/human body reproductions in the exhibit) Why did you use the 2D format rather than a 3D format? (If there is a mix of 2D and 3D formats) Why have you used a mix of formats?
7. Visitor Numbers
   - How many visitors does the museum have annually?
   - Do you have any type of breakdown of the visitor numbers? (eg the number of school groups)
   - Do you have an idea of your visitor demographic
   - Have your visitor numbers changed since the introduction of your facial/full body reconstructions?
   - Was it increased or decreased?
   - Have you aimed the gallery/exhibit/display at a particular demographic group?

8. Feedback

- Do you receive much feedback from the visitors about the gallery?
- What type of setup do you have in place for visitor feedback? Eg comment cards, questionnaires, website feedback forms
- Are the comments negative, positive or both?
- Can you give me an example of the types of comments?
- Is the gallery popular?

9. Museum guide

- Is there a guidebook to the museum/exhibit?
- Is there an audio guide to the museum/exhibit?
- What languages is it available in?
- Are there information cards available in the galleries in different languages?
- Are the text panels in other languages? If so what languages?
- Are guided tours run that include the exhibit/s?
- Do you use actors to inform the public about the exhibit/gallery/display?

10. Human remains

- Do you have human remains on display in the museum/galleries/exhibits?
- Why have you included them in the museum/galleries/exhibits?
- Have you had any objects from the public/indigenous groups?

APPENDIX C

QUESTIONS FOR ARTISTS AND/OR FIGURE MAKERS

- How many reconstructions have you done?
- What museums are they in?
- What type of qualifications do you have?
- What type of facial reconstruction method do you use?
- What medium do you use/prefer?
- What guidelines do you use for the facial features?
- Were you given a brief or information to follow from the museum?
- What information were you originally given about the skull?
- Who gave you that information?
- Who chose the eye and hair colour?
- Do you use historical information, such as from paintings/mosaics/literature?
- Did anyone else work on the reconstruction with you?
- What qualifications did they have?
- What was the purpose of the facial reconstruction/s?
- Were they intended to convey any particular messages?
- What type of feedback have you received from the museum?
- Have you received feedback from any individuals?

These questions were not necessarily asked in order. Information was often more forthcoming when the artist was engaged in conversation and one topic would lead naturally to another. Not all artists were able to answer all questions as each reconstruction was an individual case.

APPENDIX D

The number of hominin representations in each institution visited, shown by the total number of representations, the number of those representations that are on display and the number of those in storage along with the relevant percent value.

Institution	On display	Not displayed	Total	
	n=	n=	n=	%
Cooks' Cottage, Melbourne			0	
Henry Forman Atkinson Dental Museum, Melbourne			0	
Shot Tower Museum, Melbourne			0	
Museum of the History of Medicine, Vienna			0	
Municipal Museum Vander Kelen–Mertens, Leuven			0	
Ashmolean Museum, Oxford			0	
Cast Gallery, Oxford			0	
Natural History Museum, Colchester			0	
The Oxford University Museum of Natural History, Oxford			0	
Catacombs, Paris			0	
Musée du Louvre, Paris			0	
Senckenberg Forschungsinstitute Und Naturmuseum, Frankfurt			0	
Budapesti Torteneti Muzeum, Budapest			0	
Ethnology Museum, Lisbon			0	
McManus Galleries and Museum, Dundee			0	
Manimal Works, Rotterdam			0	
Archaeology Museum, Frankfurt	1		1	0.1
Australian Stockman's Hall of Fame and Outback Heritage Centre, Longreach	1		1	0.1
British Museum, London	1		1	0.1
Eindhoven		1	1	0.1
Evora ossury, Evora	1		1	0.1
Geology museum, Lisbon	1		1	0.1
Hollytrees Museum, Colchester	1		1	0.1
Hyde Park Barracks Museum	1		1	0.1
Universiteitsmuseum, Groningen		1	1	0.1
Victorian State Library	1		1	0.1
Cardiff National Museum, Cardiff	1	1	2	0.2
Leiria Castle museum, Leiria	2		2	0.2
Museum of London, London	2		2	0.2
National Antiquities Museum, Leiden	2		2	0.2
Pitt Rivers Museum, Oxford	2		2	0.2
Cairns police	3		3	0.3
Caroline Wilkinson's studio, Dundee		3	3	0.3
Chinese Museum	3		3	0.3
Museum of Natural Sciences, Brussels	4		4	0.5

Institution	On display	Not displayed	Total	
	n=	n=	n=	%
Cairns museum	6	1	7	0.8
Eiffel Tower, Paris	7		7	0.8
History Trust Gallery, Adelaide	7		7	0.8
Museum of Tropical Queensland	8		8	0.9
Victorian Police Museum	8		8	0.9
Dover Museum, Dover	9		9	1.0
Hessisches Landes–Museum, Darmstadt	9		9	1.0
Flanders Field Museum, Ypres	10		10	1.2
Queensland Police Museum	10		10	1.2
Australian National Maritime Museum	11		11	1.3
Hunterian Museum, Glasgow	11		11	1.3
Natural History Museum, London	11		11	1.3
Australian Tennis Museum	13		13	1.5
Bangerang Cultural Centre	13		13	1.5
Coimbra University		14	14	1.6
Colchester Castle Museum, Colchester	14		14	1.6
Corinium Museum, Cirencester	15		15	1.7
South Australian Museum –Netley Store		15	15	1.7
Justice and Police Museum	16		16	1.9
The Waltzing Matilda Centre	11	5	16	1.9
Musee De L'homme, Paris	17		17	2.0
Qantas Outback Founders Museum	18		18	2.1
Melbourne Museum	15	5	20	2.3
The Oxford Story, Oxford	20		20	2.3
Manchester Museum, Manchester	15	8	23	2.7
Ripley's Believe it or Not!	23		23	2.7
Drenthe Museum, Assen	24		24	2.8
Africa Museum, Tervuren	26		26	3.0
Neanderthal Museum, Mettmann	29		29	3.4
Museon, Den Haag	29	5	34	4.0
Jorvik Viking Centre, York	37		37	4.3
Magyar Természettudományi Múzeum, Budapest	38		38	4.4
Haus Der Natur, Salzburg	41		41	4.8
Australian Museum	3	62	65	7.6
Naturhistorisches Museum, Vienna	6	60	66	7.7
Madame Tussauds, London	122		122	14.2
Grand Total	**679**	**181**	**860**	**100.0**

APPENDIX E

The list of the *H. sapiens* representations sampled in terms of their facial realism for Chapter 4: "*Finishing techniques used on the anatomically modern human representations"*. Ordered by their facial realism (FR) score. In the number column the prefix E stands for European

Number	Country	Institution	Representation name or description*	FR
E321	Netherlands	Museon, Den Haag	Army figure	1
E327	Netherlands	Museon, Den Haag	Wooden figure 1	1
E328	Netherlands	Museon, Den Haag	Wooden figure 2	1
E329	Netherlands	Museon, Den Haag	Wooden figure 3	1
E330	Netherlands	Museon, Den Haag	Wooden figure 4	1
E331	Netherlands	Museon, Den Haag	Wooden figure 5	1
E332	Netherlands	Museon, Den Haag	Wooden figure 6	1
E011	Austria	Haus Der Natur, Salzburg	Early pilot	2
E319	Netherlands	Museon, Den Haag	Indonesian man standing	2
E600	Netherlands	Museon, Den Haag	Indonesian woman sewing	2
E318	Netherlands	Museon, Den Haag	Indonesian woman	3
E322	Netherlands	Museon, Den Haag	Native South American woman	3
E323	Netherlands	Museon, Den Haag	Woman	3
E324	Netherlands	Museon, Den Haag	Drummer	3
E325	Netherlands	Museon, Den Haag	Piper	3
E449	England	Manchester Museum, Manchester	Kiribati armour figure	4
E085	England	Colchester Castle Museum, Colchester	Celtic head	5
E089	England	Colchester Castle Museum, Colchester	Celtic head	5
E134	England	Colchester Castle Museum, Colchester	Celtic head	5
E045	Belgium	Flanders Field Museum, Ypres	Standing soldier 1	6
E046	Belgium	Flanders Field Museum, Ypres	Standing soldier 2	6
E047	Belgium	Flanders Field Museum, Ypres	Standing soldier 3	6
E048	Belgium	Flanders Field Museum, Ypres	Standing soldier 4	6

Number	Country	Institution	Representation name or description*	FR
E049	Belgium	Flanders Field Museum, Ypres	Sitting soldier 1	6
E050	Belgium	Flanders Field Museum, Ypres	Sitting soldier 2	6
E051	Belgium	Flanders Field Museum, Ypres	Sitting soldier 3	6
E052	Belgium	Flanders Field Museum, Ypres	Sitting soldier 4	6
E151	England	Manchester Museum, Manchester	Man with crossbow	7
E042	Belgium	Museum of Natural Sciences, Brussels	Wooden male *H. sapiens*	8
E212	France	Musee De L'homme, Paris	Cro-Magnon	9
E006	Austria	Haus Der Natur, Salzburg	Prof. Dr. Hans Hass the deep sea diver	10
E169	England	Manchester Museum, Manchester	Man in boat	11
E115	England	Hollytrees Museum, Colchester	Lady in drawing room	12
E153	England	Manchester Museum, Manchester	Khnum	13
E164	England	Manchester Museum, Manchester	Original Seianti as old woman	14
E167	England	Manchester Museum, Manchester	Priest	15
E165	England	Manchester Museum, Manchester	Ada	16
E259	Hungry	Magyar Természettudományi Múzeum, Budapest	Antal Fischer	17
E152	England	Manchester Museum, Manchester	Nekht	18
E317	Netherlands	Museon, Den Haag	Roman woman	19
E257	Hungry	Magyar Természettudományi Múzeum, Budapest	Ferenc Wurth	20
E241	Germany	Neandertal Museum, Mettmann	Orange forensic head	21
E280	Hungry	Magyar Természettudományi Múzeum, Budapest	Mediterranean woman	22
E273	Hungry	Magyar Természettudományi Múzeum, Budapest	Sarmatian woman	23
E275	Hungry	Magyar Természettudományi Múzeum, Budapest	Neolithic woman	24
E276	Hungry	Magyar Természettudományi Múzeum, Budapest	Avar period woman	25
E258	Hungry	Magyar Természettudományi Múzeum, Budapest	Antal Simon	26
	Hungry	Magyar Természettudományi Múzeum, Budapest	Cromagnoid type	27
E274	Hungry	Magyar Természettudományi Múzeum, Budapest	Bronze–Age man	28
E283	Hungry	Magyar Természettudományi Múzeum, Budapest	Mediterranean type woman	29
E174	England	Natural History Museum, London	Adult female	30
E277	Hungry	Magyar Természettudományi Múzeum, Budapest	Avar prince	31

Number	Country	Institution	Representation name or description*	FR
E286	Hungry	Magyar Természettudományi Múzeum, Budapest	Finished head	32
E279	Hungry	Magyar Természettudományi Múzeum, Budapest	Hun female distorted head	33
E264	Hungry	Magyar Természettudományi Múzeum, Budapest	Middle aged man (6830)	34
E080	England	Colchester Castle Museum, Colchester	Camilla	35
E285	Hungry	Magyar Természettudományi Múzeum, Budapest	Harmonised face	36
E278	Hungry	Magyar Természettudományi Múzeum, Budapest	Avar period man	37
E263	Hungry	Magyar Természettudományi Múzeum, Budapest	Bowman from Vors	38
E267	Hungry	Magyar Természettudományi Múzeum, Budapest	Middle aged woman from vors	39
E272	Hungry	Magyar Természettudományi Múzeum, Budapest	Roman woman	40
E266	Hungry	Magyar Természettudományi Múzeum, Budapest	Middle–aged man from Vors	41
E261	Hungry	Magyar Természettudományi Múzeum, Budapest	Woman from Vors	42
E284	Hungry	Magyar Természettudományi Múzeum, Budapest	Nordic male	43
E265	Hungry	Magyar Természettudományi Múzeum, Budapest	Old warrior from Karos–Eperjesszog	44
E281	Hungry	Magyar Természettudományi Múzeum, Budapest	Conqueror male	45
E077	Scotland	Caroline Wilkinson's studio, Dundee	Bleden male	46
E166	England	Manchester Museum, Manchester	Priestess	47
E262	Hungry	Magyar Természettudományi Múzeum, Budapest	10th Century child	48
E260	Hungry	Magyar Természettudományi Múzeum, Budapest	Warrior from Benepuszta	49
E168	England	Manchester Museum, Manchester	Worsley blank	50
E079	Scotland	Caroline Wilkinson's studio, Dundee	Mesolithic child	51
E078	Scotland	Caroline Wilkinson's studio, Dundee	Spitalfield	52
E242	Germany	Neandertal Museum, Mettmann	White forensic head	53
E175	England	Natural History Museum, London	Adult male	54
E179	England	Natural History Museum, London	Modern male (comparison with primates)	54
E177	England	Natural History Museum, London	Prepubescent male	55
E163	England	Manchester Museum, Manchester	B52	56
E160	England	Manchester Museum, Manchester	Γ51	57
E158	England	Manchester Museum, Manchester	Γ55	58
E161	England	Manchester Museum, Manchester	Z59	59

Number	Country	Institution	Representation name or description*	FR
E162	England	Manchester Museum, Manchester	Σ131	60
E170	England	Museum Of London, London	Shepperton woman	61
E159	England	Manchester Museum, Manchester	Γ58	62
E076	England	British Museum, London	Seianti	63
E336	Wales	Cardiff National Museum, Cardiff	Tomb builder bronze	64
E154	England	Manchester Museum, Manchester	Asru	65
E240	Germany	Neandertal Museum, Mettmann	Grey forensic head	66
E044	Belgium	Flanders Field Museum, Ypres	Female in pre–WW1 dress	67
E043	Belgium	Flanders Field Museum, Ypres	Male in pre–WW1 dress	68
E577	Austria	Haus Der Natur, Salzburg	Peripheral vision	69
E083	England	Colchester Castle Museum, Colchester	Man in pillory	70
E101	England	Corinium Museum, Cirencester	Mrs Getty	71
E001	Austria	Haus Der Natur, Salzburg	Bushman	72
E104	England	Corinium Museum, Cirencester	Child	73
E008	Austria	Haus Der Natur, Salzburg	Old fashioned diver	74
E287	Hungry	Magyar Természettudományi Múzeum, Budapest	Girl by pond	75
E082	England	Colchester Castle Museum, Colchester	Civil war rifleman	76
E087	England	Colchester Castle Museum, Colchester	Medieval soldier	77
E111	England	Dover Museum, Dover	Woman	78
E109	England	Dover Museum, Dover	Roman	79
E013	Austria	Haus Der Natur, Salzburg	Woman	80
E119	England	Jorvik Viking Centre, York	Finished reconstruction head	81
E102	England	Corinium Museum, Cirencester	Man	82
E227	Germany	Archaeology Museum, Frankfurt	Ötzi	83
E091	England	Colchester Castle Museum, Colchester	Fighting Celt	84
E298	Scotland	Hunterian Museum, Glasgow	Roman	85
E118	England	Jorvik Viking Centre, York	Reconstruction head	86
E017	Austria	Haus Der Natur, Salzburg	Man eating	87
E012	Austria	Haus Der Natur, Salzburg	Tibetan Man drinking tea	88
E022	Austria	Naturhistorisches Museum, Vienna	Ötzi	89

Number	Country	Institution	Representation name or description*	FR
E018	Austria	Haus Der Natur, Salzburg	Man talking	90
E015	Austria	Haus Der Natur, Salzburg	Shaman	91
E081	England	Colchester Castle Museum, Colchester	Civil war solider	92
E294	Portugal	Geology museum, Lisbon	Art head	93
E121	England	Jorvik Viking Centre, York	Bald man	94
E088	England	Colchester Castle Museum, Colchester	Cleaning female	95
E147	England	Jorvik Viking Centre, York	Person in the red lined cape	96
E131	England	Jorvik Viking Centre, York	Child fisherman	97
E124	England	Jorvik Viking Centre, York	Trader	98
E141	England	Jorvik Viking Centre, York	Man with skins	99
E122	England	Jorvik Viking Centre, York	Antler worker	100
E132	England	Jorvik Viking Centre, York	Man on toilet	101
E133	England	Jorvik Viking Centre, York	Lady looking over fence	102
E142	England	Jorvik Viking Centre, York	Man with blue cloak	103
E114	England	Dover Museum, Dover	Sir William Crundell	104
E129	England	Jorvik Viking Centre, York	Bearded fisherman	105
E100	England	Corinium Museum, Cirencester	Man	106
E125	England	Jorvik Viking Centre, York	Woman near boat	107
E145	England	Jorvik Viking Centre, York	Pregnant brunette	108
E171	England	Museum Of London, London	Spitalfields woman	109
E337	Wales	Cardiff National Museum, Cardiff	Tomb builder coloured	110
E016	Austria	Haus Der Natur, Salzburg	Man serving	111
E107	England	Dover Museum, Dover	Anglo-Saxon man	112
E095	England	Corinium Museum, Cirencester	Woman	113
E099	England	Corinium Museum, Cirencester	Girl	114
E316	Netherlands	Museon, Den Haag	Cananefates girl	115
E094	England	Corinium Museum, Cirencester	Pregnant woman	116
E149	England	Jorvik Viking Centre, York	Man with carrot	117
E110	England	Dover Museum, Dover	Iron Age warrior	118
E092	England	Corinium Museum, Cirencester	Man	119
E108	England	Dover Museum, Dover	Anglo-Saxon woman	120

Number	Country	Institution	Representation name or description*	FR
E032	Austria	Naturhistorisches Museum, Vienna	Female Bushman	121
E002	Austria	Haus Der Natur, Salzburg	American Indian	122
E156	England	Manchester Museum, Manchester	1770	123
E090	England	Colchester Castle Museum, Colchester	Fighting Roman	124
E178	England	Natural History Museum, London	Painter	125
E112	England	Dover Museum, Dover	Man	126
E031	Austria	Naturhistorisches Museum, Vienna	Wakusasse Musquake–Indianer	127
E139	England	Jorvik Viking Centre, York	Woman chatting	128
E113	England	Dover Museum, Dover	Child	129
E146	England	Jorvik Viking Centre, York	Chatty woman	130
E103	England	Corinium Museum, Cirencester	Woman	131
E105	England	Corinium Museum, Cirencester	Hodgekinson Paine	132
E140	England	Jorvik Viking Centre, York	Man with dead pigeon	133
E233	Germany	Neandertal Museum, Mettmann	Woman	134
E300	Netherlands	Eindhoven	Marcus van Eindhoven	135
E033	Austria	Naturhistorisches Museum, Vienna	Underwater artist	136
E150	England	Jorvik Viking Centre, York	Wood worker	137
E123	England	Jorvik Viking Centre, York	Man in boat	138
E096	England	Corinium Museum, Cirencester	Roman soldier on horse	139
E299	Netherlands	Drenthe Museum, Assen	Yde Girl	140
E335	Netherlands	Universiteitsmuseum, Groningen	Janus	141
E334	Netherlands	National Antiquities Museum, Leiden	Sensaos	142
E155	England	Manchester Museum, Manchester	Phillip	143
E232	Germany	Neandertal Museum, Mettmann	Cro–Magnon male	144
E023	Austria	Naturhistorisches Museum, Vienna	Cro–Magnon man	145
E229	Germany	Neandertal Museum, Mettmann	Modern man	146
E333	Netherlands	National Antiquities Museum, Leiden	Trintje	147
E157	England	Manchester Museum, Manchester	Worsley man	148

***The representation name or description were given by the author to the representations for use in this study as a memory aide and were based on the representation, the museum's label and associated information.**

APPENDIX F

The list of earlier hominin representations sampled in terms of their facial realism for chapter 5: the body shape, size and overall finish of the earlier hominin representations. Ordered by their facial realism (FR) score. In the number column the prefix E stands for European and the prefix A stands for Australian.

Number	Country	Institution	Representation name or description*	FR
E249	Germany	Neandertal Museum, Mettmann	Gibraltar Neandertal 1935	1
E271	Hungry	Magyar Természettudományi Múzeum, Budapest	Neandertal female	2
E251	Germany	Neandertal Museum, Mettmann	Male Neandertal bust	3
E244	Germany	Neandertal Museum, Mettmann	1925 La Chapelle–aux–Saints	4
E252	Germany	Neandertal Museum, Mettmann	1962 standing Neandertal	5
E207	France	Musee De L'homme, Paris	Australopithecine 1	6
E208	France	Musee De L'homme, Paris	Australopithecine 2	6
E209	France	Musee De L'homme, Paris	*Homo habilis*	6
E210	France	Musee De L'homme, Paris	*Homo ergaster*	7
E211	France	Musee De L'homme, Paris	Neandertal	8
E250	Germany	Neandertal Museum, Mettmann	Female Neandertal bust	9
E248	Germany	Neandertal Museum, Mettmann	1935 Neandertal	10
A120	Australia	Australian Museum	*H. habilis*	11
E024	Austria	Naturhistorisches Museum, Vienna	Hunched Neandertal	12
E247	Germany	Neandertal Museum, Mettmann	1950 La Chapelle–aux–Saints	13
E245	Germany	Neandertal Museum, Mettmann	1956 gold Neandertal	14
E246	Germany	Neandertal Museum, Mettmann	1950 Monte Circeo	15
E268	Hungry	Magyar Természettudományi Múzeum, Budapest	*Homo erectus*	16
E269	Hungry	Magyar Természettudományi Múzeum, Budapest	Neandertal	17
E039	Belgium	Museum of Natural Sciences, Brussels	Wooden Neandertal	18
E270	Hungry	Magyar Természettudományi Múzeum, Budapest	Child	19
A123	Australia	Australian Museum	*H. erectus*	20
A122	Australia	Australian Museum	Neandertal	21

Number	Country	Institution	Representation name or description*	FR
E255	Germany	Neandertal Museum, Mettmann	Squatting Neandertal	22
E254	Germany	Neandertal Museum, Mettmann	Neandertal in suit	23
E173	England	Natural History Museum, London	*Australopithecus*	24
E172	England	Natural History Museum, London	Female Neandertal	25
E307	Netherlands	Museon, Den Haag	*H. habilis*	26
E311	Netherlands	Museon, Den Haag	*Australopithecus afarensis*	27
E308	Netherlands	Museon, Den Haag	*Australopithecus boisei*	28
E309	Netherlands	Museon, Den Haag	*Australopithecus africanus*	29
E230	Germany	Neandertal Museum, Mettmann	*Homo erectus*	30
E306	Netherlands	Museon, Den Haag	*H. erectus*	31
E063	Netherlands	Drents Museum, Assen	Child with meat	32
E075	Netherlands	Drents Museum, Assen	Reclining child	33
E060	Netherlands	Drents Museum, Assen	Child dragging rocks	34
E073	Netherlands	Drents Museum, Assen	Dead female	35
E068	Netherlands	Drents Museum, Assen	Standing female	36
E056	Netherlands	Drents Museum, Assen	Pointing child	37
E057	Netherlands	Drents Museum, Assen	Hyena near child	38
E303	Netherlands	Museon, Den Haag	*H. ergaster*	39
E064	Netherlands	Drents Museum, Assen	Wounded child	40
E238	Germany	Neandertal Museum, Mettmann	Male flint knapper	41
E069	Netherlands	Drents Museum, Assen	Bare–breasted female	42
E070	Netherlands	Drents Museum, Assen	Sitting female	43
E301	Netherlands	Museon, Den Haag	Teshik Tash Child	44
E302	Netherlands	Museon, Den Haag	La Chapelle–aux–Saints	45
E304	Netherlands	Museon, Den Haag	*Homo heidelbergensis*	46
E310	Netherlands	Museon, Den Haag	Neandertal	47
E253	Germany	Neandertal Museum, Mettmann	1994 Kieser/Schnaubelt	48
E025	Austria	Naturhistorisches Museum, Vienna	Male australopithecine	49
E026	Austria	Naturhistorisches Museum, Vienna	female australopithecine	50
E030	Austria	Naturhistorisches Museum, Vienna	Child – Teshik Tash	51
E256	Germany	Neandertal Museum, Mettmann	Female kneeling Neandertal	52
E072	Netherlands	Drents Museum, Assen	Mourning female	53
E065	Netherlands	Drents Museum, Assen	Worried male	54

Number	Country	Institution	Representation name or description*	FR
E066	Netherlands	Drents Museum, Assen	Male at fire	55
E071	Netherlands	Drents Museum, Assen	Mourning male	56
E062	Netherlands	Drents Museum, Assen	Male with meat	57
E074	Netherlands	Drents Museum, Assen	Shaman	58
E055	Netherlands	Drents Museum, Assen	Male flintknapper	59
E067	Netherlands	Drents Museum, Assen	Old man	60
E237	Germany	Neandertal Museum, Mettmann	Male hunter	61
E243	Germany	Neandertal Museum, Mettmann	Female mourning	62
E228	Germany	Neandertal Museum, Mettmann	Neandertal	63
E235	Germany	Neandertal Museum, Mettmann	Child	64
E236	Germany	Neandertal Museum, Mettmann	Female gatherer	65
E221	Germany	Hessisches Landes–Museum, Darmstadt	*Australopithecus anamensis*	66
E218	Germany	Hessisches Landes–Museum, Darmstadt	Neandertal	67
E041	Belgium	Museum of Natural Sciences, Brussels	Gracile australopithecine	68
E040	Belgium	Museum of Natural Sciences, Brussels	Robust australopithecine	69
E219	Germany	Hessisches Landes–Museum, Darmstadt	*Australopithecus boisei*	70
E224	Germany	Hessisches Landes–Museum, Darmstadt	*H. habilis*	71
E027	Austria	Naturhistorisches Museum, Vienna	Boxed Neandertal	72
E059	Netherlands	Drents Museum, Assen	Crouching with spear	73
E223	Germany	Hessisches Landes–Museum, Darmstadt	*Au. africanus*	74
E222	Germany	Hessisches Landes–Museum, Darmstadt	*Au. afarensis*	75
E220	Germany	Hessisches Landes–Museum, Darmstadt	*Kenyanthropus platyops*	76
E296	Portugal	Leiria Castle museum, Leiria	Australopithecine	77
E295	Portugal	Leiria Castle museum, Leiria	Neandertal Male	78
E297	Scotland	Hunterian Museum, Glasgow	*H. habilis*	79
E061	Netherlands	Drents Museum, Assen	Stepping with spear	80
E053	Netherlands	Drents Museum, Assen	Yorik male	81
E231	Germany	Neandertal Museum, Mettmann	Neandertal	82
E234	Germany	Neandertal Museum, Mettmann	Old female	83
E058	Netherlands	Drents Museum, Assen	Standing with spear	84
E226	Germany	Hessisches Landes–Museum, Darmstadt	*H. erectus*	85

Number	Country	Institution	Representation name or description*	FR
E225	Germany	Hessisches Landes–Museum, Darmstadt	*H. rudolfensis*	86
E029	Austria	Naturhistorisches Museum, Vienna	Old Neandertal male	87
E028	Austria	Naturhistorisches Museum, Vienna	Neandertal squatting	88
E305	Netherlands	Museon, Den Haag	Neandertal female	89
E239	Germany	Neandertal Museum, Mettmann	Feldhofer	90

***The representation name or description were given by the author to the representations for use in this study as a memory aide and were based on the representation, the museum's label and associated information.**

APPENDIX G

The standard anthropometric points used in the second study in Chapter 5: "*The Overall Finish and Body Proportions of the Earlier Hominin Representations"*, are found at specific anatomical points or landmarks on the body. These landmarks are some of the many anthropometric points that are found on the body. The points used in this study are found at specific areas based on skeletal markers which are able to be palpated (or felt) on the body. These points consist of the full body length, vertex to base (v–b), the trunk measurement, suprasternale to symphysion (sst–sy), the upper limb length, acromiale to dactylion (a–da) and the lower limb length, base to symphysion (b–sy).

NOTE:
This figure is included on page 476 of the print copy of the thesis held in the University of Adelaide Library.

FIGURE G1 The anthropometric points used in this study shown as they are defined by Martin (1928) using skeletal landmarks on the body: (A) landmarks on the frontal view, with the relevant points in red, 1, vertex; 6, suprasternale; 7, acromiale or akromion; 14, symphysion; 18, dactylion or daktylion. The red line corresponds with the base used. (B) The landmarks on the profile view: 1, vertex; 6, acromiale; 7, suprasternale; 13, symphysion; 17, dactylion. Adapted from Montagu (1960).

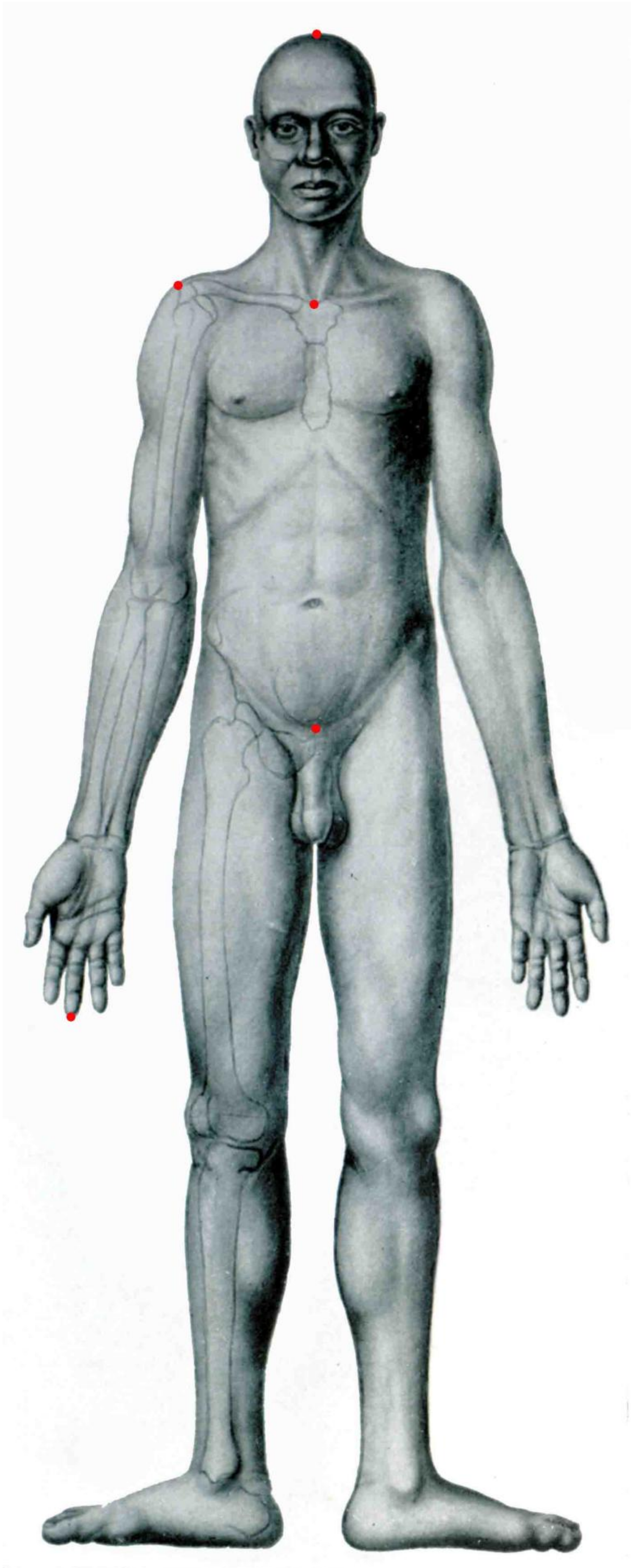


FIGURE G2 The anthropometric points used in this study shown as red dots on a human figure adapted from Schultz (1933).

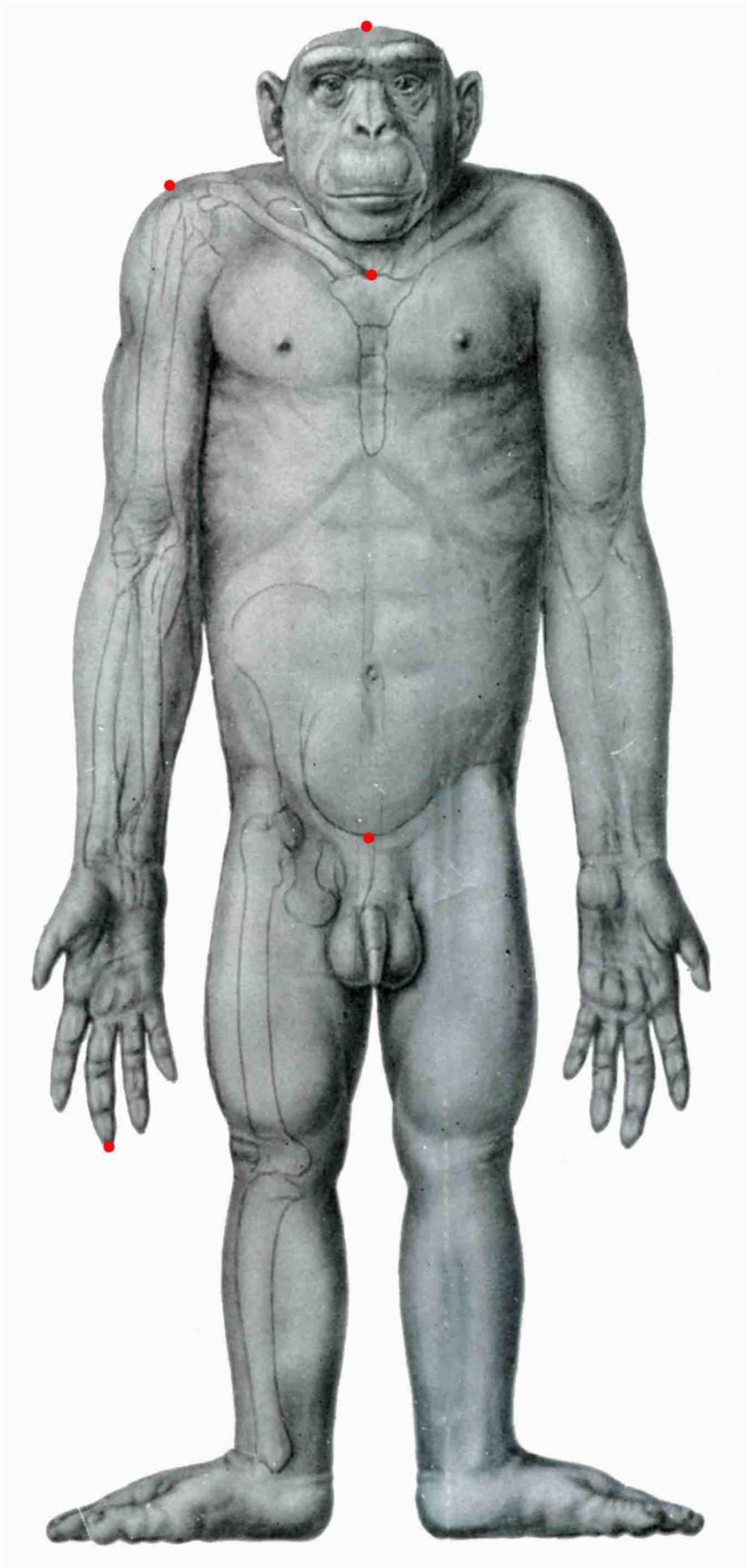


FIGURE G3 The anthropometric points used in this study shown as red dots on a chimpanzee figure adapted from Schultz (1933).

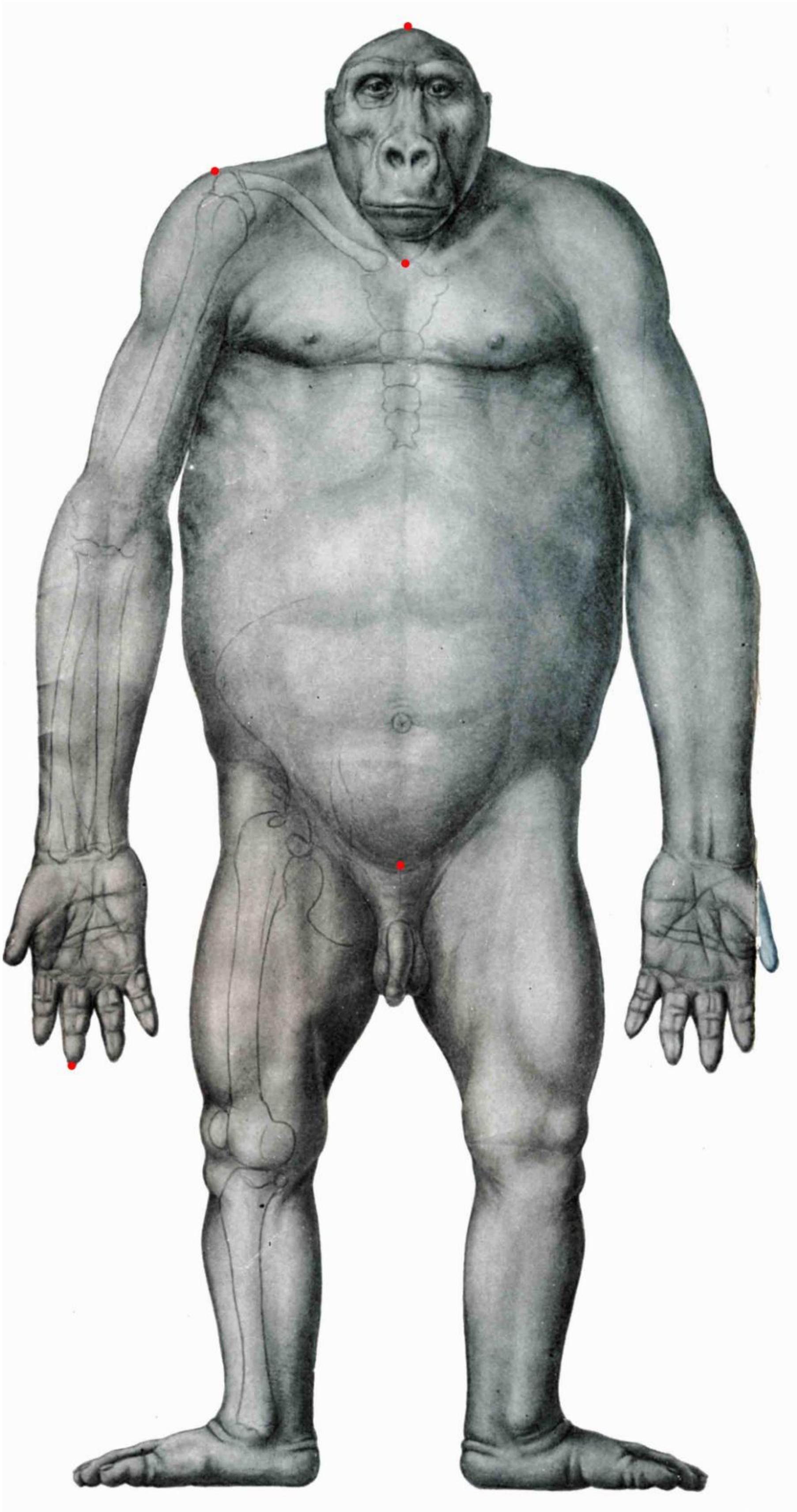


FIGURE G4 The anthropometric points used in this study shown as red dots on a gorilla figure adapted from Schultz (1933).

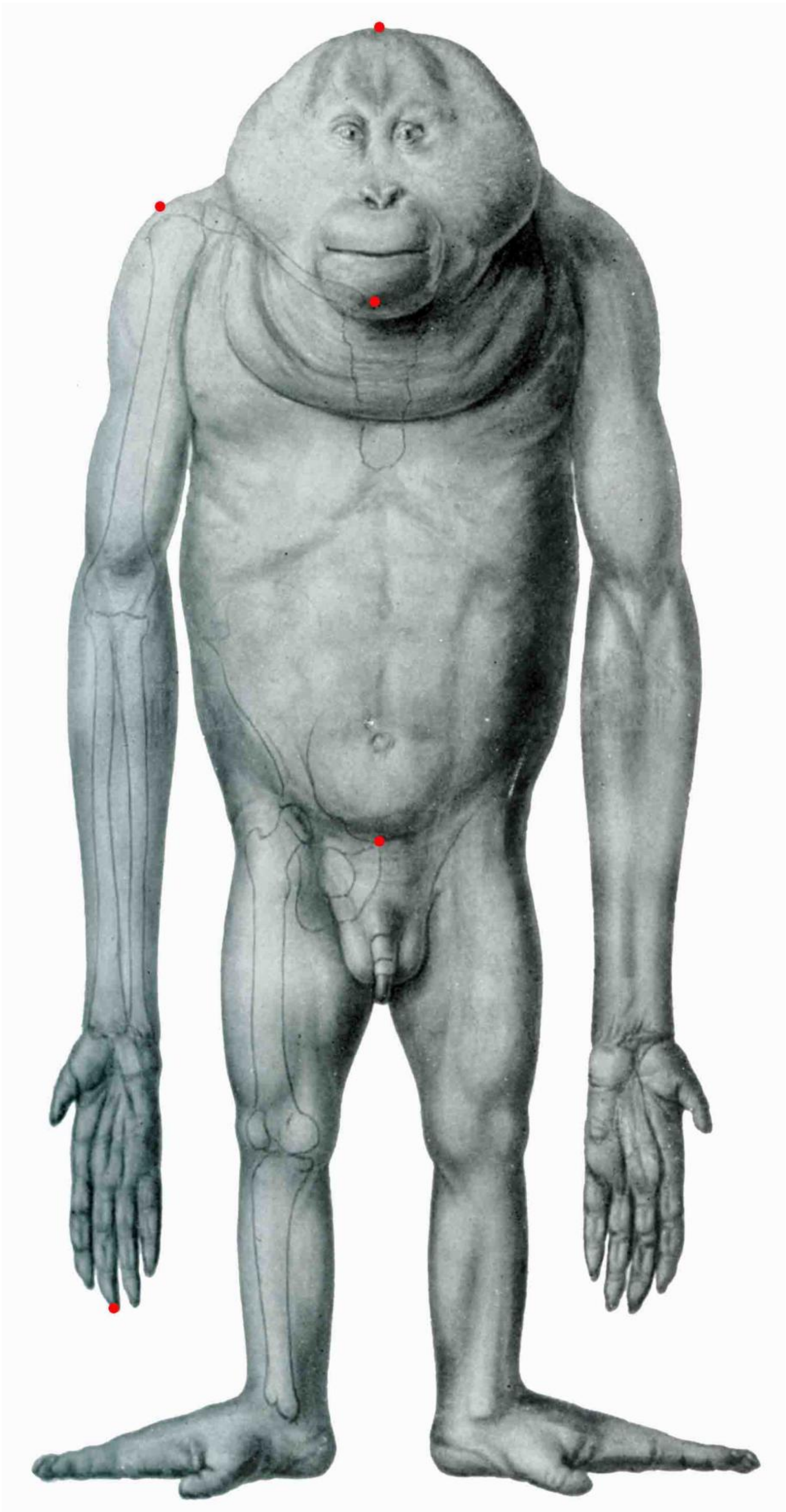


FIGURE G3 The anthropometric points used in this study shown as red dots on an orang–utan figure adapted from Schultz (1933).

References

Martin R. 1928. Lehrbuch der anthropologie: in systematischer darstellung. Jena: Verlag Von Gustav Fischer.

Montagu MFA. 1960. An introduction to physical anthropology. Springfield: Charles C Thomas.

Schultz AH. 1933. Die Körperproportionen der erwachsenen catarrhinen Primaten, mit spezieller Berücksichtigung der Menschenaffen. Anthropologischer Anzeiger 10:154-185.

APPENDIX H

A list of the representations used for the experiment in Chapter 6 *"Conveying Intended Information: An Experiment on the Recognition of Hominin Species"* comparing the arbitrary score to the Christian assessor's scores. This assessor's results were not included in the experiment as their categories were based on religious beliefs and could not be placed in the evolutionary categories defined in the experiment. The assessor's categories consisted of "human" (1) and "not human".

Number	Representation name or description	Arbitrary score	Christian	Number	Representation name or description	Arbitrary score	Christian
E001	Bushman	1	1	E075	Reclining child	3	9
E022	Ötzi	1	1	E172	Female Neandertal	3	9
E153	Khnum the Egyptian	1	1	E211	Neandertal	3	9
E156	1770	1	1	E218	Neandertal	3	9
E157	Worsley Man	1	1	E228	Neandertal	3	9
E229	Modern man	1	1	E234	Old female	3	9
E242	Forensic head	1	1	E237	Male hunter	3	9
E335	Janus	1	1	E238	Male flint knapper	3	9
E285	Harmonised face	1	9	E243	Female mourning	3	9
E294	Art head	1	9	E246	1950 Monte Circeo	3	9
E023	Cro–magnon man	2	1	E248	1935 Neandertal	3	9
E212	Cro–magnon male	2	1	E250	Female Neandertal bust	3	9
E232	Cromagnon male	2	1	E251	Male Neandertal bust	3	9
E233	Female	2	1	E252	1962 standing Neandertal	3	9
E024	Hunched Neandertal	3	1	E253	1994 female Neandertal	3	9
E030	Child Neandertal	3	1	E254	Neandertal in suit	3	9
E053	Yorik male	3	1	E256	Female kneeling Neandertal	3	9
E058	Standing with spear	3	1	E269	Neandertal	3	9
E064	Wounded child	3	1	E295	Neandertal male	3	9
E073	Dead female	3	1	E301	Child – Teshik Tash	3	9
E231	Neandertal	3	1	E302	Man – La Chapelle	3	9
E235	Child	3	1	E310	Neandertal	3	9
E236	Female gatherer	3	1	E304	*Homo heidelbergensis*	3.5	9
E239	Feldhofer	3	1	E213	*H erectus*	4	1
E244	1925 La Chapelle–aux–Saints	3	1	E268	*H erectus*	4	1
E245	1956 gold Neandertal	3	1	E230	*H erectus*	4	9
E247	1950 La Chapelle–aux–Saints	3	1	E306	*Homo erectus*	4	9
E249	Gibraltar Neandertal 1935	3	1	E210	*H ergaster*	4.5	9
E255	Squatting Neandertal	3	1	E225	*H rudolfensis*	4.5	9
E270	Child	3	1	E303	*Homo ergaster*	4.5	9
E271	Neandertal female	3	1	E209	*H habilis*	5	9
E305	Neandertal female	3	1	E224	*H habilis*	5	9
E027	Boxed Neandertal	3	9	E297	*Homo habilis*	5	9

Number	Representation name or description	Arbitrary score	Christian	Number	Representation name or description	Arbitrary score	Christian
E028	Neandertal squatting	3	9	E307	*Homo habilis*	5	9
E029	Old Neandertal male	3	9	E025	Male australopithecine	6	9
E039	Wooden Neandertal	3	9	E026	female australopithecine	6	9
E054	Male with boar	3	9	E041	Gracile australopithecine	6	9
E055	Male flintknapper	3	9	E173	*Australopithecus*	6	9
E056	Pointing child	3	9	E207	Australopithecine 1	6	9
E057	Hyena bait child	3	9	E208	Australopithecine 2	6	9
E059	Crouching with spear	3	9	E214	Australopithicine	6	9
E060	Child dragging rocks	3	9	E215	Australopithicine	6	9
E061	Stepping with spear	3	9	E216	Australopithicine	6	9
E062	Male with meat	3	9	E221	*A anamensis*	6	9
E063	Child with meat	3	9	E222	*A afarensis*	6	9
E065	Worried male	3	9	E223	*A africanus*	6	9
E066	Male at fire	3	9	E296	Australopithecine	6	9
E067	Old man	3	9	E309	*A africanus*	6	9
E068	Standing female	3	9	E311	*A afarensis*	6	9
E069	Bare–breasted female	3	9	E220	*Kenyanthropus platyops*	6.5	9
E070	Sitting female	3	9	E040	Robust australopithecine	7	9
E071	Mourning male	3	9	E219	*A boisei*	7	9
E072	Mourning female	3	9	E308	*A boisei*	7	9
E074	Shaman	3	9				

CD APPENDIX

To fully explain several of the features observed in the museums that were visited, six videos are included in this thesis on a CD. These videos open with Window's Media Player, Apple's iTunes or with QuickTime.

CHAPTER 2

Video 2.1 – a video showing an example of an animatronic model, a Tyrannosaurus Rex at the Natural History Museum in London
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CHAPTER 3

Video 3.1 – a video showing an example of an animatronic full–bodied face reconstruction, a Viking emptying his bowels at the Jorvik Viking Centre, York, England.

Video 3.2 – a video example of stockman hologram/video at the Australian Stockman's Hall of Fame and Outback Heritage Centre, Longreach, Australia.

Video 3.3 – a video example of a complete context type, the Viking Village at the Jorvik Viking Centre, York, England, had painted backgrounds, built foregrounds, animated face–reconstructions with audio, visual and olfactory effects.

Video 3.4 – a video example of the commentary heard in the people–mover as it travels around the Jorvik Viking Centre, York, England.

Video 3.5 – a video example of the Tibetan dioramas at the Haus Der Natur, Salzburg. While visiting this gallery, sound effects from other galleries and sounds of other visitors echoed through the gallery influencing the visitor's experience.