Use of Anthropological Methods in the Identification of Unknown Individuals : Human Remains and Armed Robbers

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Abstract: The author, a forensic anthropologist, has developed methods for identification of unknown individuals: human remains and bank armed robbers. In the first case the identification is based on the comparison of facial parameters (for example: inter eyes distance) between facial skull and photo of the presumed victim. In the second case the same method is used by comparison between hold up video tape and photo of the presumed defendant. In the two cases the technique used is very hopeful and gives 80 to 90 percent of valuable identifications.
Keywords: Anthropology - Identification of unknown individuals - Human remains - Armed robbers

Introduction

We suggest to introduce a general view of our anthropological methodology for identification of two particular cases: human remains and armed robbers. In both cases, dead victims or presumed defendants are suspected.

Identification of Unknown Human Remains

The first significative step is a detailed anthropological study leading to a diagnosis for the following points:
-Sex
-Age
- Racial phenotype
-Stature
- Pathology

Obviously, all these elements are compared with all information we have about the presumed victim (health or dental file)...

The second point we deal with is a life-size skull picture (cubic dioptrograph) in norma lateralis. The facial view is particularly significative since it is the starting point of the photograph comparison.

It is to be noticed that the first two points are identical to those we use for face rebuilding, namely:
- Eye balls location in eye-sockets
- Searching for face muscle insertions.

The eye is positioned according to Gerasimov technique: the iris basis is tangential to a straight line from the optic tubercle to the middle of the lachrymal fossa. This step is essential since it displays the location of both pupils, the right one (A) and the left one (B).

Besides, the orbital socket shape is to be taken into account: indeed, it may create irregular spaces around the eye. Consequently, an infero-external space corresponds on the living individual to bags under the eyes, easily located on a photograph.

Our search on muscle insertions is based upon the link between muscle activity and insertion surface at bone level: the more the surface is marked, the more is the muscle likely to have been used while the subject was alive. If a muscle has a part to play within face gestures, we know that frequent tensing may create typical and marked wrinkles.

All those details found through bone examination are easily identifiable on a photograph and either may assert (when they are found) or invalidate (when they cannot be found) the possible similarity between human remains assessed and the presumed victim who had her picture taken.

The comparison with the photograph of the presumed victim dose not take into consideration parametric values (except angle values), rather ratios between those different parameters, which allows us not to depend on a scale difference between the picture and the photograph.

The similarity between the skull and the photograph is asserted by taking into consideration differences for each value (angles and ratios) between skull and photograph missing individual values. The result obtained has an algebraic sign: (+) if skull value is stronger, (-) in the reverse case. The algebraic sum of all these intervals is calculated, then divided by the number of parameters checked: the result between the skull and the photograph is the AVERAGE ALGEBRAIC SUM. We accept it as a favourable COMPATIBILITY (thus a similarity

leading to POSITIVE IDENTIFICATION) for an average interval between 0 and +/- 2.

As an example of our method we introduce the following case: in March 1994, we were led to examine a skull (Fig. 1), maybe of a male individual missing for some time ago, and we were given a photograph. (Fig. 2). The general aspect of the skull is slender, almost feminine (particularly the sharp top orbital edges) even compatible with teenager still immature. The age is about 15 to 20 (as shown by skull sutures still in order and wisdom molars included).

The missing subject is 17 and is feminine featured, which corroborates the anthropologic examination.

The average algebraic value (+1,58) is significant of a skull/missing individual assimilation (Table 1), confirmed by anatomic study of photograph. On the skull picture, eyeballs were in position: compared with orbital cavity, we easily notice an interval below, which correspond to the bag under bottom eye lid of the photograph.

Other element: the chin bone displays strong chin tult insertion which leads to overswelling on bottom lip: detail also confirmed through photograph.

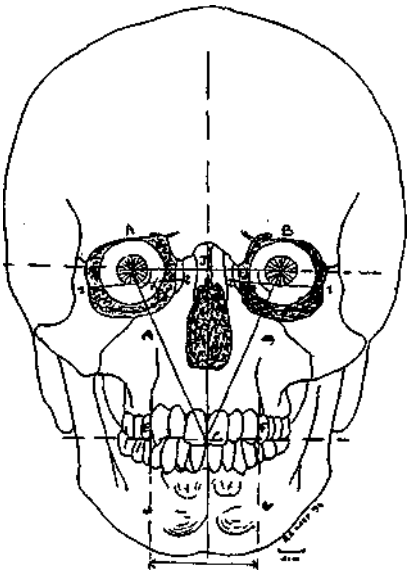

Fig. 1. Facial view (Norma facialis) **of the unknown** skull.
A: Right pupil point B: Left pupil point
A6: Inter-eyes distance (located under the look plane)
ABC: Bi-oculo-occlusal triangle
C: Sagittal line intersection with occlusal plane point
D: Middle vertical crossing AB point
EF: Oral width (located under the occlusal plane)
alpha angle = BAC angle beta angle = ABC angle
1: Optic tubercule 2: Middle of the lachrymal fossa

Fig. 2. Facial view of the presumed victim.
Legends IDEM Fig. 1.

Table 1. Diameters, angle values and ratios comparisons between skull and missing individual photograph.

Diameters (mm) Angle values (°) Ratios (%)	Skull	Missing individual photograph	Skull/missing individual photograph algebraic intervals (1)
AB	57	20	
AC	70	26	
BC	70	26	
AD	29	9	
DC	65	24	
BF	42	15	
Angle CAB	67	68	-1
Angle ABC	67	67	0
ABx100/AC + BC	40,71	38,46	+2,25
ADx100/AB	50,87	45	+5,87
ABx100/DC	87,69	83,33	+4,36
EFx100/AB	73	75	-2
**1:* In our case the average algebraïc of intervals is +1,58 and is significant of a SKULL MISSING INDIVIDUAL assimilation.			

Fig. 3. Unknown individual video (left) and defendant photograph (right) comparison [first case].
A: Ear top end B: Nose tip
C: Chin tip D: Adam's apple prominence
E: Ear bottom end

Table 2. Parameters comparison between unknown individual video and defendant photograph [first case].

Diameters (mm) Angle values (°) Ratios (%)	Unknown individual video	Defendant photograph	Unknown individual video/ defendant photograph algebraic intervals (1)
AB	57	50	
AC	70	53	
AE	70	20	
BC	29	21,5	
BD	65	34	
EB	42	37	
EC	42	35	
ABx100/AC	94,11	94,34	-0,23
BCx100/BD	61,90	63,24	-1,34
EBx100/EC	104,35	105,71	-1,36
*1 : The interval average displays a highly significant value (-0/97) of unknown individual-defendant assimilation.			

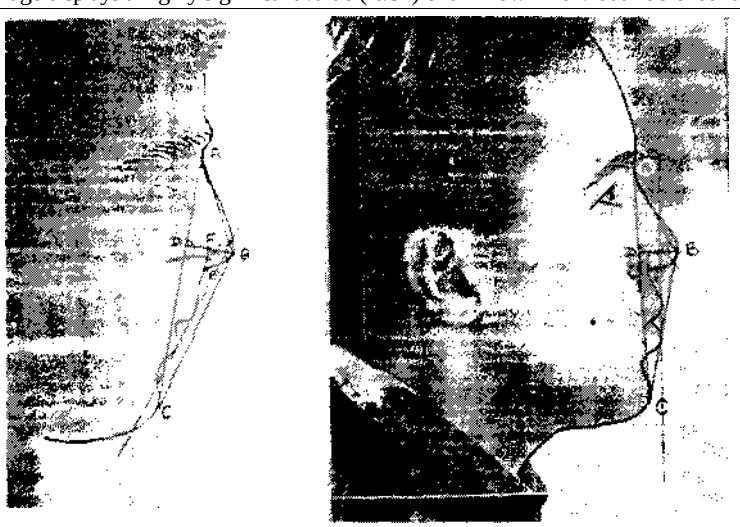

Fig. 4. Unknown individual video (left) and defendant photograph (right) comparison [second case].
A: Nasion B: Nasal protuberance point
C: Chin protuberance point D: B point on segment AC projection
E: Philtrum most internal point F: E point on segment BD projection
Dotted line = Tangency line on both lips

Armed Robbers Identification

We are led to compare PHOTOGRAPHS FROM A VIDEO showing real time hold up sequences (robber in action), with ANTHROPOMETRIC PHOTOGRAPHS of defendants, well-known in legal offices and likely to have committed hold up (general aspect, clothing, witnesses).

Two major difficulties are to be noticed

- Poor quality video (the same tracks reused every day)
- Frequent disguise of offender (cap, wig, sunglasses, false nose, false moustache, false beard or simply real beard on the hold up day, cut the day after or vice-versa; without forgetting the use of hoods or simply unusual clothes).

All those elements have significant impacts and highly complicate the task of the expert: each case is different from the others and the work method varies according to the case. However two criteria are to be taken into account: the PROFILE VIEW and all APPARENT FACE DETAILS being integrated into anatomic and parametric (angle values) comparison.

As an example, we introduce two cases from our files (both based upon the use of profile view): the one is the source to identify the subject as the robber, the other in the contrary, is a file confirming the subject is not guilty.

1st case: Armed robbery in a Credit Agricole branch, in the suburbs of Lyon (FRANCE)

The subject filmed was hairless, wearing sunglasses and a cap. A suspect was arrested and denied the facts. The Court of Appeal entrusted us with the photograph file of the defendant and the video shot at the time of the event. (Fig. 3).

The interval average displays a highly significant value (-0,97) of unknown individual/video defendant assimilation. (Table 2).

This fact is confirmed by taking into account the shape of the following organs: ear, nose, mouth and chin.

Despite the rather poor quality of the video, a non fortuitous similarity is to be noticed between the unknown individual and the defendant.

As a conclusion, we are almost certain that the unknown person and the defendant are ONE INDIVIDUAL.

2nd case: Armed robbery in another Credit Agricole branch in the suburbs of Paris (FRANCE)

Two suspects were arrested: one of them soon confessed the facts, the other strongly denied participating in the event he was arrested for. (Fig. 4).

We were entrusted with the case for an expert assessment. Some time later, after examination, we confirmed the innocence of the defendant by supplying significant clues.

The interval average displays a +3,83 value which is the clearest possible evidence that the unknown person and the defendant are TWO DIFFERENT INDIVIDUALS.

Besides, the fact is confirmed by the visual comparison between both profiles:

- Front zone: Rounded with non prominent glabellar zone (defendant = D)
  Subvertical with very prominent glabellar zone (unknown individual = UI)
- Nasal bone: Slightly concave (D)
  Convex (UI)
- Tangency line on both lips:
  Forward the chin end (D)
  Backward the chin end (UI)

Conclusions

We exposed a methodology stemming from our experience, based upon the reliability of face parameters while identifying a skull or an unknown face, by comparison with a photograph.

The results obtained are promising enough to develop further application of the methodology so as to make it even more reliable (through 20 cases dealt with in the last five years, 90% proved to be positive identifications).

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