H54 Use of Facial Indices for Comparative Metric Facial Identification After Parametrical Superimposition

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The goal of this presentation is to prove the somatic correspondence between the criminal and the suspect by means of a mixed superimposition image.

This study will impact the forensic community by demonstrating the possible use of facial indices for personal identification after a parametrical superimposition. The parametrical superimposition is a tested technique in which each suspect is positioned exactly in the same place and with the same posture assumed by the subject to identify, filmed during a crime, usually bank rubbery.

If parametric superimposition is positive and close up of the face of the rubber is available then it is possible to perform a metric analysis between the image of the face of the criminal and the image of the face of the suspect obtained at the end of the best mixed parametrized superimposition in order to have personal identification on statistic basis. Different parameters can be used for comparing metric analysis between analogous marked points on the two faces in comparison (absolute distances, relative distances, triangle perimeters and area, form factors, facial indices).

In a previous study we showed that no statistic comparison can be reliable unless prior parametrical somato-physical superimposition of the images of the subjects in comparison. At the current state of art, no comparison between facial indices can be accepted for identification purposes unless supported by positive findings in a prior parametric somato- physical superimposition.

It is also supposed in anthropology that facial indices are not influenced by head movements. As a consequence we decide: (1) to test the opportunity to use facial indices as metric parameters to compare the two faces obtained at the end of parametric superimposition, and (2) to determine if facial indices evaluated on photo are not really influenced by head movements, in order to justify a metric comparison even in the case of a not perfect parametric super-imposition.

Materials and method: 20 subjects were invited to take up a precise series of different head positions and then filmed in two different times. Image acquisition was made, taking care to place each subject exactly on the same environment, position and attitude using the same lighting, filming equipment and technique. All the films were taken with diffuse, known studio lighting, using a professional video camera with variable focus fixed at a distance of about 4 mt. A prior superimposition, correctly carried out, was essential for the subsequent metric analysis of compared images. Two sets images of the face were taken for each subject from different facial angles (frontal, rotated 15° and 30° to the right and left, 20° flexion and 20° extension). In each images it was possible to identify accurately anthropo- logical points such as glabella, nasion, gnathion, subnasal point, super and subauralis points, etc. The *height of the face* was measured as the distance between the nasion (the deepest point of the root of the nose) and the gnathion (the lowest point on the median sagittal plane of the front of the chin); the *height of the nose*, defined as the distance from the nasion to the subnasal point (apex of the naso-labial angle on the median sagittal plane); the *height of the chin*, defined as the distance between the stomion (the point where the median sagittal plane converges with the labial commissure, with the mouth closed) and the gnathion; the *height of the* ears, defined as the distance in a straight line from the apex of the helix to the lowest point of the lob). The following facial indices were thus calculated: Index X: (chin height/morpho- logical height of the face); Index Y: (nose height/morphological height of the face); Index Z: (ear height/morphological height of the face).

The four facial indices were then calculated from each image; the aim was to verify if there were substantial statistic differences comparing the index values of the face belonging to the same subjects taken in different time and in the same position of the head and then to verify if there were statistical differences comparing facial indices belonging to the same subjects taken in different time and in different position of the head.

A dedicated program was used for the statistical analysis.

Results showed: (1) the high reliability of discriminated power of the facial indices for personal identification just for images of the two faces in comparison placed in the same attitude, (2) the poor reliability of discrimi- nated power of the facial indices in personal identification for face images in different position.

These results stress the opportunity to use facial indices as metric parameters for personal identification in facial comparison only if a full positive previous superimposition is performed.

Personal Identification, Facial Index, Parametrical Superimposition

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