



Physical Anthropology Section – 2009

H29 An Evaluation of Facial Features Used for Facial Recognition Applied to Cases of Missing Persons

Samantha M. Seasons, BA*, and Erin H. Kimmerle, PhD, University of South Florida, Department of Anthropology, 4202 East Fowler Avenue, Soc 107, Tampa, FL 33820

The goals of this study are to demonstrate a simple method for creating 2-D composites for facial reconstructions and to evaluate the accuracy of this method through both qualitative and quantitative methods. This research identifies what facial features are most recognizable and key components for successful recognition.

This presentation will impact the forensic community by explaining several important outcomes that are noted from the study. First, 2-D composites are shown to be accurate with a high rate of recognition among people who did not know the victim. It also highlights which facial features are most important in facial recognition and the differences among males and females in how they recognize faces. One critical outcome of this research is that it demonstrates that the quality and intrinsic properties of the reference photograph given by families to law enforcement may also play a role in recognition among cases of missing persons. Therefore, the image obtained by police in missing persons is as important as accuracy in facial reconstructions created for unidentified decedents. The importance of accurate and time efficient methods for facial reconstructions, which are based on an understanding of how specific facial features impact facial recognition and the variation among observers, may aid law enforcement agencies and increase the number of identifications for missing and deceased persons.

The problem of missing persons and unidentified decedents, specifically how to link individuals within these two arenas, is critically important for families and for judicial accountability in cases of homicide. Due to the increased demand to identify missing persons globally, the role of forensic anthropologists in those types of investigations is expanding. Forensic anthropologists construct a biological profile including the sex, ancestry and the approximate age of the decedent, which provide the foundation for facial reconstructions. Facial tissue depth data along with the biological profile are used to create composite images using computer software programs such as Photoshop CS and FreeForm[®] Modeling Plus.[™] Recent advancements in 3-D imaging have resulted in virtual applications of facial reconstructions. Such technologies, however, may not always be available to all investigators particularly in human rights investigations.

The purpose of this study is to: (1) evaluate the accuracy of craniofacial reconstructions created through 2D composites, (2) identify what facial features are most recognizable, and (3) identify patterns among respondents that may influence recognition such as gender, age, or the quality of the reference (missing person) photograph. For this study, four composite images were created for three skulls, using photo superimposition techniques. A total of 120 students from the University of South Florida were asked to match the composite image with the picture of who he most looked like (out of six possible choices). Among the comparison images, one image was the actual decedent. Participants were randomly surveyed about the likeness of the images and the ranked order of likeness. Demographic data about the participants was also collected. Qualitative descriptions about similarities and differences were collected from each participant. Further, *Pearson's Chi Square* tests were used to test the significance of the likeness among the composite and photographs and the responses from the survey.

In two of the four cases, the composite image and the actual decedent photograph were said to be very *similar*. In one case, the same composite image was used but the missing person image was changed. In this case, it was said to be *not at all similar*. This highlights an important point - that recognition is not only important on the level of the created composite but also in the intrinsic factors of the missing person photograph (i.e., the presence of a hat, certain clothing, the angle of the face, background, or shading contrast). It is shown that by changing the picture of the missing person that is used to elicit recognition, the outcome varies. Therefore, the picture families give to law enforcement in missing persons cases may affect the how likely someone is to recognize that person.

Other patterns are also discussed, such as differences among males and females in recognizing the same faces. For example, out of 52 male participants and 68 female participants, 25% (13/52) of males ranked a composite photograph as the most similar whereas in the same case, only 7.4% (5/68) of the females ranked it as the most similar. Among traits that are used to evaluate the likeness of two images, the nose was the most common trait used according to 76.5% of participants, followed by the eyes. Interestingly, the nose and eyes are largely subjective areas in creating composite images since the particular morphology and color can not be estimated from skeletal remains. Yet, participants who said those were the most important traits still correctly matched the composite images with the actual photograph of the deceased. It is evident that the relationship between different facial features and the overall composition of the face does influence the rate of facial recognition.

Facial Reconstruction, Recognition, Missing Persons