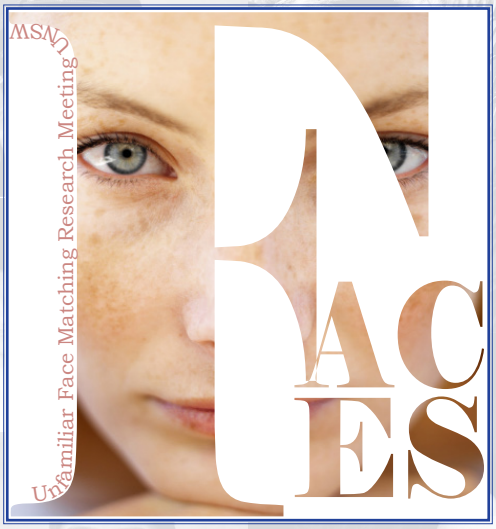

RESEARCH MEETING

Unfamiliar Face Matching

19th February 2013
UNSW

UNSW AUSTRALIA

Introduction

Welcome to the Unfamiliar Face Matching Research Meeting, February 19th 2013.

National security and crime prevention can depend on our ability to establish a person's identity, and this is most often achieved through the use of photo-ID documents. But the use of photo-ID documents relies on our ability to determine whether two images are of the same unfamiliar person. This is the task we refer to as Unfamiliar Face Matching, and psychological research conducted in recent years shows this is a much harder task than previously realised.

Research in this field has important practical applications, potentially leading to an improvement in our ability to detect identity fraud and other crime. But this research has also led to significant advances in theory and particularly a better understanding of the differences between familiar and unfamiliar face processing.

The study and application of unfamiliar face matching is an area in which Australia has particular expertise, with several active research groups and excellent collaboration with users from various sectors of government. We decided to hold this special one-day research meeting to help bring these groups together to share their expertise and discuss their work in a relaxed and informal environment. We have been surprised and delighted by the response to our invitation. What we thought would be a small meeting of 10 or 12 people has turned into a 40 person conference. Despite this, we are keen to stick to our original vision, and for this reason have allocated equal time to the presentations and to the discussion of these presentations.

We hope that you enjoy the day. Please let us have any feedback – I suspect we may be doing this again so any advice on how we might improve things will be useful.

Richard Kemp, David White & Manuela Tan.

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10.30 - 10.40am	Measuring competence in face matching	Jason Tangen
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10.50 - 11.00am	An update on face-related research from the Defence Science and Technology Organisation	Rebecca Heyer
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4.45pm Wine and cheese		

Abstracts: Session 1

Facial recognition and the Australian Passport Office

Michael Matheson
Australian Passport Office, Department of Foreign Affairs and Trade

This presentation will outline how the Australian Passport Office (APO) has integrated facial recognition technology in its day to day business process. The presentation will also discuss some challenges for the APO with the use of facial recognition in a passport environment.

Measuring competence in face matching

Jason Tangen
University of Queensland

Recognising unfamiliar faces is challenging and people frequently make errors on matching tasks, even in optimal conditions. We designed a simple proficiency test of face recognition and compared the performance of novices to surveillance camera operators. We found no significant difference in their overall discrimination ability, but our results suggest that the benefit of expertise may be in a reduction of the own-race effect. I will discuss some of the challenges we faced in devising these experiments, which may be useful in designing future experiments and testing expertise and competency more generally.

An update on face-related research from the Defence Science and Technology Organisation

Rebecca Heyer
Defence Science and Technology Organisation

The Defence Science and Technology Organisation (DSTO) has been engaged in biometric research for Defence and other government agencies since 2001. This presentation will provide an update on the face-related work being undertaken. Both technical and human-orientated projects will be summarised, including those involving:

- technical evaluations of facial recognition systems and algorithms (using operational data);
- facial recognition in challenging environments;
- face-in-a-crowd in operational environments (technical and human-related studies);
- studies of one-to-one human face matching ability (the translation of lab to live, impact of impostor types and numbers, individual differences, expertise, and ageing on performance, comparison to algorithms); and
- studies of one-to-many human face matching (the impact of image presentation, decision aids, expertise and individual differences on performance).

The presentation will conclude with a discussion of proposed projects for 2013 and beyond (the requirements for which have come directly from government agencies both here in Australia and overseas). Potential mechanisms for collaboration will also be discussed.

Abstracts: Session 2

Negative images: The law on 'expert' face matching from *Smith* to *Morgan* (and *Dupas*)

Gary Edmond
UNSW

This presentation offers a short history of legal responses to identification evidence derived from images. It explains the emergence of legally recognized 'experts' (e.g. facial mappers), after senior appellate courts effectively prevented police officers from presenting their opinions about the identity of persons in images before juries, along with recent judicial expressions of concern about the value of image interpretations and the general reliability of incriminating expert opinion evidence.

Face Identity Processing and Unfamiliar Face matching

Nadia Menon
UNSW

According to models of face processing, (Bruce & Young, 1986) familiar faces are processed both in terms of image-based pictorial codes, and as more abstract structural codes. However, it is not clear which level of processing is involved when matching unfamiliar faces. Two experiments explored this issue. We aimed to isolate effects of identity-level structural representations by informing participants that identical images were either two photos of different people (2ID condition), or of the same person (1ID condition). Sequential-matching accuracy was greater in the 1ID relative to the 2ID condition, suggesting that matching was mediated by structural codes, and that these structural representations were generated in working memory.

Developing Forensic Capacity with Facial Images

Glenn Porter
University of Western Sydney

This paper will examine how the identity of persons of interest from images can be explored in a wider context than just facial features. Images may be considered as a representation of time, space and content. Developing a forensic capacity for the examination of images incorporates a range for interpretation and information sourced from images to develop forensic evidence. This paper will highlight the scope of using images in casework and introduce the notion of building greater forensic capacity with this form of evidence.

My passport photo looks nothing like me! The influence of likeness on unfamiliar face matching

Amy Burton
UNSW

People often remark that some photos are more representative of their appearance than others. Here I present three studies investigating the role of image likeness on unfamiliar face matching accuracy. We compared face matching performance from images that were chosen to be of high likeness, with images chosen to be of low likeness. Our results show that self-selected images improve matching accuracy, but that images selected by unfamiliar observers provide better conditions for face matching. For both self-selected and unfamiliar-selected images, performance was best when matching a high-likeness image to a smiling face.

Investigating the relationship between confidence and accuracy in face matching decisions: The impact of matching strategy and base rates

Carolyn Semmler
University of Adelaide

In applied decision-making contexts such as identity verification , the objectively "correct" decision is unknown. Consequently, much research has focused on exploring potential independent markers of accuracy, such as confidence judgements. Confidence judgements can play a very important role in the process of identity resolution, yet little research has been conducted to determine whether they represent a stable and useful marker of decision accuracy in the face matching context. The first factor we investigated is the base rate of matching and non-matching faces presented to decision makers. This was included to seek further evidence that base rates have an impact on the usefulness of subjective confidence as an indicator of accuracy. The second factor was included to test whether the confidence-accuracy relationship is affected by the orientation or matching strategy of the decision makers. In real world settings, individuals may use face matching both to search for persons of interest who match a known person, and to search for impostors who do not match an image but may claim to be the known person. The results suggest that over all, the difference in the confidence accuracy relationship is affected by the type of decision made. Matching strategy did not seem to have an important influence on human performance, but base rates influenced accuracy and had a marked effect on the confidence-accuracy relationship. We discuss implications for using confidence as a marker of accuracy in applied contexts.

Abstracts: Session 3

A systematic bias to over-estimate people's face matching ability

Mike Burton
Aberdeen University

Despite well-established evidence that unfamiliar face matching is difficult, we continue to rely on photo-ID. I will report a recent experiment which suggests a reason for this. When asked to match two photos, viewers were much more accurate with familiar than unfamiliar faces - an effect which is already well-known. However, when asked to estimate how the general public would perform with these same images, subjects consistently rated photos familiar to them as being easier to match in general, even by unfamiliar viewers. This failure to de-centre, and imagine a familiar face to be unfamiliar, may help to explain why photo-ID remains popular.

Department of Immigration and Citizenships training programs

Catherine Carey
Department of Immigration and Citizenship

This presentation will provide an overview of the range and content of the current training courses delivered by Department of Immigration and Citizenships (DIAC) and the need for the continued development and refinement of them.

Despite the increasing prevalence of automated biometric facial technologies DIAC is currently the only Australian government department (State or Federal) with a dedicated team of facial image comparison specialists and one of the few providing guidance and training in what is considered a 'difficult' and controversial work space. The specialists are drawn from a range of forensic backgrounds, conducting training, case work and research into facial image comparison techniques and procedures with the aim of increasing DIAC's forensic capability.

As part of a whole of government capacity building approach, DIAC regularly develop and deliver training to a wide audience base including Australian and overseas immigration and border protection officers, as well as law enforcement agencies and specialists.

Evaluating the Face Shape Strategy

Alice Towler
UNSW

Deciding whether two face images are of the same person or of two different people is a surprisingly difficult task, with psychological research demonstrating high error rates even when images are compared simultaneously. Despite this poor performance, unfamiliar face matching remains a crucial component of many security and forensic procedures, such as the practice of verifying identity by checking photo-identification documents. It has been suggested that the accuracy of face matching performance might be improved by training people to compare images according to certain strategies. One strategy that is commonly encouraged in training courses is to classify the persons' face shape. However, it is unclear whether or not such classification improves matching accuracy because this assumption has never been empirically tested. Here I present data showing the degree to which classification of face shape is stable within-identity.

Generalising across 3/4 views of faces rotated in pitch and yaw

Simone Favelle
University of Wollongong

In recent studies from my lab (Favelle, Palmisano & Maloney, 2007; Favelle, Palmisano & Avery, 2011), we have demonstrated that when matching to or from full-face views (in a sequential matching task), face recognition following rotations in the pitch axis is viewpoint dependent and that the effect of change in viewpoint in the pitch axis is qualitatively different to that in yaw. The current study determines whether this pattern of results holds true when generalising from views of faces rotated in either the pitch or yaw axis, specifically: 45° leftwards yaw, 45° upwards pitch, and 45° downwards pitch. Results showed that the pattern of generalisation does depend on the viewpoint of the face to be matched and varies based on the axis of rotation. Implications for canonical views are considered.

Unfamiliar face matching across changes in lighting and viewpoint

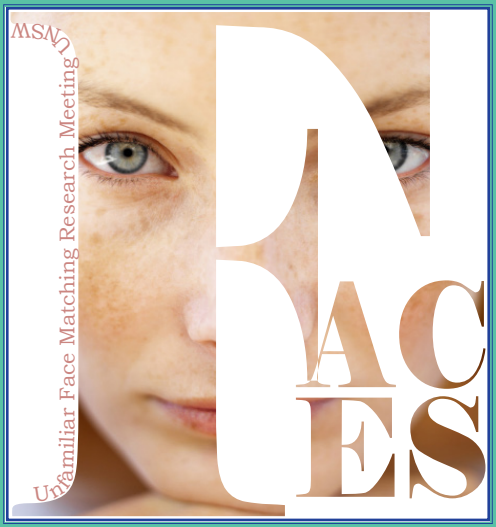
Harold Hill
University of Wollongong

We never see quite the same image of a face twice making the ability to match identity across image changes central to understanding visual recognition. Images are a function not only of the potentially individuating shape and reflectance of the face itself, but also of viewpoint, lighting, atmosphere and the imaging device. Patterns of generalization across different image changes provides pointers to how identity matching is achieved (or isn't). Matching performance is not simply a function of the magnitude of image changes: performance is better when images are upright, across changes in lighting than changes in view, across 'yaw' than 'pitch', and the effects of a change in viewpoint depend on lighting. Thus, while face matching may be more closely image based for familiar than unfamiliar faces, class based knowledge of faces and matching at surface or object, as well as image, based levels of encoding also plays a part.

Feedback training for facial image comparison

David White

People are typically poor at matching the identity of unfamiliar faces from photographs. Encouragingly, recent research from our lab shows significant improvements in face matching ability following feedback training. Given the reliability of the performance enhancement, and its generalization to diverse image sets, we suggest that feedback training may be useful for face matching in occupational settings. Here I summarise our lab based findings and consider how feedback might be incorporated into 'real world' face matching tasks.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