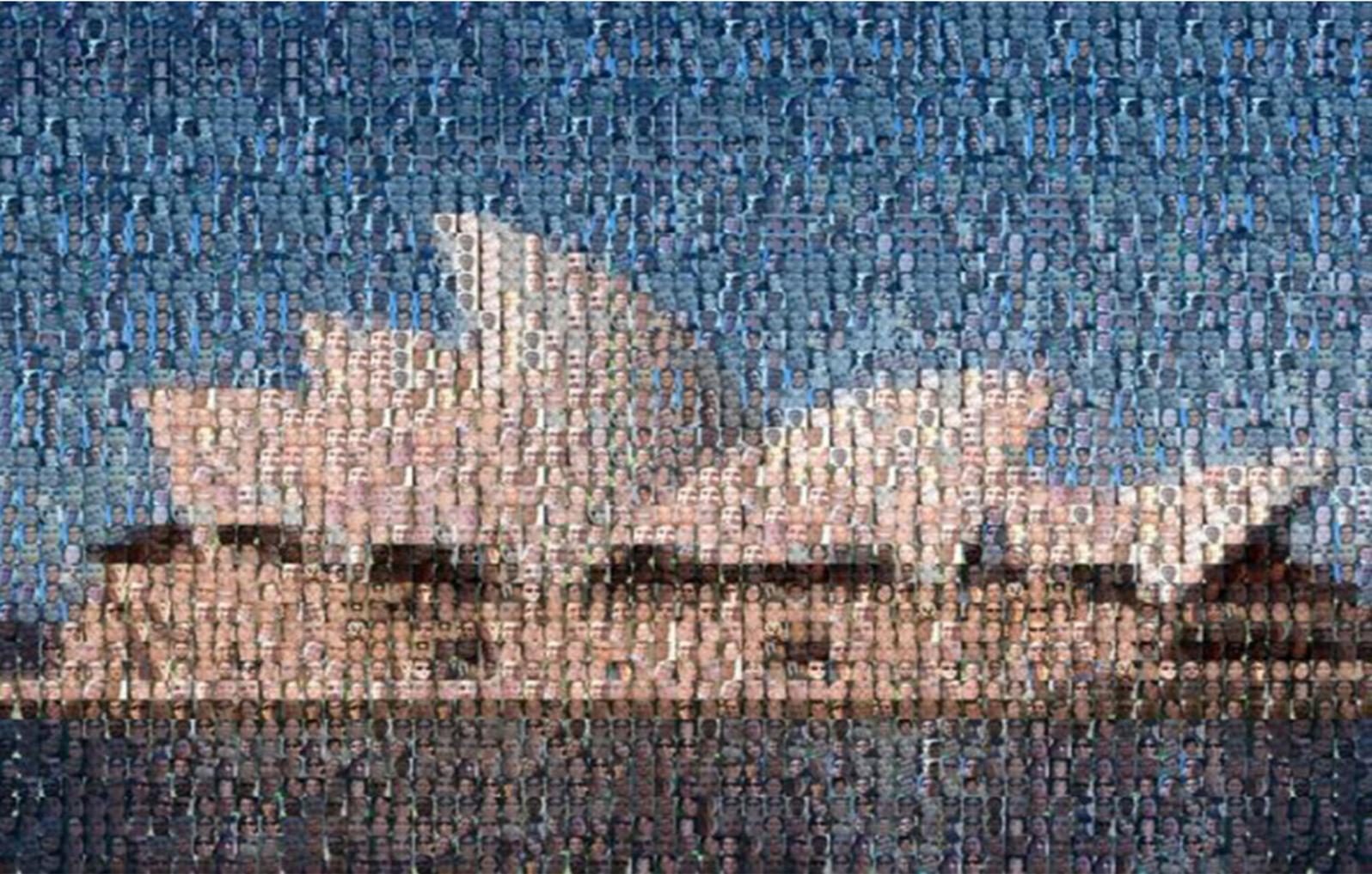




UNFAMILIAR FACE IDENTIFICATION GROUP



CONFERENCE PROGRAM 2017

Monday - Tuesday
9 - 10 January



UNSW
THE UNIVERSITY OF NEW SOUTH WALES

Introduction

Welcome to the fifth annual meeting of this group, and the second under our new title Unfamiliar Face Identification Group (UFIG).

The first UFIG meeting was held at UNSW in February 2013. The idea was to bring together in an informal setting users and developers of security and other systems that use Automatic Face Recognition software, with researchers interested in the performance of the human operators working with these systems, and legal scholars interested in the implications of this technology. This work is of both academic interest to researchers in the field of face recognition and of practical significance to those who use these systems to identify customers, passengers, citizens or offenders. The meeting was a great success and was repeated in 2014, 2015 and 2016, with delegate numbers increasing each year. In the last few years Australia has emerged as a world leader in this type of applied face processing research. This research meeting will provide the opportunity for everyone to contribute to the continued success of the collaborative work that has been taking place in this field.

The timing of UFIG2017 means that we have been able to confirm two world experts in human and machine face identification, Jonathon Phillips from the National Institute of Standards and Technology, and Romina Palermo from the University of Western Australia.

As always we hope the meeting will provide an informal setting where the latest research findings can be revealed in brief and accessible presentations, followed by wide ranging discussions of the practical, legal and theoretical implications of the collaborative work that has been taking place in this field.

Richard Kemp, David White & Tanya Wayne



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Schedule

Time	Topic	Presenter
Monday 9th January UNSW Law Building, Ground Floor, G02		
9.00 - 10.30am	Networking Breakfast	
10.30 - 11.00am	Introduction: Towards an agenda for unfamiliar face identification research	Richard Kemp [UNSW]
Keynote Presentation 1		
11.00 - 12.00pm	Measuring human and machine face recognition performance.	Jonathon P. Phillips [NIST]
12.00pm - 1.00pm Lunch		
Session 1		
1.00 - 1.20pm	Using visual search to understand how to find faces in crowds.	James Dunn [UNSW]
1.20 - 1.40pm	Managing contextual bias and two forensic disciplines.	Trevor Alt
1.40 - 2.00pm	Image quality assessments.	Patricia Moss [DFAT]
2.00 - 2.20pm	Face identification from degraded images.	Kay Ritchie [University of Lincoln]
2.20 - 2.40pm	An update on face activities from DST Group	Rebecca Heyer [DSTG]
2.40 - 3.10pm Afternoon Break		
Session 2		
3.10 - 3.50pm	Identification evidence and the Courts - Legal update.	Gary Edmond & Mehera San Roque [UNSW]
3.50 - 4.10pm	Unfamiliar face patterns and practices.	Andrew Burr [The Westbourne Group]
4.10 - 4.30pm	Who is the usual suspect? Evidence of a selection bias towards faces that make direct eye contact in a line-up task.	Celine van Golde [USyd]
4.30 - 4.50pm	Developments in voice identification.	Tanya Wayne [UNSW]
4.30 - 5.30pm General Discussion		
6.00pm Dinner at Whitehouse, UNSW (must RSVP beforehand to attend)		

Time	Topic	Presenter
Tuesday 10th January UNSW Law Building, Ground Floor, G02		
Keynote Presentation 2		
9.30 - 10.30am	Face blindness: The inability to recognise identity from the face.	Romina Palermo [UWA]
10.30am - 11.00am Morning Break		
Session 1		
11.00 - 11.20am	Combating Passport Fraud: Training and awareness of the morphed passport photo problem eliminates fraudsters advantage.	David Roberston [University of York]
11.20 - 11.40am	Measuring eyewitnesses' decision processes: Moving beyond the dichotomy.	Jennifer Beaudry [Swinburne]
11.40 - 12.00pm	Distinctiveness in practice?	Harold Hill [UOW]
12.00 - 12.20pm	Using response time to understand unfamiliar face matching.	Carolyn Semmler [University of Adelaide]
12.20 - 1.30pm Lunch		
Session 2		
1.30 - 1.50pm	Do facial impressions predict online sharing of missing persons' photos?	Clare Sutherland [UWA]
1.50 - 2.10pm	Sources of bias in estimation of facial age.	Tamara Watson [WSU]
2.10 - 2.30pm	Facial recognition within the NSW police force (past, present, and future).	Dallas Maher [NSWPF]
2.30 - 2.50pm	The digital passport - what does it really mean?	David Chadwick [APO]
2.50 - 3.10pm	Towards optimal human decision input for facial recognition systems.	David White [UNSW]
3.10 - 3.30pm Afternoon Break		
Session 3		
3.30 - 5.00pm	Round Table Discussion	Chair: David White

Roundtable Meeting

All are welcome to attend the Roundtable. The Roundtable sessions are based around a number of discussion topics that have been proposed by members, either during the research meeting or before it. The proposer will briefly introduce their topic and then chair the discussion that follows.

Topics include:

- Practical applications of unfamiliar face research.
- Response time modelling to understand human and system performance.
- Integrating man and machine in face identification.
- What are the upper limits of accuracy for face recognition by humans?
- In facial forensic, best practice calls for forensic comparisons to be performed by a deliberative process. Morphological analysis is an example of a deliberative process. Is it possible to perform comparisons that are less deliberative and more intuitive?

Keynote Presentation 1

Monday, 9 January 2017

11.00am - 12.00pm

Dr. P. Jonathon Phillips

National Institute of Standards and Technology

Dr. Jonathon Phillips is a leading technologist in the fields of computer vision, biometrics, and face recognition. He is at National Institute of Standards and Technology (NIST), where he runs challenge problems and evaluations to advance biometric technology. His previous efforts include the Iris Challenge Evaluations (ICE), the Face Recognition Vendor Test (FRVT), the Face Recognition Grand Challenge and FERET. From 2000-2004, Dr. Phillips was assigned to DARPA. For his work on the FRVT 2002 he was awarded the Dept. of Commerce Gold Medal. His work has been reported in the New York Times, the BBC, and the Economist. He has appeared on NPR's Science Friday show. In an Essential Science Indicators analysis of face recognition publication over the past decade, Jonathon's work ranks at #2 by total citations and #1 by cites per paper. In 2013, he won the inaugural Mark Everingham Prize. He is a fellow of the IEEE and IAPR.

Title: Measuring human and machine Face Recognition performance.

Talk summary: Over the last decade, NIST has systematically compared human and computer performance in tandem with competitions for face recognition algorithms. These comparisons provide a detailed look at human versus machine performance across multiple face recognition tasks. Although machines surpass humans with illumination-controlled frontal faces; when multiple identity cues, such as face, body, and motion, are simultaneously available humans fare better than machines. Current research is looking at the performance of people with superior face recognition ability, with facial forensic examiners providing a gold standard for the best human performance.

Keynote Presentation 2

Tuesday, 10 January 2017

9.30 - 10.30am

Professor Romina Palermo

School of Psychology, University of Western Australia

Romina Palermo is an Associate Professor in the School of Psychological Science at the University of Western Australia, where she leads the Person and Emotion Perception Lab (PEPLab). She is a Chief Investigator of the ARC Centre of Excellence in Cognition and its Disorders, an Associate Investigator of the Social Potential in Autism Unit at the Friedrich Schiller University Jena, Germany and an Honorary Associate of the Department of Cognitive Science at Macquarie University. She is an Associate Editor for the British Journal of Psychology and the Australian Psychologist. Her lab seeks to understand the perceptual, cognitive, and neural mechanisms underlying person perception. This often involves studying faces, as they provide information about the identity, age, sex, race, attractiveness and mood of other people, but also involves studying the perception of bodies and voices. You can find out more at: <https://sites.google.com/site/drrominapalermo/>

Title: Face blindness: The inability to recognise identity from the face.

Talk summary: For many people, a simple glance at the face of another person is sufficient to determine whether they are a family member, friend, celebrity or stranger. However, some other people are face-blind, and have severe difficulty recognising the identity of familiar faces. In some cases, people lose the ability to recognise identity from faces after a brain injury, a condition known as acquired prosopagnosia. In contrast, people with congenital (or developmental) prosopagnosia do not report brain trauma but appear to have failed to develop adequate face identity recognition skills. This talk will consider how to diagnose prosopagnosia in children and adults, and which perceptual mechanisms might be impaired and which might be spared. Implications for improving face recognition skills will also be discussed.

Abstracts: Monday Session 1

USING VISUAL SEARCH TO UNDERSTAND HOW TO FIND FACES IN CROWDS

*James Dunn, Richard Kemp, & David White
School of Psychology, UNSW Australia*

The ever increasing prevalence of CCTV and surveillance technology has created new tests on human ability to perform unfamiliar face recognition. Now instead of simply matching one person to their identification document, large complicated searches are performed on crowds, with the goal of identifying sometimes predetermined targets. This task mirrors the visual search paradigm that researchers have previously employed in labs to investigate and understand attention and memory. Here, we used a visual search paradigm to investigate how performance could be improved for finding faces in crowds. Our results show that performance is affected by the images used to instruct participants to find the target. Importantly, showing multiple images appears to improve performance more than a face average. We will present these results and discuss how this paradigm could be used in the future research to improve understanding of face recognition.

MANAGING CONTEXTUAL BIAS AND TWO FORENSIC DISCIPLINES

Trevor Alt

The Australian Passport Office (APO) has only two people involved in (1) the forensic examination of faces, and (2) the forensic examination of documents. This can present difficulties when one case involves a request for examination in both disciplines. This talk will discuss how the APO handled a significant case that involved a facial comparison, a document examination, and an examination of the travel record within the document. It will cover how the examinations were conducted and quality controlled and the sequencing of those examinations and conclude with a “lessons learnt” segment.

IMAGE QUALITY ASSESSMENTS

*Patricia Moss
Department of Foreign Affairs and Trade*

An issue that has yet to be addressed is the ability of non facial image comparison practitioners ability to undertake image quality assessments to determine if an image is suitable for purpose, whether it be for enrolment in a FR database or an agency facial image database, or for issuance of a travel or identity document. The Australian Passport Office is undertaking a project to clearly describe, in very simple terms, image quality assessment elements for the non practitioner that will include images for each image quality element.

FACE IDENTIFICATION FROM DEGRADED IMAGES

Kay L. Ritchie^{1, 2}, Robin S. S. Kramer¹, Eilidh Noyes¹, Rob Jenkins¹, David White³, & A. Mike Burton¹

¹*Department of Psychology, University of York;* ²*School of Psychology, University of Lincoln;*

³*School of Psychology, UNSW Australia*

Low quality images are problematic for face identification systems in forensic settings, such as identifying faces from CCTV images. Previous studies have shown that an average image comprising multiple images of the same person leads to higher accuracy in face identification than single images. Here we test the average advantage with pixelated images in human face matching and automatic face recognition. We find a decrease in face identification accuracy for pixelated images, which is overcome by averaging those images together. We suggest that averaging together multiple poor quality images can produce a better image for use with face identification systems.

AN UPDATE ON FACE ACTIVITIES FROM DST GROUP

Rebecca Heyer

Defence Science and Technology Group

This talk will provide an update on face research activities at DST Group including a summary of our vulnerabilities in face recognition program (incorporating research in ageing, plastic surgery, image manipulation, and image quality and restoration) as well as an overview of our applied research and development program in biometrics.

Abstracts: Monday Session 2

IDENTIFICATION EVIDENCE AND THE COURTS - LEGAL UPDATE

Gary Edmond & Mehera San Roque

Faculty of Law, UNSW Australia

In this session we will provide an update on legal developments relevant to the admission of identification evidence and expert comparison evidence in Australian courts, including the recent High Court decision in *IMM v The Queen* and *Dickman v The Queen* - a case granted special leave at the end of 2016. We will also discuss how criticisms and recommendations raised in the recent report from the President's Council on Science and Technology on *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* apply in the Australian context.

UNFAMILIAR FACE PATTERNS AND PRACTICES

Andrew Burr

The Westbourne Group

In recent times a wealth of research has been conducted in the Unfamiliar Face domain, however a persistent issue is the question of how to disseminate findings to the broadest possible audience. One strategy is to look to other fields which deal with complex concepts to discover how such matters are resolved. 'Design Patterns' are an approach successfully used in fields such as architecture, engineering and software development to conveniently describe higher level concepts in succinct manner. This talk will focus on the potential of utilising a pattern based approach to package Unfamiliar Face concepts and how such an approach may be used in applied contexts.

WHO IS THE USUAL SUSPECT? EVIDENCE OF A SELECTION BIAS TOWARDS FACES THAT MAKE DIRECT EYE CONTACT IN A LINE-UP TASK.

Celine van Golde

School of Psychology, University of Sydney

Eyewitness identification relies upon a human decision based on vision and memory. Here we investigated eyewitness identification with an appreciation for a factor known to influence vision and memory, specifically eye gaze direction. Our idea, tested in this study, was that eye gaze direction might interact with difficult identity judgements to the point of biasing selection in a line-up setting. Our data imply a person may look more familiar when they are looking directly at the participant compared to when they look in other directions, driving a higher misidentification rate. This study offers a method for reducing the occurrences of misidentification and improving the quality of justice.

DEVELOPMENTS IN UNFAMILIAR VOICE IDENTIFICATION

Tanya Wayne

School of Psychology, UNSW Australia

In 2016, two tests that looked at voice identification were published. These were the Glasgow Voice Matching Test (Aglieri et al., 2016) and a test designed to measure the prevalence of phonagnosia, the inability to recognise familiar voices, in the population (Shilowich & Biederman, 2016). The first of these focused on voice recognition with unfamiliar voices, while the latter used famous-familiar voices. Although this move towards standardised testing is a positive one, neither of these tests directly informs unfamiliar voice discrimination, a key component of 'expert' voice identification evidence. In my presentation, I will discuss these developments and their implications in the context of my own work on unfamiliar voice discrimination, in particular learning and individual differences in this task.

Abstracts: Tuesday Session 1

COMBATING PASSPORT FRAUD: TRAINING AND AWARENESS OF THE MORPHED PASSPORT PHOTO PROBLEM ELIMINATES FRAUDSTERS ADVANTAGE

David Robertson & Mike Burton

Department of Psychology, University of York

Fraudulent passports provide a serious challenge to border security. Identity fraudsters are attempting to increase their success rate by using a face morph containing characteristics of both the genuine document holder and the unlawful applicant. It is not clear whether these morphs could mislead passport office staff, border officials or face recognition algorithms (e.g. e-Gates). In a series of experiments, we tested whether human and machine recognition systems would accept morphed images as genuine target matches. We observed 70% morph acceptance rates among humans with no knowledge of the morph fraud problem, but training humans and using machine systems effectively solved this problem.

MEASURING EYEWITNESSES' DECISION PROCESSES: MOVING BEYOND THE DICHOTOMY

Jennifer Beaudry¹, Jamal Mansour², Mai-Tram Nguyen¹, & Roy Groncki¹

¹Swinburne University of Technology; ²Queen Margaret University

Conjecture about eyewitnesses' decision processes influences identification procedure recommendations, informs conclusions about eyewitness reliability, and advances theoretical understanding. Despite its importance, the field has not revisited Dunning and Stern's (1994) original five-item checklist measure of automatic and deliberative processes. We present evidence that the original scale fails to capture the complexity of an eyewitness' identification decision. Participants viewed a mock-crime video, attempted an identification from a target-present or -absent lineup, and completed a questionnaire regarding their identification decision. An exploratory factor analysis on choosers' (n = 345) data revealed a four-factor solution, reflecting Automatic, Absolute, Conflicting, and Confirming decision processes.

DISTINCTIVENESS IN PRACTICE?

Harold Hill

School of Psychology, University of Wollongong

In the laboratory people can rate how easily an unfamiliar face would be to "pick out in a crowd" and these ratings predict that face's recognisability. As such distinctiveness would seem to have considerable practical relevance for applications requiring the identification of unfamiliar faces. For example would someone with a typical face find it easier to escape detection when fraudulently applying for a second passport?

If so, can this be usefully controlled for? The talk will review methods, findings, theories and applications in the hope of provoking discussion, generating research questions and improving practice.

USING RESPONSE TIME TO UNDERSTAND UNFAMILIAR FACE MATCHING

Carolyn Semmler, Drew Hendrickson & Rebecca Heyer
School of Psychology, University of Adelaide

Response time has long been a central variable in the investigation of decision processes (Luce, 1986). Despite this – its value in applied contexts such as unfamiliar face matching has been largely overlooked. We propose that there are several aspects of response time that represent value in applied research; 1) as an driver of decision accuracy, 2) as a measure of expertise in face matching. Here we describe the beginnings of a program of research investigating the value of response time to developing a theory of expertise in unfamiliar face matching – listing candidate models and paradigms that may be of value. We describe experiments where set size is varied among novice and experienced face matchers in combination with FR algorithms to illustrate the value of response time and show how response time may key to understanding decision accuracy.

Abstracts: Tuesday Session 2

DO FACIAL IMPRESSIONS PREDICT ONLINE SHARING OF MISSING PERSONS' PHOTOS?

Clare Sutherland¹ & Sally Quinn²

¹University of Western Australia; ²University of York, UK

On average, over 200,000 people go missing in the UK every year (Missing Persons' Bureau, 2012). Police forces in the UK and elsewhere now routinely use social media to share images of missing people, in a bid to reach members of the public who may recognize that person. However, the effectiveness of this technique depends on members of the public being willing to share these images. An important factor determining image sharing may be impressions formed from the images themselves, because people readily form impressions of others from facial photographs, such as judging how trustworthy they look. Here, we examined whether key impressions of trustworthiness, dominance and attractiveness influence online sharing of missing person photographs posted on Twitter by UK police and other stakeholders. Results showed that facial impressions interacted with the gender and age of the missing person to influence photograph sharing. For example, photographs of young people were shared more often if they looked trustworthy. We conclude that social media can provide a helpful tool for the police to share images of missing people, but more research is needed to uncover the factors influencing the effectiveness of these online strategies. Our current findings may help stakeholders choose optimal photographs for online sharing.

SOURCES OF BIAS IN ESTIMATION OF FACIAL AGE

Tamara Watson¹, Colin Clifford², & David White²

¹School of Social Sciences and Psychology, Western Sydney University; ²School of Psychology, UNSW Australia.

Accurately estimating the age of an unfamiliar face is important when providing age-restricted services. Facial age estimation also supports police investigations, for example when profiling criminal suspects, or when assessing the legality of pornography. Our previous work has shown that faces tend to appear older when image quality is low. Here we present a series of three experiments where participants estimated facial age from passport images ranging between 7 and 70 years of age. These images were viewed either unobscured or through apertures that obscured either half or one third of the face. Across three experiments, we found that age estimation was relatively accurate, with typical errors of around 8 years for unobscured faces. However, we found systematic biases in facial age estimates, whereby: (i) estimates were biased towards the age of the preceding face, and (ii) younger faces were generally perceived to be older than they are, and older faces to be younger. Both of these biases contributed to errors in age estimation, but by far the strongest influence was the age of the preceding face. The effect of the preceding face had the strongest influence when faces differed by 30 years and this biased age estimates by an average of 3 years. We conclude that recent perceptual experience has a substantial impact on facial age estimation, which has important implications for forensic and security tasks that rely on accurate age estimation.

FACIAL RECOGNITION WITHIN THE NSW POLICE FORCE (PAST, PRESENT & FUTURE)

Dallas Maher & Arnold Jansen

New South Wales Police Force

As end users of a single FR product for the past 12 years, we are now searching for the most beneficial path forward relevant to law enforcement. We need to consider the optimal way to utilise both current & future technologies to find the right balance between man and machine. As specialists only in the field of Digital Imaging, we are largely reliant on the research results & experience of other relevant groups & agencies to assist our future direction.

THE DIGITAL PASSPORT – WHAT DOES IT REALLY MEAN?

David Chadwick

Australian Passport Office (APO)

In this presentation, David Chadwick will look at the concept of the Digital Passport and what it could mean for international travel. But, behind all of the technical talk, international standards and media releases is one simple question: “Can we use our face as an identity token?” Currently, our passport acts as a ‘token’ to initiate a transaction and allow a 1:1 verification. But when there are 10,000 people in an airport, is the face alone good enough to do a 1:n and meet security standards? There may be a way...

TOWARDS OPTIMAL HUMAN DECISION INPUT FOR FACE RECOGNITION SYSTEMS

David White, Stephanie Summersby, Tarryn Balsdon, & Richard Kemp

School of Psychology, UNSW Australia

Recently, wide deployment of biometric face recognition systems (FR) has been accompanied by substantial gains in algorithm performance. However, FR designers typically do not consider the errors of human operators, who are an integral part of FR solutions in many forensic and security settings. This is a problem because people are known to be very poor at face matching tasks. Here, I summarise recent work in collaboration with the Australian Passport Office that aims to optimise the accuracy of human decision input in FR systems.

Meeting Organisers

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Attending organisations include:

Government and Industry

- Aervision Technologies Pty Ltd.
- Attorney-General's Department
- Australian Federal Police
- Australian Passport Office
- Cognitec Systems Pty Ltd
- Defence Science and Technology Group
- Department of Foreign Affairs and Trade
- Identity Matters Consulting
- New Zealand Immigration
- NSW Police Force
- National Institute of Standards and Technology
- Queensland Police Service
- The Westbourne Group
- Victoria Police Forensic Services
- Victoria Police

Academic Institutions

- James Cook University
- Macquarie University
- Swinburne University of Technology
- University of Adelaide
- University of Queensland
- University of Sydney
- University of Western Australia
- University of Wollongong
- Western Sydney University

