

Allan Hodda Memorial Award 2008

Executive Summary – Duncan McCarthy

The goal of my successful application for the ANZFSS 2008 Allan Hodda Memorial Award was to gain further knowledge in the use of statistics as a method to represent fingerprint identifications. The 7th International Conference on Forensic Inference and Statistics (ICFIS) in Lausanne Switzerland presented an opportunity to gain the further knowledge I desired, as lectures and workshops included content on these applications which had not been presented in Australia to date.

As detailed within the Dairy section of this report, the conference contained lectures and presentations that were informative and relevant to fellow fingerprint practitioners, as well as other members of ANZFSS. I sought to incorporate this information within my presentation to other ANZFSS members at the 19TH International Symposium on the Forensic Sciences, in Melbourne 2008. The lectures of specific interest to my presentation were included therein and they present exciting possibilities for the future presentation of fingerprint identification opinion evidence. Further information was contained within many presentations at the ICFIS would be of potential benefit to other forensic practitioners, in particular, DNA biologists and disciplines that present opinion evidence.

Itinerary

Monday 18 August 2008

Depart Brisbane Intl. Airport – Singapore Airlines SQ236 @ 14:45

Tuesday 19 August 2008

Depart Singapore Intl. Airport – Singapore Airlines SQ346 @ 01:05

Arrive Zurich Intl. Airport Switzerland @ 07:45

- Regional train to Lausanne from Zurich airport, arrive Lausanne 11:10

Wednesday 20 August – Saturday 23 August 2008

Attended 7TH ICFIS Conference, University of Lausanne – See Dairy section for further details of content.

Tuesday 26 August 2008

Travel - Regional train from Lausanne Switzerland to Lyon France, Arrive 13:15

Wednesday 27 August 2008

Meeting with OIC of Interpol Fingerprint Unit, Interpol Headquarters Lyon France

Thursday 28 August 2008

Travel – Regional train from Lyon France, to Bern Switzerland, Arrive 14:10
Unable to contact Nicholas Dewhirst of the Federal Office of Police Bern, for proposed meeting regarding Fingerprint Digital Image transmission. As such, an earlier flight arranged to return to Australia.

Saturday 30 August 2008

Depart Zurich Intl. Airport – Singapore Airlines SQ341 @ 17:45

Sunday 31 August 2008

Arrive Brisbane Intl. Airport – Singapore Airlines SQ235 @ 07:45

Expenditure

Funds available for Allan Hodda Memorial Award **\$5000.00 AUD**

Conference Registration **\$660.00 CHF - \$704.15 AUD**

- Receipted on 23/04/08, sighted and reimbursed prior to departure by Treasurer, L.
SMALLWOOD

Air Travel **\$2549.00 AUD**

- Booking quote sighted and reimbursed prior to departure by Treasurer, L.
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Conference Accommodation \$1365.00 CHF - **\$1473.00 AUD**

- Booking quote sighted and reimbursed prior to departure by Treasurer, L.

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Total amount expended prior to departure - \$4726.15 AUD

Remaining funds unclaimed - \$273.85 AUD

Other unclaimed expenses incurred during travel;

Rail fares -

19/08/08 - \$71.00 CHF - \$75.13 AUD

25/08/08 - \$59.00 CHF - \$62.37 AUD

28/08/08 - \$49.10 EUR - \$83.92 AUD

29/08/08 - \$51.00 CHF - \$54.32 AUD

Accommodation

Lyon, France \$276.10 EUR - \$472.59 AUD

Bern, Switzerland \$110.00 CHF - \$125.96 AUD

Total other unclaimed funds expended - \$874.29 AUD

- The above funds are only shown as a detailed expenditure was requested in the conditions of the Allan Hodda Memorial Award. I understand that the above amounts are above the total funds allocated to undertake the proposed travel and no claim is made of the ANZFSS National Executive for the above costs.

Diary

Wednesday 20 August 2008

The workshop 'The use of Bayesian Networks in Forensic Science' commenced at 9.00am and was a PC based series of probability scenarios using HUGIN software. The scenarios used in the workshop were relevant to broader applications where

investigators may wish to represent the conditional probability of a fingerprint identification and a positive hand writing match on an exhibit for example. The software enables the user to visualise the changing probability of suspect involvement based on the changing levels of forensic evidence entered. The content provided a useful practical insight into the software available to statistically represent forensic identifications. The HUGIN software used is available free online and participants were shown where to access and download the program. A copy of the scenarios used in the workshop was also included with the workshop notes. The software has potential value in representing the overall involvement of evidence types from fingerprints, physical evidence, DNA and document examination to name a few. The evidence involvement or value to the investigation is quantified in a statistical manner which can show changes in probability based on the addition or removal of relevant evidence.

Thursday 21 August 2008

Day 1 – ICFIS

After an official welcome, the following lectures were presented as follows:

Lecture – “It’s not rocket science” Wouldn’t it be wonderful if judges understood the principles of evidence interpretation? Ian Evett, FSS UK.

Comment and discussion was presented regarding the incorrect use of statistics in the UK cases of R v Sally Clark and R v Doheny & Adams. The defendants in each case were eventually exonerated on appeal with the original forensic evidence dismissed as it was based on prejudicial reasoning.

Lecture – A science of evidence: contributions from law and probability

David Schum, George Mason University, USA

The reference WIGMORE, J.H (1937) *Science of Proof; Evidence and Law* was the focus of this presentation. Discussion centred on the need to debate the current definitions of science and stated ‘classification’ as the most important element of modern science. Also to point where facts, data, knowledge and information become evidence was debated in light of ‘inferential (or probative) force or weight’.

Lecture – **Avoiding legal fallacies in practice using Bayesian networks**

Fenton & Neil, Queen Mary University of London, UK

The author discussed the future need to present clearer arguments when using Bayesian statistical applications in legal matters. Current legal fallacies were discussed as well, with the suggested use of decision or event tree formats for presenting statistical evidence to courts instead of using theorems.

Lecture – **Beyond individualisation, or how Wittgenstein can save forensic identification.** Simon Cole, University of California, USA

The presenter of this lecture is a well known objector to the current use of opinion evidence, in particular the fields of fingerprint identification and hand writing analysis. One of the author's central arguments is the removal of the word unique from the description of the characteristics that individualise fingerprints. The term unique doesn't sufficiently describe that a particular piece of evidence belongs to one person to the exclusion of all others.

- The question session at the conclusion of this presentation saw some excited and pointed debate regarding fingerprint identification. Cole strongly supports the representation of fingerprint individualisation without the use of uniqueness, however he did agree that fingerprint characteristics are 'unique', but questioned how do we not know that someone could be so similar as to be erroneously identified?

- Further lectures were presented during the afternoon sessions that contained detailed information on the use of various statistical methods in DNA reporting.

Friday 22 August 2008

Day 2 – ICFIS

After a brief welcome address, the morning lecture session contained presentations on hand writing analysis, including the use of random match probabilities to report results and a presentation on forensic automated speaker recognition.

Lecture – **Painting the target around the arrow: misuse of statistics to characterise DNA evidence.** William Thompson, University of California, USA

This discussion by Thompson would be an interesting debate for any forensic field using statistical representation, especially DNA biologists as mentioned above.

Thompson, a consultant defence lawyer, discussed cases where US biologists

reporting DNA results in court have not used particular loci in their probability calculations and used unjustified opinion to categorise results as mixed profiles or inconclusive results. In effect, as Thompson describes, making matches appear more probative than they appear.

- Further afternoon lectures were presented on evaluating likelihood ratios in DNA mixtures, using Bayesian models for DNA mixtures and Bayesian modelling of electropherogram curves.

Lecture – **Computing likelihood ratios for partial fingerprints using a hierarchical system of matches.** Arsic, Dauly, Anthonioz, Champod & Ashbaugh. This presentation by Ivana Arsic, contained the focal information of my submission for the Allan Hodda Memorial award. The statistical model presented is based on the use of a computer matching algorithm used in the automated searching of latent fingerprints. The lowered threshold of this searching tool allows for the possibility of calculating the likelihood of identification based on as little as 3 minutiae points within latent fingerprints. The model is an ongoing work, where likelihood ratios of identifications are based in associated minutiae pairs, ridge sequences and relative positions. The potential applications for the content within this statistical model are exciting, as it satisfies a number of current questions asked of fingerprint opinion evidence. Further comment on this presentation is offered within the conclusions of this report.

Saturday 23 August 2008

Day 3 – ICFIS

Following a brief introduction, the morning presentations included content on the use of nuclear DNA in DVI incidents and paternity testing allowing for mutation rates.

Lecture – **Are expert opinions telling us both sides of the story?** Hepler, Baio, Dawid & Lund. University College of London & University of Cambridge, UK. The discussion presented within this lecture asserted that crucial arguments regarding alternative reasons for suspect involvement in crimes is not presented by some disciplines or jurisdictions. DNA matches were discussed as a standard, whereby statistical hypothesis can be reported as inclusive and exclusive, whilst disciplines

such as fingerprint identification only represents one possibility, ie. Inclusion, and the possibility of exclusion is ignored. From a standpoint of my professional knowledge, this argument failed to consider the implications of the fundamental principles of fingerprint identification for fingerprint experts and how that impacts upon case and court reporting.

Lecture – **The nature of forensic science opinions.** Graham Jackson, University of Abertay Dundee, UK.

The content of this presentation sought to provide a more transparent, impartial framework from which forensic scientists can phrase their opinions when given in evidence. The removal of influence from employers and mentors from the way reports are phrased was considered crucial, and a Bayesian probability foundation was proposed on which to base opinions. It was also discussed that when forming a report and detailing opinions, forensic scientists could first consider their role in one of two aspects, ie. Either Investigative or Evaluative, in regard to the collection or discovery of evidence, or the evaluation of the relevance of the recovered evidence.

- Following a discussion on the above presentation, official closing remarks were made and the 7TH ICFIS, Lausanne 2008 was declared closed.

Conclusion

Following my attendance at the 7TH ICFIS I took the opportunity to meet with Mark Branchflower, the OIC of the Interpol Fingerprint Unit, in Lyon France. I was shown through the facilities at Interpol Headquarters and discussed Interpol's future directions and ways the QPS Fingerprint Bureau can benefit and participate in these activities. I arranged this meeting as my earlier attempts to meet with Nicholas Dewhirst of the Federal Office of Police Bern, for proposed meeting regarding Fingerprint Digital Image transmission proved unsuccessful.

Since returning to Australia and attending the recent ANZFSS Symposium in Melbourne, I have made further contacts regarding the application of Statistics to Fingerprint Identification. In particular, a renowned expert from Minnesota USA, Glen Langenberg, who facilitates a statistics for latent fingerprint examiners course. Glen is also a PhD student of Christophe Champod, a professor and co-author of the project presented at the ICFIS which formed the focus of my presentation in

Melbourne. Information from this correspondence will complement knowledge gained from the ICFIS and assist in the development of a Statistics training module for the Fingerprint Bureau, QPS. My new position within the Fingerprint Bureau training office will ensure that this goal is met, as I am involved in developing a new Diploma of Public Safety for fingerprint technicians.

At the completion of the lecture presented by Simon Cole, (as detailed in the diary section above) I spoke with him and obtained a list of references relevant to the content of his presentation. Considering the nature of his arguments in relation to fingerprint identification evidence, this information is a valuable resource for fingerprint experts in the defence of their examination results and opinions presented in court.

The content from a large number of the presentations during the ICFIS could be of interest to members of the forensic biology community. I have abstracts of the presentations made during the ICFIS and perusal of this information is welcomed by any interested member of ANZFSS.

The proposed content for the upcoming 20TH International ANZFSS Symposium in Sydney 2010 presents an opportunity to develop the knowledge gathered from my attendance at the ICFIS further. From the ANZFSS website, the quote, 'Do we generate absolute or statistical identifications?' shows direct relevance to the content of the ICFIS conference and the application of statistics to fingerprint identification. My attendance at the ICFIS in fulfilment of the Allan Hodda Memorial award has provided me with the opportunity to gain knowledge on an emerging issue within the forensic sciences. The timeliness of this travel presents a further opportunity to develop these ideas, by putting them into practice in a Fingerprint Identification training module and bring this information forward for comment and discussion in the proposed forum in Sydney 2010.

The experience I have gained from the Allan Hodda Memorial award has provided an invaluable foundation from which I can further expand my knowledge as an expert and introduce important, developing concepts into the training program of future fingerprint experts.