

Response to: DR AS 5388.3 Forensic analysis - Part 3- Interpretation

prepared by:

Prof. Phil Rose, *Australian Academy of Forensic Sciences*

Ph.D. (Cambridge), M.A., B.A. Hons. *First Class* (Manchester), Dip. I.P.A. *First Class* (London).

Chairman, Forensic Speech Science Committee *Australasian Speech Science and Technology Association*

Adjunct Associate Professor in Phonetics and Chinese Linguistics *School of Language Studies, Australian National University*

British Academy Visiting Professor *Joseph Bell Centre for Forensic Statistics and Legal Reasoning, University of Edinburgh*

Visiting Professor *Hong Kong University of Science & Technology*

Mr Hugh Selby

Advocacy and expert witness instructor *College of Law, Australian National University*

1.0 Introduction

Below are our comments on the draft Standard for Interpretation of Forensic Analysis circulated for public comment by Standards Australia. We write in our respective capacities as practitioner, researcher and chair of the *Australasian Forensic Speech Science* committee (Rose), and joint-editor of *Expert Evidence*, which is one of the documents related to evidence interpretation explicitly cited in the draft (Selby). We have read the critique from Morrison et al., and endorse it. Therefore we do not restate their points, other than their main one of rejection of the draft.

2.0 Preamble

The purpose of forensic analysis is to aid the justice system to arrive at just outcomes. In criminal cases such analysis may be instrumental both in excluding a person as a suspect or strengthening the case against a suspect.

Given that the ‘end users’ of forensic analysis are lay people (be they investigators, jurors, judges, advocates, or the media) it is necessary that the statement of results and the confidence with which those results are expressed are both accurate and comprehensible to those audiences.

In criminal cases, where the prosecution is required to prove each material fact beyond a reasonable doubt, it is vital that the decision makers comprehend the strength and limitations of the evidence that is put before them.

It is only with such comprehension that decision makers are then able to combine all the evidence (forensic science and other) they have heard and seen to reach a just result.

The widespread adoption of a standard for the interpretation of forensic science evidence is welcome if and only if that standard reflects the highest known standards and promotes the search for even better ones.

A standard that reflects approaches now known to be logically incorrect and therefore misleading (albeit that such misdirection in the past was inadvertent) is worse than no standard at all. This is

so because a poor standard provides support for those who adhere to it. A jury is not to know that a standard is poor. A jury (or a judge sitting alone) is entitled to believe that a standard is 'best current practice'. They will not downgrade the weight they give to an alleged expert's opinion because the cross-examination shows that there is another approach. Moreover, as laypeople, they are not expected to understand why one interpretative approach is better than another – that is what the authors of a standard are supposed to do for them.

3.0 Critique

The draft is unfortunately a retrograde step towards setting an appropriate standard. It is fine up to section 4.1 paragraph four, where it proposes guidelines which go counter to state of the art approaches to the interpretation of forensic evidence. The authors wrongly state, p. 5:

Interpretation includes answering the question as to whether or not—

- (a) an outcome may have been caused by a particular event or action (Reconstruction);
- (b) X is a particular thing (Identification); or
- (c) items share a common origin (Comparison).

All standard references to the interpretation of evidence, including the one listed by the draft authors as having been consulted, agree that the forensic expert **CANNOT LOGICALLY ANSWER SUCH QUESTIONS**. The committee should know that one has to know the probability of the hypothesis *before* you adduce the evidence in order to be able to say how likely it is that the hypothesis is true *after* the evidence is adduced. Since the forensic expert is usually not privy to such information they therefore *cannot logically give the answer the committee says it is their job to furnish*. It is that simple.

Expert Evidence contains a chapter (by Robertson and Vignaux) on the Interpretation of Evidence setting out why you cannot do what the draft says is best practice. It is also explained in the chapter on forensic voice comparison by Morrison. See too Roberts' chapter on statistics in DNA. If these are not accessible you can find an explanation in the first author's 2006 *Australian Journal of Forensic Sciences* paper on forensic voice comparison.

Because the draft goes wrong so early, other mistakes consequently follow. For example:

- it is stated p.5 "The examiner should follow an approach that seeks to evaluate the null hypothesis." No. The examiner does not need to refer to a null hypothesis at all: there are only two hypotheses they need to address – the prosecution hypothesis and the defence hypothesis – and they need to estimate the probability of the evidence under both. From those results comes the estimate of the evidence strength.
- on page 17 it is stated "... defin[ing] what constitutes an inclusion /exclusion." No. You cannot do that because that implies a posterior probability that cannot be estimated unless you have the prior odds.
- on p. 9 it is even stated that it is possible to be absolutely certain about a hypothesis! ("In cases where a definitive opinion is expressed, the assigned probability has a value of 1 (certainty)").
- the statement "The two items have a common source" is given on p. 10 as an example of a statement where a likelihood ratio can be used. But one needs – once again! - the priors to combine with the LR in order to do this.
- etc. etc.

By all means say at the outset that the expert tries to *help* the trier-of-fact determine the questions you list, but you must make clear that their job is to do this by estimating the *strength of the evidence*, NOT the *probability of the hypothesis, given the evidence*. If you start like that, the rest of the document will follow easily, as methods for testing the accuracy and precision of the approach have been developed over the past decade and are readily implementable. The things that need elaboration are then the need for transparency and testability, and you can leave the various methods for estimating the strength of evidence (which differs from forensic medium to forensic medium) open to the practitioners following the standard.

Much of the text is vague and incomprehensible without further exemplification. For example on p.6 it is stated “The degree of professional judgement required to derive the information from the data may vary depending on the method and/or instrumentation used”. Whatever does this mean? It implies that if I use instrumentation/method *a* I don’t have to use as much (or more) professional judgement as if I use instrument/method *b*? The whole draft needs to be rewritten in such a way as to make it clear what is being claimed (of course).

Glossaries in works like this seldom perform a useful function, as they usually contain insufficient information. If, for example, you are going to include Bayes[sic:’] Theorem, then it needs TWO equalities and it needs to be explained more clearly.¹ If it is felt that a list of terms should be included, it must be comprehensive, comprehensible, and correct.

4.0 Summary

The draft has been written from the standpoint of a particular forensic approach that unfortunately is no longer considered current or even appropriate. It gives the impression that it has been deliberately written in such a vague way in the hope that it will have coverage to all approaches. Mistakes abound. We note the claim on the final page that Australian Standards “... reflect the latest scientific and industry experience”. Because it gets the most basic of facts wrong, the draft falls well short of that. It should be redone from scratch. We would recommend that the committee make use of the not inconsiderable Australasian expertise on the proper

¹ Here for example is an entry from an encyclopedic dictionary that is somewhat clearer: **Bayes’ Theorem** *FORENSIC N.* a general theorem of probability theory and the fundamental formula of forensic science interpretation governing, among other things, inference from DNA evidence. Bayes’ Theorem makes explicit how to rationally update belief in a hypothesis in the face of new evidence adduced in its support. The updated belief is a function of the strength of the evidence and the belief in the hypothesis before the evidence is adduced. In *forensic voice comparison*, for example, Bayes’ theorem can be used to estimate the probability that the suspect said the incriminating speech, given the *voice evidence* adduced by the prosecution. Two formulations of Bayes’ Theorem are commonly found: an *odds form* and a probability form. The explicit role of Bayes’ Theorem in forensic inference is clarified in all major works on forensic statistics, for example in the 2004 textbook *Statistics and the Evaluation of Evidence for Forensic Scientists* by UK forensic statisticians Colin Graeme Girdwood Aitken (1951-) and David Allen Stoney. An excellent introduction can be found in the 1995 book *Interpreting Evidence* by New Zealand legal professional Bernard Robertson (1953-) and statistician Tony Vignaux (1935-).

evaluation of forensic evidence to reformulate the draft so that it conforms to “the latest scientific and industry experience”.

5.0 Recommendations

- Replace section 4.1 para. 4 with the logically correct specification of the job of the forensic interpretation expert (“to estimate the strength of the evidence”).
- Jettison the rest of the document, including the hodge-podge of a glossary.
- If it is felt that a list of terms should be included, it must be comprehensive, comprehensible, and correct.
- Include an explanation of what the estimation of the strength of evidence entails, by making use of the existing and extensive literature.
- Emphasise the need for transparency and testability of methods used to estimate the strength of evidence.
- Provide readers with a proper bibliography. This must include Robertson & Vignaud’s *Interpreting Evidence* (soon to appear in a new edition with Berger from the Netherland’s Forensic Science Institute as co-author). This is essential reading for anything to do with how to interpret forensic evidence, and is easy to read and understand.
- Enlist the help of experts who know what is involved in properly estimating strength of evidence, and how it can be made transparent and testable.
- Include the names of the draft’s authors: anonymity is dangerous in a document of this importance.