Schedule for ELEC9781
Forensic Voice Comparison and the Evaluation of Evidence
–
First part

Document version of 4 August 2011

Monday 1 August 2011 – Tuesday 2 August 2011

Paradigm shift

Saks & Koehler (2005); Morrison (2009a); Morrison (2010, §99.70–§99.90)

– What are the elements of the new paradigm?

– What are the problems with the following assumptions which are found in Saks & Koehler (2005, p. 892)?

– Two indistinguishable marks must have been produced by a single object.

– Markings produced by different people or objects are observably different.

– According to Sak & Kohler (2005, p. 894–895), what are the problems with the claim that there are no errors in forensic science?

– Why is the situation better in the forensic comparison of DNA profiles?

Monday 1 August 2011 – Tuesday 2 August 2011 continued

Likelihood-ratio I: Philosophy

Morrison (2010, §99.140–§99.190, §99.370–§99.390)

– Within the likelihood-ratio framework, what is the rôle of the forensic scientist, and what is the rôle of the trier of fact?

– Why should a forensic scientist not present to the trier of fact a statement of the posterior probability that two object have the same origin?

– What does a likelihood ratio (LR) of 1/100 mean?

– If I find no measurable difference between to objects, does this mean that the have the same origin?

– Is it possible to talk of a match in forensic voice comparison?

– Explain the two principle fallacies in the interpretation of likelihood ratios.

Wednesday 3 August 2011

Likelihood-ratio II: Calculation

Morrison (2010, 99.200–99.230)

Do Matlab exercises:

01 discrete LR 02 histogram to pdf 03 univariate uniGaussian

Thursday 4 August 2011

Likelihood-ratio II: Calculation

Do Matlab exercises: 04 correlation 05 bivariate uniGaussian

Logic and probability – Bayes' Theorem

Bolstad (2007, ch. 4)

– Use graphics to demonstrate that $p(A \cap B) = p(A) \times p(B)$ if A and B are statistically independent, but $p(A \cap B) \neq p(A) \times p(B)$ if A and B are not statistically independent. Hint: Use straight lines instead of circles.

– Use graphics to demonstrate that:

$$p(B|A) = \frac{p(A \cap B)}{p(A)} \tag{1}$$

$$\Rightarrow p(B|A) = \frac{p(A \cap B)}{p(A \cap B) + p(A \cap \tilde{B})} \tag{2}$$

$$\Rightarrow p(B|A) = \frac{p(A|B) \times p(B)}{p(A|B) \times p(B) + p(A|\tilde{B}) \times p(\tilde{B})} \tag{3}$$

– Make the following substitutions in Equation 3 above, and transform it to Formula 2 of Morrison (2010).

$A \leftarrow E$ $B \leftarrow H_{so}$ $\tilde{B} \leftarrow H_{do}$

Friday 5 August 2011

Evaluation I: Validity

Morrison (2010, §99.290–§99.320); Morrison (2011b, §1–2, 4–6)

– What are the differences between validity, reliability, accuracy, and precision?

– Why are classification-error rates inappropriate for measuring the validity of a forensic-comparison system?

– What properties are appropriate for a metric of the validity of a forensic-comparison system?

– What are the uses of measurements of accuracy, precision, and error rates?

Evaluation II: Tippett plot

Morrison (2010, §99.330)

Monday 8 August 2011

Likelihood-ratio II: Calculation

Do Matlab exercise: 06 Aitken & Lucy 2004 07 GMM-UBM

Calibration and fusion

González-Rodríguez *et al.* (2007); Morrison (2009b)

– Any criticisms positive or negative about González-Rodríguez *et al.* (2007)?

– Any criticisms positive or negative about Morrison (2009b)?

– What are calibration and fusion, what do they do, and why are they important?

Tuesday 9 August 2011

Calibration and fusion

Do Matlab exercise: 08 calibration

Evaluation III: Reliability

Morrison (2011b, §3); Morrison, Thiruvaran, Epps (2010); Morrison (2011a)

– What is needed to be able to calculate an estimate of a credible interval?

– Why is it important to consider the precision of a forensic-comparison system?

– How should you decide which is the best system to use?

– What is cross validation, why is it done, and what is a better solution?

Wednesday 10 August 2011

Evaluation II: Validity / Evaluation III: Reliability

Do Matlab exercise: 09 accuracy & precision

The alternative hypothesis

TBA

Approaches to forensic voice comparison

Morrison (2010, §99.650–§99.730)

– Which approaches are best and least suited to use within the new paradigm, and why?

– What properties should a property of speech have if it is to be useful for forensic voice comparison?

Some techniques in acoustic-phonetic forensic voice comparison

– phonetic unit selection
– formant-trajectory measurement
– parametric curves

Thursday 11 August 2011

– diagnostic quiz

– explanation of assignment to write a critical review of a paper

– any outstanding questions

– guest lecture by Dr Philip Rose

Friday 12 August 2011

Resistance to the adoption of the new paradigm

Students will be divided into two groups. One group will complete Task 1 and the other Task 2

– Task 1: Read French & Harrison (2007) and take notes from the perspective of the new paradigm on the problems with the framework which they present . Afterwards read Rose & Morrison (2009); Morrison (2009a, §2.5); French et al. (2010); Morrison (2010, §99.400). Be prepared to lead a discussion on these readings including summarising and commenting critically on the initial document and the key arguments ensuing therefrom.

– Task 2: Read *R v T* [2010] and take notes from the perspective of the new paradigm on the problems with the decision. Afterwards read Evett *et al*. (2011); Berger *et al*. (2011); Morrison (2012). Be prepared to lead a discussion on these readings including summarising and commenting critically on the initial document and the key arguments ensuing therefrom.