ASQDE 2016 PANEL DISCUSSION

The logical approach to evidence evaluation and reporting

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Description of the approach

- Four essential requirements for evaluation and reporting
  - '***Balance***': Consider more than one proposition
  - '***Logic***': Probabilistic evaluation of the evidence/findings given the propositions (plus relevant background information)
  - '***Robustness***': Capable of sustaining scrutiny or review
    - other experts through review or under cross-examination
  - '***Transparency***': Applies to everything.
    - As always, everything should be demonstrable and recorded
    - Approach requires consideration of all facets of process

Description continued

- Key points:
  - Examiner's beliefs are personal and subjective. Belief about findings and observations in a given case are informed by that expert's knowledge, training, experience, etc.
  - Evaluation is based on uncertain information and uncertainty must be addressed through probability and logic
  - Reasoning and scientific belief can be expressed in probabilistic terms whether quantitative or qualitative
- Three basic rules to guide any evaluation:
  1. Evaluation **always** occurs within a framework of information,
  2. At least two competing propositions, and
  3. Expert evaluates the evidence given the propositions, and not the propositions directly.

The formula

- In mathematical terms, (odds) form of the 'construct' is:

$$\text{“LR”} = \frac{p(E|H_1, I)}{p(E|H_2, I)}$$

- MANY ways this concept (or non-mathematical equivalent) can be expressed verbally

- ENFSI guide provides examples but several others can be found in the literature

Verbal expression of the Opinion

- "Relative degree of support provided by the evidence"
  - Seems to appeal to practitioners (vs probabilistic wording)
  - Expert evaluates and expresses belief in terms of the degree of support provided by the evidence for one proposition over another competing proposition

- *e.g.*: Evidence provides <modifier> support for proposition X over proposition Y

  <modifier> = very strong, strong, moderate, 'limited', equal

  - 'Limited' is a special case: "The evidence provides more support for proposition X than for proposition Y and the level of that support, while stronger for X than for Y, is limited/weak."

- No conclusive ‘identification’
  - ‘Elimination’ possible in select circumstances
- Could be adopted now, as-is
  - Would address many of the logical issues with existing approach
- Not perfect and only a ‘stop-gap’ solution
  - Research still required
    - What specific numbers of levels are warranted/justified
    - What specific wording is optimal
  - Issues apply equally for any existing terminology
  - NOT an issue restricted to the logical approach

Scientific literature/research

- Most of existing literature in support of claims of expertise remains valid and applicable
  - Basic analyses and examination processes do not change
- *Validation* of the 'conclusion scale' is still required
  - Again, also an issue for existing scale(s) and terminology
- 'Short list' of articles and textbooks supporting the logical approach (in one form or another)
  - As a system of reasoning for evaluation purposes
  - For presentation of opinions (in any forensic domain)
  - See printout for details

Advantages/strengths

- Approach is <u>founded in logic</u>
  - Ensures a logically sustainable result that addresses all issue(s) at hand in a robust and transparent manner

- *<u>Key points</u>:*
  - Based on probabilistic reasoning and logic
  - Enhances transparency & thoroughness
    - **Must** state conditions/assumptions
    - **Must** clarify any ambiguous information
  - Focuses on, and answers, the questions of interest to the trier
  - Helps to clarify the role of all parties in the decision-making process
  - Does not overstep the bounds of science and knowledge

Other advantages

- Approach works with quantified data (statistics)
  - Proper numeric data permits a ‘true’ likelihood-ratio approach
  - Key issue rests in the proper acquisition of data
  - Actual mathematics involved can be complex (conditionalities)
    - Complexity is a function of the problem, not the solution
    - Would apply no matter how we try to use quantified data

- It works equally well for ALL types of evidence

Disadvantages/limitations

- Lack of awareness and understanding
  - Examiners and clients
  - Judiciary, legal pundits, lawyers and lay-persons
  - Translates into fear and uncertainty

- Can be addressed through further research and education for all parties

- Beyond this, no practical/real limitations or disadvantages

Who currently uses this approach

- Estimating number of ‘users’ is difficult…
  - Safe to say it is not many in terms of overall percentage of FDEs
- Significant effort to standardize in Europe
  - ENFSI published extensive guide intended for all labs/disciplines
  - Formally adopted in a few select labs but not many/majority
  - Pace of change is not surprising
- North America:
  - Some discussions have and are occurring
  - Elements are present in docs from the NCFS and even OSAC
- Unofficially, a few laboratories exploring the approach
  - In our lab it is used for select cases (depends on examiner)

Barriers to implementation

- Uncertainty and inertia – going against the *status quo*
  - It is different from our traditional norm and approach
  - Coupled with uncertainty about the benefits and value

- From a pragmatic point-of-view, the biggest barrier is the **need for education and information**
  - Training, both theoretical and practical in nature, is needed for practitioners… lots of training
  - Education is also needed for our clients – particularly the judiciary and lawyers but also immediate clientele

- Such things take time, money and resources