Review of Draft NIST Report, Feedback Received, and Mixture Website

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National Institute of Standards and Technology

Workshop Disclaimer

Points of view in this workshop are those of the presenters and do not necessarily represent the official position or policies of the National Institute of Standards and Technology.

Certain commercial equipment, instruments, and materials are identified in order to specify experimental procedures as completely as possible. In no case does such identification imply a recommendation or endorsement by NIST, nor does it imply that any of the materials, instruments, or equipment identified are necessarily the best available for the purpose.

DNA Mixture Interpretation:

## Communicating the science

Rich Press

Public Affairs Office

National Institute of Standards and Technology

Online resources

- **Report**
- **Bibliography**
- **Summary**
- **FAQ**
- **Explainer**

Why is communicating this material important?

- **Non-experts are the users of FS information**

- **Public perceptions of FS tend to come from fictional accounts**

- **Reporting on FS tends toward extremes**

- **Help establish a shared foundation**

Gray Scale Ranging from 0 to 100 Percent Black
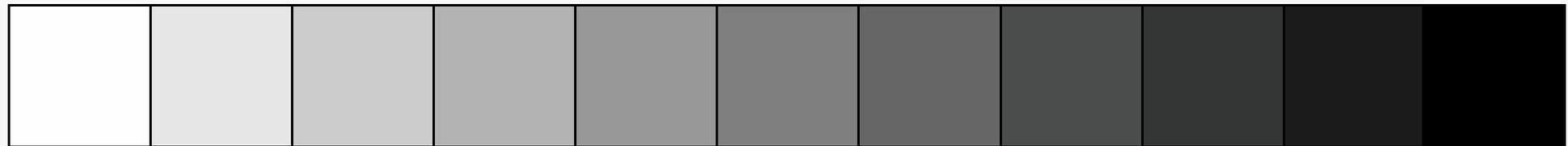
| 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |

Laurie Garo
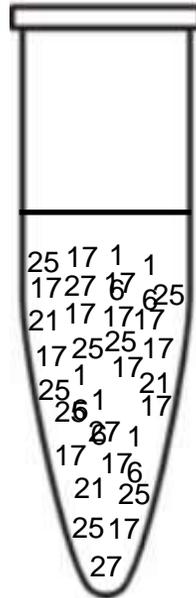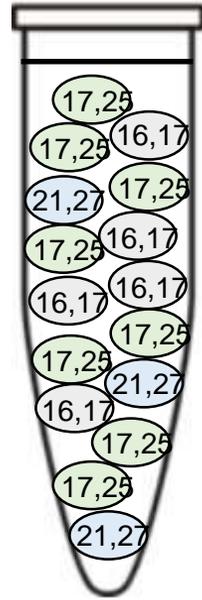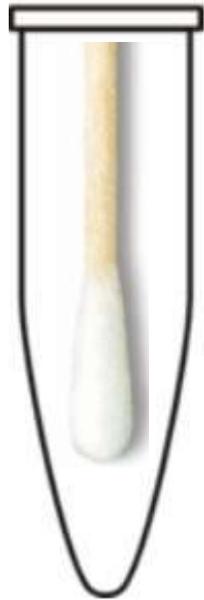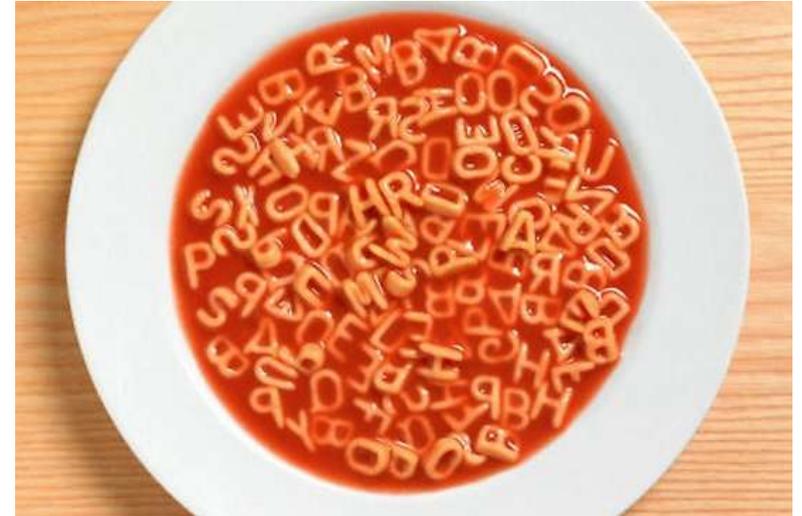
Evidence Processing   Extraction   Post extraction   PCR

Redbubble.com

⬤ Contributor 1 with a "16,17" genotype
⬤ Contributor 2 with a "21,27" genotype
⬤ Contributor 3 with a "17,25" genotype

https://www.nist.gov/topics/forensic-science

NISTIR 8225 DRAFT

NIST Scientific Foundation Reviews

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September 2018

U.S. Department of Commerce
Wilbur L. Ross, Jr., Secretary

National Institute of Standards and Technology
Walter Copan, NIST Director and Undersecretary of Commerce for Standards and Technology

Draft Provided Seeking Feedback

- Outlines our plans to conduct studies and report findings along with historical overview of previous efforts (NAS, SoFS, PCAST, AAAS) and similar international activities

- Public Comment Period:
  - September 24 to November 19, 2018
  - Press release (Sept 24) with GovDelivery email blast to several thousand people
  - Email ScientificFoundationReviews@nist.gov established with notice that all comments will be published

- **13 responses received**

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Feedback Received on NISTIR 8225 Draft

All comments now available at https://www.nist.gov/topics/forensic-science/draft-nistir-8225-nist-scientific-foundation-reviews

	Author (Institution)	Feedback or Suggestions Provided
1	Scott Weidman (NAS)	Remove mention of responses to PCAST report
2	Bruce Heidebrecht (Maryland SP Lab)	Some minor corrections with formatting
3	Itiel Dror (consultant-UK)	Cognitive bias and separating observation from interpretation
4	Norah Rudin (consultant-CA)	Validation definition & having underlying data be available as supplemental
5	John Buckleton and Jo-Anne Bright (ESR New Zealand)	Concerns expressed about bibliography and definitions for empirical data, forensic science activities, discriminating power, and sample sizes
6	Leverhulme Research Centre (Scotland)	Encouraged ranking data sources, establishing criteria for respectability, and developing core set of resources; felt that historical overview was too long
7	James Wayman (San Jose State Univ)	Address differences with approaches used: Pr(H1 or H2|E) vs Pr(E|H1 or H2)
8	Geoffrey Morrison (consultant-Canada)	Asks that criteria for interpretation be logically correct & test data reflect casework
9	James Johns (AFIS Unit-Mesa, AZ)	Use "friction ridges" rather than "latent fingerprints" in text
10	Sarah Chu (Innocence Project)	Provide clearer scope, questions, criteria, and any plans to conduct research
11	Mecki Prinz (John Jay College, NYC)	Include training materials in reference list; create an online repository of data
12	Ray Wickenheiser (ASCLD)	Supportive of effort if there is extensive forensic community involvement
13	Vanessa Antoun (NACDL)	Supportive but cautions about using unpublished data or non-independent papers

First email received <1 day after we posted Draft NISTIR 8225

Public comments received
on Draft NISTIR 8225
NIST Scientific Foundation Reviews
Published February 12, 2019

DRAFT NISTIR 8225: NIST Scientific Foundation Reviews was published on September 24, 2018. That document is available at:

https://www.nist.gov/topics/forensic-science/draft-nistir-8225-nist-scientific-foundation-reviews

The public comment period closed on November 19, 2018. This document lists all comments received. These comments will be included in the final version of the document, which will be published at a later date.

NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

Subject: DRAFT NISTIR 8225
Date: Tuesday, September 25, 2018 at 12:35:19 PM Eastern Daylight Time
From: Weidman, Scott
To: ScientificFoundationReviews

There are two places in the DRAFT NISTIR 8225 that strike me as having the wrong tone for a NIST document that lays out a scientific foundation:

1. The verb "opines" on line 460 seems inappropriate in describing a scholarly analysis. The two passages quoted in that paragraph are findings based on thorough investigation and analysis, not simply opinions. I suggest changing "opines" to "finds" or "found".
2. I would delete the list of six criticisms of the PCAST report from lines 887-895. Some of them sound antagonistic to PCAST and even to general best practices of science. The inclusion of this list does not add useful information about scientific foundations, and it seems to cast unsupported doubt on the validity of the PCAST report. If the list is retained, the draft document should be augmented with discussion of these criticisms and the arguments for and against each. But I think it's better to simply delete this list and reference 29.

These opinions are my own and not of the NAS.

Scott Weidman, Ph.D.
Deputy Executive Director, Division on Engineering and Physical Sciences
National Academies of Sciences, Engineering, and Medicine

27 page pdf file
Responses from 13 individuals or groups

Includes 8 emails and 6 letters
One individual provided two emails

https://www.nist.gov/sites/default/files/documents/2019/02/12/draft_nistir_8225_comments_received.pdf

When Addressing Feedback Received on Drafts

We expect to either:

1. Be persuaded by a suggestion and make a change

2. Acknowledge that there is a difference of opinion ("while some people expressed the following view…") but do not make the requested change in the document

DNA Mixture Interpretation: A NIST Scientific Foundation Review

Primary Goals:

1. **Develop a bibliography of foundational literature**
2. Characterize capabilities and limitations of methods for mixture analysis
3. Identify knowledge gaps for future research
4. Inform the forensic community and non-specialists of findings (judges, attorneys,& general public)
5. **Create a framework for potential future NIST foundational reviews in forensic science**

Working on a Comprehensive Reference List

References for Scientific Foundation Review: DNA Mixture Interpretation

1. Alfonse, L.E., Tejada, G., Swaminathan, H., Lun, D.S. and Grgicak, C.M. (2017) Inferring the number of contributors to complex DNA mixtures using three methods: exploring the limits of low-template DNA interpretation. *J. Forensic Sci.* 62(2): 308-316.

2. Alfonse, L.E., Garrett, A.D., Lun, D.S., Duffy, K.R. and Grgicak, C.M. (2018) A large-scale dataset of single and mixed-source short tandem repeat profiles to inform human identification strategies: PROVEDIt. *Forensic Sci. Int. Genet.* 32: 62-70.

3. Balding, D.J. and Buckleton, J. (2009) Interpreting low template DNA profiles. *Forensic Sci. Int. Genet.* 4(1): 1-10.

4. Balding, D.J. (2013) Evaluation of mixed-source, low-template DNA profiles in forensic science. *Proc. Natl. Acad. Sci. USA* 110(30): 12241-12246.

5. Beecham, G.W. and Weir, B.S. (2011) Confidence interval of the likelihood ratio associated with mixed stain DNA evidence. *J. Forensic Sci.* 56 Suppl 1: S166-S171.

6. Bekaert, B., Van, G.A., Vanderheyden, N., Larmuseau, M.H. and Decorte, R. (2012) Automating a combined composite-consensus method to generate DNA profiles from low and high template mixture samples. *Forensic Sci. Int. Genet.* 6(5): 588-593.

7. Benschop, C.C., van der Beek, C.P., Meiland, H.C., van Gorp, A.G., Westen, A.A. and Sijen, T. (2011) Low template STR typing: effect of replicate number and consensus method on genotyping reliability and DNA database search results. *Forensic Sci. Int. Genet.* 5(4): 316-328.

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11. Benschop, C.C., Haned, H., Jeurissen, L., Gill, P.D. and Sijen, T. (2015) The effect of varying the number of contributors on likelihood ratios for complex DNA mixtures. *Forensic Sci. Int. Genet.* 19: 92-99.

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van Oorschot, R.A.H., Ballantyne, K.N. and Mitchell, R.J. (2010) *Investigative Genet.* 1(1):14. doi: 10.1186/2041-2223-1-14

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Wickenheiser, R.A. (2002) Trace DNA: a review, discussion of theory, and application of the transfer of trace quantities of DNA through skin contact. *J. Forensic Sci.* 47(3): 442-450.

Zoppis, S., Muciaccia, B., D'Alessio, A., Ziparo, E., Vecchiotti, C. and Filippini, A. (2014) DNA fingerprinting secondary transfer from different skin areas: Morphological and genetic studies. *Forensic Sci. Int. Genet.* 11: 137-143.

~600 articles collected so far

DNA Mixture Interpretation Report Being Written

- Front Material: Acknowledgments and Disclaimers
- Chapter 1: Introduction
- Chapter 2: DNA Mixtures: History and Principles
- Chapter 3: Study Input and Data Sources
- Chapter 4: Context and Relevance Issues
- Chapter 5: Measurement and Interpretation Issues
- Chapter 6: Technology and Training Issues
- Chapter 7: Key Takeaways and Considerations
- Appendix 1: Foundational Bibliography (currently ~600 references)
- Appendix 2: DNA Basics and Glossary

Thank you for your attention!

DNA Mixture Interpretation
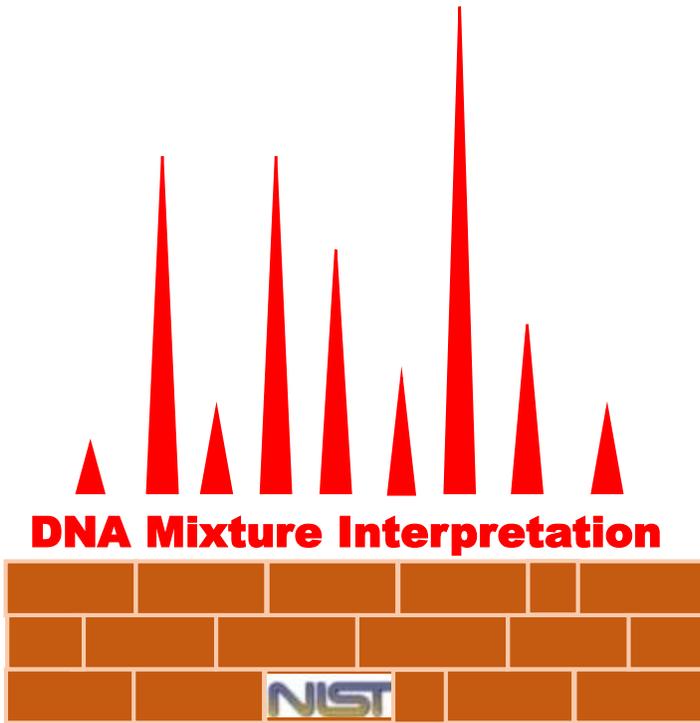
Scientific Foundation Review

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