



Netherlands Forensic Institute
Ministry of Justice and Security

Communicating LR- conclusions in forensic reports

NIST 25-26 July 2024

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Numerical LR

- › LRs are reported in all DNA reports
- › In smaller volume in other areas such as glass, automatic speaker identification, fingerprints, telecom, authorship

Special communication challenge: [database search results](#)

- Searches generate many “good” leads but also a few “false” leads
- It’s special because other evidence may be missing completely
- NFI adds text box warning in reports



Verbal LR

“The findings are **far more probable*** when the fragment comes from the window than when the fragment comes from some other glass object”

| Verbal equivalent | LR |
|--------------------------------|------------------|
| Approximately equally probable | 1-2 |
| Slightly more probable | 2-10 |
| More probable | 10-100 |
| Appreciably more probable | 100-10,000 |
| Far more probable | 10,000-1 million |
| Extremely probable | > 1 million |



Footnote (1)

This term is part of a standard verbal scale (the left column in the table). This scale is used when the scientist has no or insufficient numerical data to explicitly substantiate a numerical conclusion.

The selection of the specific verbal term is based on expert knowledge, experience in research and casework, etc.

To promote the transparency for the reader and the uniformity among the different experts the NFI has defined the verbal terms numerically. These definitions are expressed in orders of magnitude and are listed in the right column in the table below.

For example, the term 'slightly more probable' means that the probability of observing the results of the investigation is considered 2 to 10 times larger when one hypothesis is true than when the other hypothesis is true.



Footnote (2)

The conclusion expresses the evidential strength of the results regarding the hypotheses. The conclusion does not represent the probability that a particular hypothesis is true. That probability depends on other evidence and information outside the domain of forensic expertise and falls outside the scope of this report.

More information about this way of concluding is available in the professional annex “De reeks waarschijnlijkheidstermen van het NFI”. This annex is, among others, available through the NFI website www.forensischinstituut.nl .



Education

- > Reports include link to professional annex
- > Courses / e-learnings for
 - police
 - prosecutors
 - judges
 - defence lawyers
- > Infographics are being developed



Inhoudsopgave

1. De vakbijlage algemeen
2. Inleiding
3. Hoe wordt de reeks gebruikt?
4. Een medisch voorbeeld: de HIV-test
5. De regel van Bayes
6. Een getallenvoorbeeld: de DNA-match
7. Het Bayesiaanse model voor interpretatie van forensisch bewijs
8. Hypothesen
9. De reeks verbale waarschijnlijkheidstermen
10. Een voorbeeld met verbale termen: gezichts-vergelijkend onderzoek
11. Denkfeiten
12. Zekerheid/geen oordeel
13. Lijst van gebruikte termen
14. Literatuur

1. De vakbijlage algemeen

Het Nederlands Forensisch Instituut (NFI) kent een groot aantal typen onderzoeken. Normaal gesproken gaat elk onderzoeksrapport van het NFI vergezeld van een vakbijlage. Deze dient als toelichting op het onderzoek en heeft een zuiver informatief karakter. Achterin de vakbijlage zijn een verklaarde woordenlijst en een overzicht van bron- en literatuurverwijzingen opgenomen.

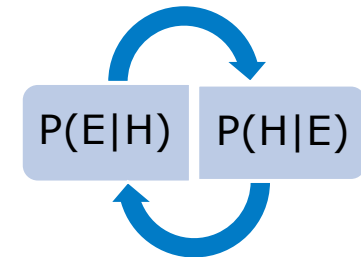
2. Inleiding

In veel gevallen kan de forensisch onderzoeker de vraag die de opdrachtgever hem stelt niet met een volmondig ja of nee beantwoorden. Er is dan een bepaalde mate van onzekerheid over de conclusie. Bij voorkeur wordt deze onzekerheid getalsmatig uitgedrukt, bijvoorbeeld in de vorm van een kans of een interval. Maar in sommige onderzoeken kan de onderzoeker zijn conclusie slechts formuleren in verbale termen van waarschijnlijkheid. Hierbij gebruiken NFI-onderzoekers, waar van toepassing, een standaardreeks van termen om hun conclusiete formuleren. Deze standaardreeks is gebaseerd op inzichten die volgen uit het zogeheten 'Bayesiaanse model' voor de interpretatie van bewijs. In deze vakbijlage wordt dit model besproken aan de



What goes wrong? /prosecutor's fallacy

1. We see this very often
2. With any form of conclusion:
 - Random match probabilities
 - Numerical LR's
 - Verbal LR's
 - 'Ticks on a line'¹
3. Many variants, such as 'base rate fallacy'
4. Possibly serious consequences with small prior






What goes wrong? / 'comparison fallacy'

Irrelevant comparison for interpreting an LR:

- > what is normal in a field,
- > position in table,
- > other cases



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E.g. , for LR=200

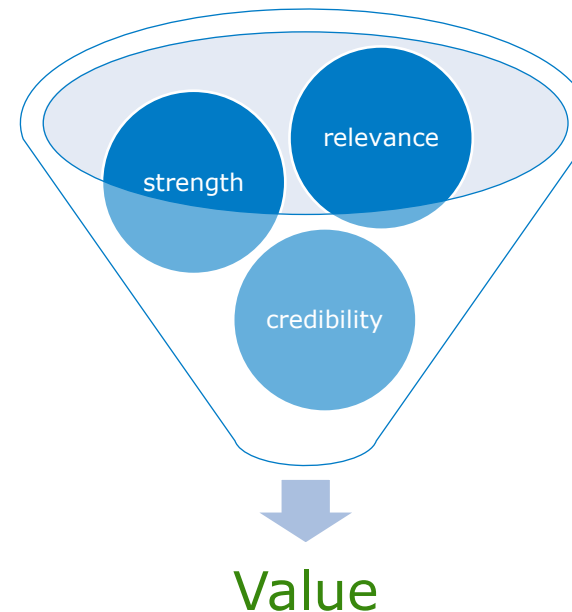
- "LR is usually smaller in this area, so very strong evidence"
- "LR would be tossed away in DNA, so very weak evidence"
- "4th position in table of 6, so weak.../...strong evidence"
- "I have seen other reports (in other cases) with higher / lower LRs, so weak.../...strong evidence"



What goes wrong? / 'Relevance fallacy'

Ignoring the relevance and focus only on LR

- > Small LR at activity level can be more valuable than large LR at source level





What goes wrong? / 'Rule based reasoning'

Rule based reasoning, e.g. :

- "DNA on moveable object = trash can"
- "LR smaller than 1 billion = trash can"
- "LR smaller than 1 million = trash can"
- "verbal LR in lower category of verbal scale = trash can"
- "Database search partial match = trash can"
- "Expert knew context = trash can"





What goes wrong? /combining LR

- > Large LR with small prior (we put a warning in the report)
- > Small LR with large prior
- > Ignoring prior
- > 'Salami strategy': discarding every piece of 'uncertain' evidence until there is nothing left



What works well?

- > Explaining LR framework in different ways (numbers, pictures, words, formulas)
- > “Everyday” comparisons (windforce, matching facial features)
- > Relating posterior probability to prior (table, graphs, various situations)
- > Avoiding probabilistic terms:
 - “results fit better with A than B”
 - “Conclusion is like adding pebble stone in prosecutor’s scale”
- > Being transparent about errors and uncertainties (expected from scientist)





Main message from the three presentations

1. Logic of LR's is leading
2. Invest in a training and continuing education program for experts
3. Numbers are unequivocal, words are not:
 - 1 mile = far (snail)
 - 1 mile = close (athlete)
4. Communicating LR's is difficult, but not impossible:
 - Train and test experts
 - Provide communication tools: leaflets, visuals, suitable wordings, e-learning...
 - More research on effective communication is very welcome
5. Statisticians **IN THE LAB**

