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THE STRENGTH OF CONCLUSIONS

Background

- Historically: The FP discipline has given discrete conclusions (ID/no ID), but not stated the strength of conclusions.
- In order for others to assess the conclusions, the strength of the conclusion (weak or strong) needs to be stated.

Background

- Dec 2015, published an easy and accurate way to assess the strength of a conclusion.
- This presentation is a simplified explanation of the published material.

Journal of Cold Case Review Volume 1, Issue 2, December 2015

Complexity, Level of Association and Strength of Fingerprint Conclusions

By Michele Triplett [1]

Abstract

False convictions and false incarcerations have pushed the topic of forensic errors into the national spot light. Friction ridge comparisons (referred to as fingerprints for the remainder of this paper) are very accurate but errors have occurred. The strength of any conclusion needs to be indicated since criminal proceedings rely heavily on this type of information. The following paper discusses a possible explanation for errors and offers a more accurate and transparent approach for arriving at and reporting results. The proposed approach labels the complexity and demonstrable level of association found between two impressions which allow others to more accurately discern the strength of a

Why State the Strength?

- Determines significance (vital information)
  - Medical condition (autism, down syndrome, cancer, broken leg): mild or severe? hairline or complex fracture?
  - Car broken: how much to fix? how long in the shop?
  - Car accident: were they injured?
  - Found money: 5 cents or $100?
  - How solid is the conclusion? Strong or at risk for error?
- Transparency
- Without criteria to determine strength, strong conclusions appear weak (Bornyk case), weak conclusions appear strong/overstated (2 ID's in Dandridge case)

Limit Overstatements

- Noted in 2009 NAS Report
- IAI 2010, rescinding resolutions
- 2012 Human Factors Report
- SWGFAST - determinations
- OSAC's Work
- Agencies: 2015 Army Crime Lab New Wording

"The latent print on Exhibit ## and the record finger/palm prints bearing the name XXXX have corresponding ridge detail. The likelihood of observing this amount of correspondence when two impressions are made by different sources is considered extremely low."

2016 DOJ Proposal Language for Testimony and Reporting

Past Methods to Show Trustworthiness

- Locard's Rule
- Fingerprints have been accepted for 100+ years
- 15 points in common
- Practitioners are certified, 25 years of experience
- 100% confidence (shows conviction)
- Error rate studies (shows how often practitioners are accurate, not when accurate)
- Verified (shows agreement, not accuracy – most errors were verified, yet incorrect)
- SWGFAST Sufficiency Graph
- Mathematical models

Limitations of Past Methods to Show Trustworthiness

- Does not measure or ensure accuracy
- Does not diminish errors
- Does not allow others to judge the strength of a conclusion
- Leaves out the relevant information

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- Quality, and Interpretation of Data

Alternative Approach

- Measure the acceptable Level of Association that holds up under scrutiny.
- ‘Acceptable Level of Association’ is how past errors were determined. The erroneous conclusions held up to verification, but did not hold up under scrutiny.
- Diminishes bias, Limits Interpretation, and STRENGTHENS CONCLUSIONS

Measuring Acceptable L of A

- Determine Complexity
- Complexity determines the Testing needed

  (Testing is holding the data and conclusion up to the light of scrutiny, have others try to falsify the conclusion, prove it wrong, have others try to disprove the hypothesis, or prove the null hypothesis – this is much more than verification, much more than an independent analysis, or someone repeating the conclusion, asking: is the conclusion well supported)

- Testing determines the acceptable level of association

Example regarding an injury:

Complexity	What Is Needed
surface wound	needs a bandage
internal bleeding	needing surgery

Basic

- Region and orientation are known
- Galton points, spatial relationship, and intervening ridges are being interpreted
- Not all data is needed
- Interpretation/correlation of data is easily reproducible by others

- MOST TENPRINT COMPARISONS

Advanced

- Region and orientation are unknown (search more difficult)
- Ancillary features (scars, creases, incipient ridges) are being interpreted
- The interpretation of data has slight ambiguity (may not initially be interpreted the same by others);
- However, the interpretation of data can easily be demonstrated to the satisfaction of others

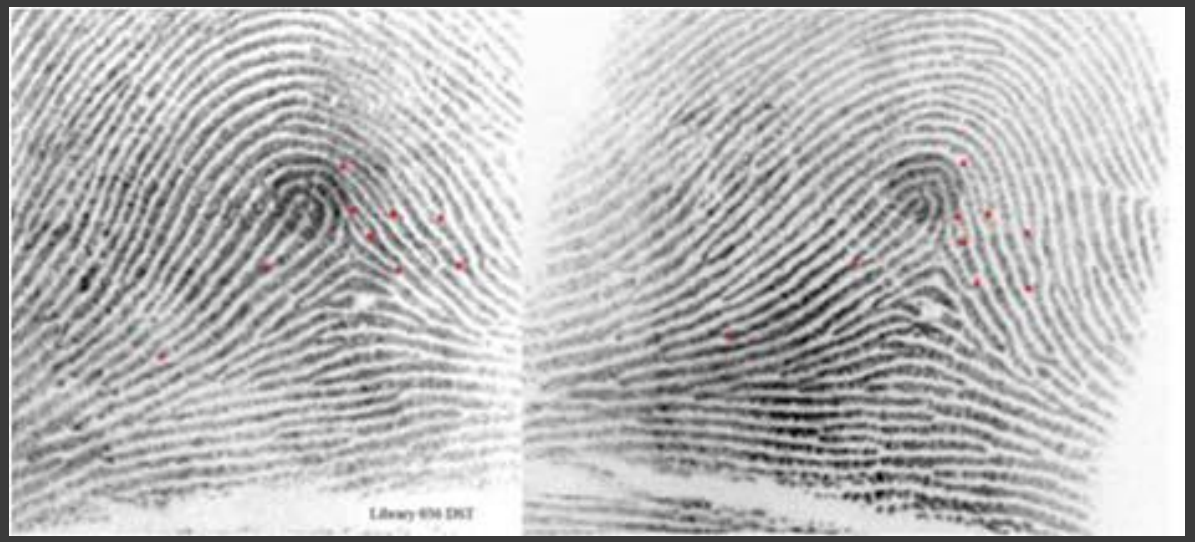
- MOST LATENT COMPARISONS

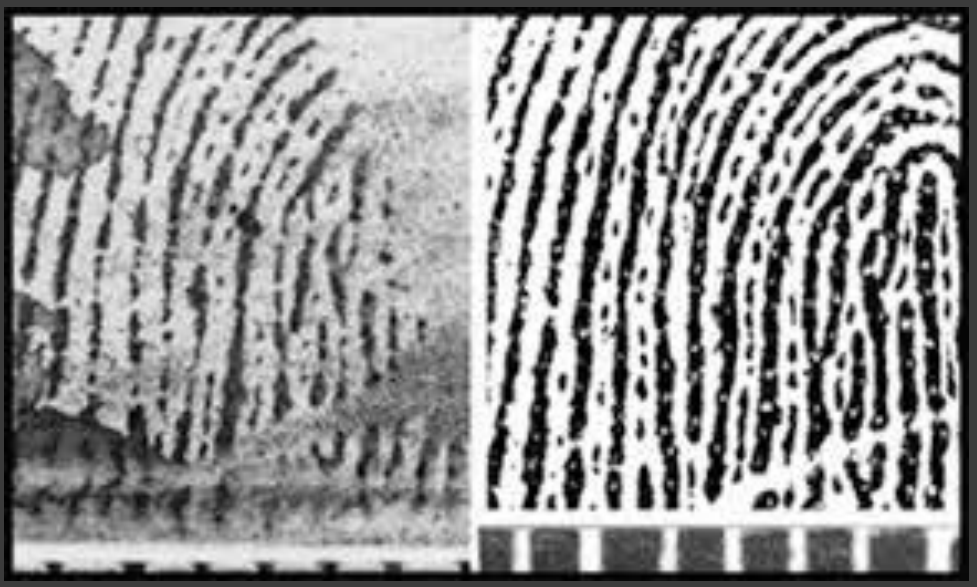
Complex

- The correlation of data is extremely limited (making it necessary to use rarity, ridge shapes, edges, pores, or features in simultaneous impressions)
- Predominant ambiguity (difficult to demonstrate to the satisfaction of others)

- Tonal Shifts, Limited Data, Mayfield, Daoud, McKie

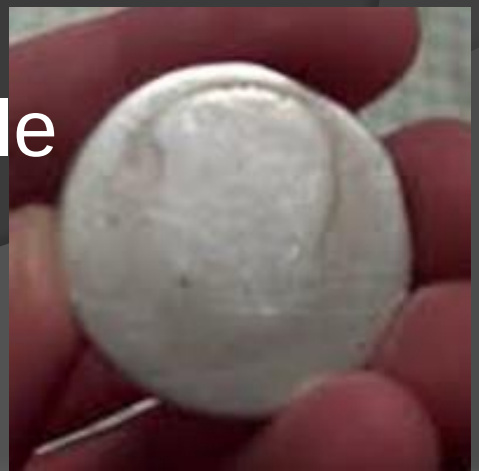
Basic / Advanced / Complex





Basic / Advanced / Complex

- Overwhelming amount of clear data, easily repeatable
  - Little risk of error
- Compelling amount of data, easily demonstrable
  - Small risk of error
- Low amount of quantity and quality, not as easily demonstrable
  - Risk of error increases



Complexity Determines Testing

- Basic: Testing not necessary
- Advanced: Testing highly desired
- Complex: Testing against scrutiny required (scrutiny found errors)

Testing Determines Strength…

- …based on data, instead of saying

-Fingerprints has been around for 100 years

-I have 20 years of experience

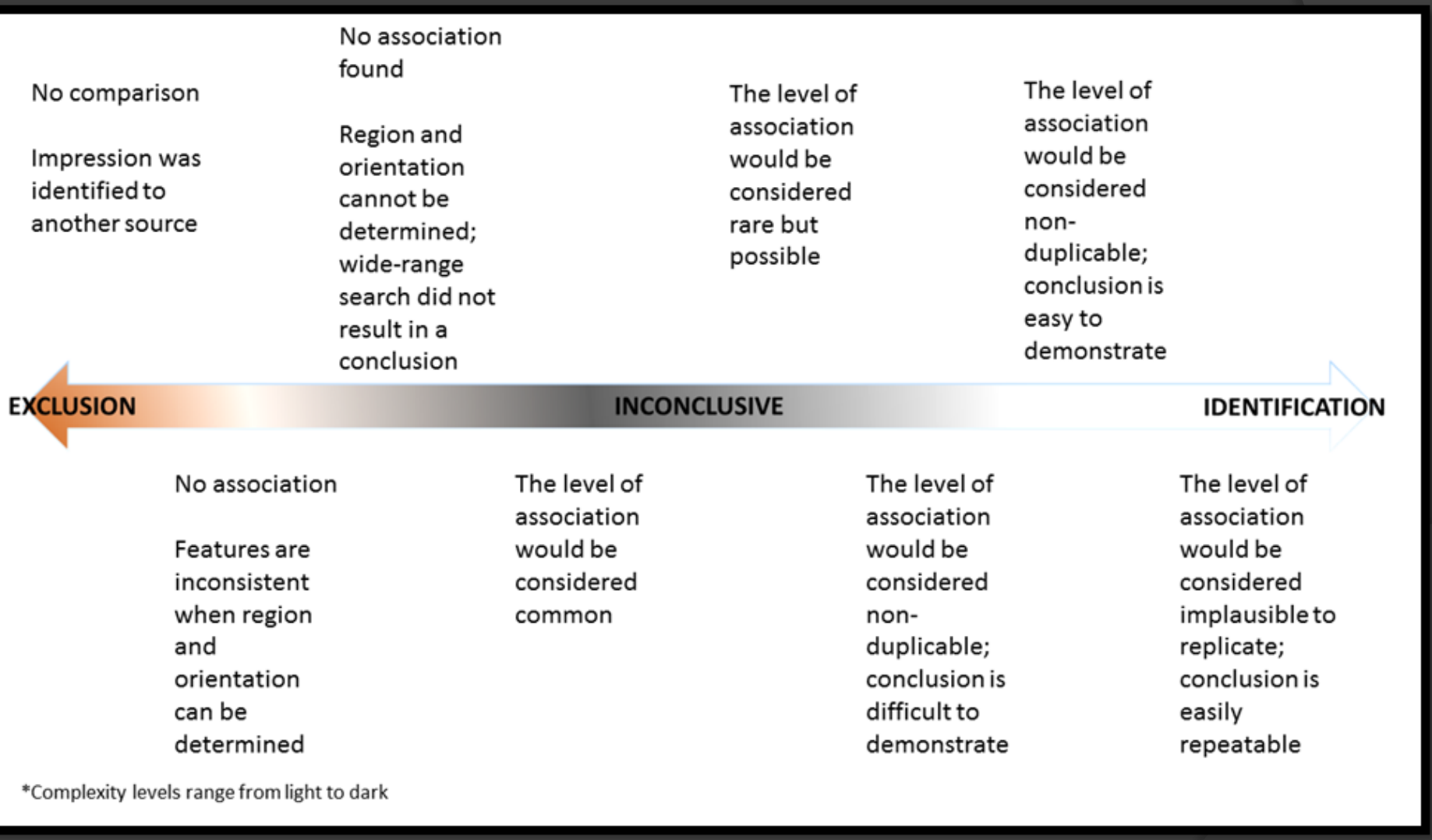
-Studies show low risk of error (right most of the time)

-I'm 100% confident (but could still be wrong)

Works for all pattern recognition

- This states the quantity and quality of the data, and a tested conclusion, not just someone's opinion.

Testing Determines the Acceptable Level of Association (the conclusion)



Level of Association Continuum

- Verbal Scale
- Common for non-quantifiable conclusions
  - Broken Bones: hairline, compound
  - Hospital Scale: stable, serious, critical
  - Cancer: Stage 1, 2, 3, 4
- Still uses the word *considered* but it's considered through *testing for supportability,* not simply considered by repeatability or by those who agree
- Gives more options for conclusions, more accurate information

Verification as Scrutiny

- Not Verification as an independent assessment (others may not independently arrive at some conclusions but that does not discount the strength of the conclusion).
- Not Verification as agreement
- Verification as ensuring the conclusion is supported as indicated (corroboration).

Reporting Identifications:

- “The comparison is *Basic*. The level of association is overwhelming and easily repeatable by others.”
- “The comparison is *Advanced*. The level of association is *compelling*, easily demonstrable, and considered implausible to replicate.”
- “The comparison is *Complex*. *Testing against strong scrutiny* determined the acceptable level of association to be persuasive and considered implausible to replicate.”

Notes:

Results Reported are dependent on the L of A from Testing (which is dependent on the complexity [Qual/Quan])

As Acceptability after scrutiny ↑

S ↑

Risk of Error↓

Strength is based on rigorousness of the Testing, not on the reproducibility

Blind Testing displays reproducibility of the conclusion but does not determine if the conclusion is well supported (i.e. Blind Verification is not valuable as a means of reviewing the basis of the conclusion)

Notes:

- Complex Does Not Mean WEAK
  - Daoud Identification
- Repeatability Does Not Mean STRONG
  - McKie, Mayfield, Dandrigde
- Difficulty Does Not Mean COMPLEX
  - Difficulty is based on training, experience and ability, not on the print

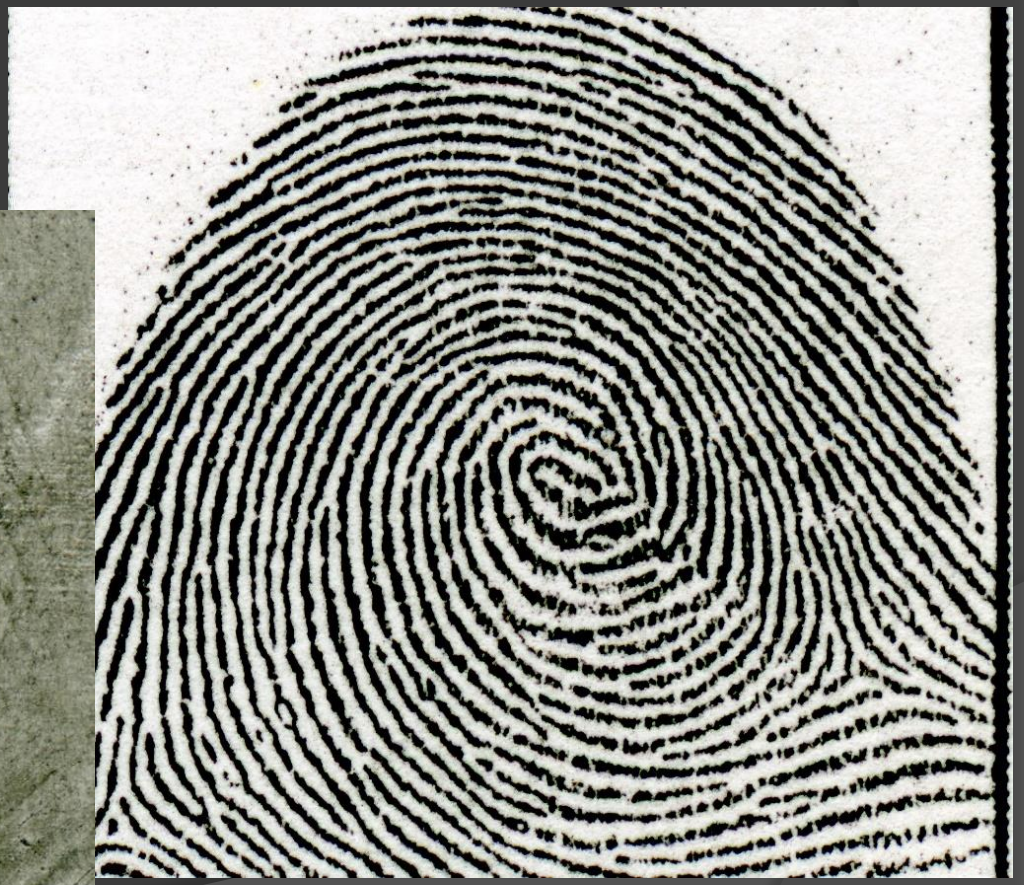
Assessing the complexity of the latent in isolation, it appears basic

Complexity changes during a comparison

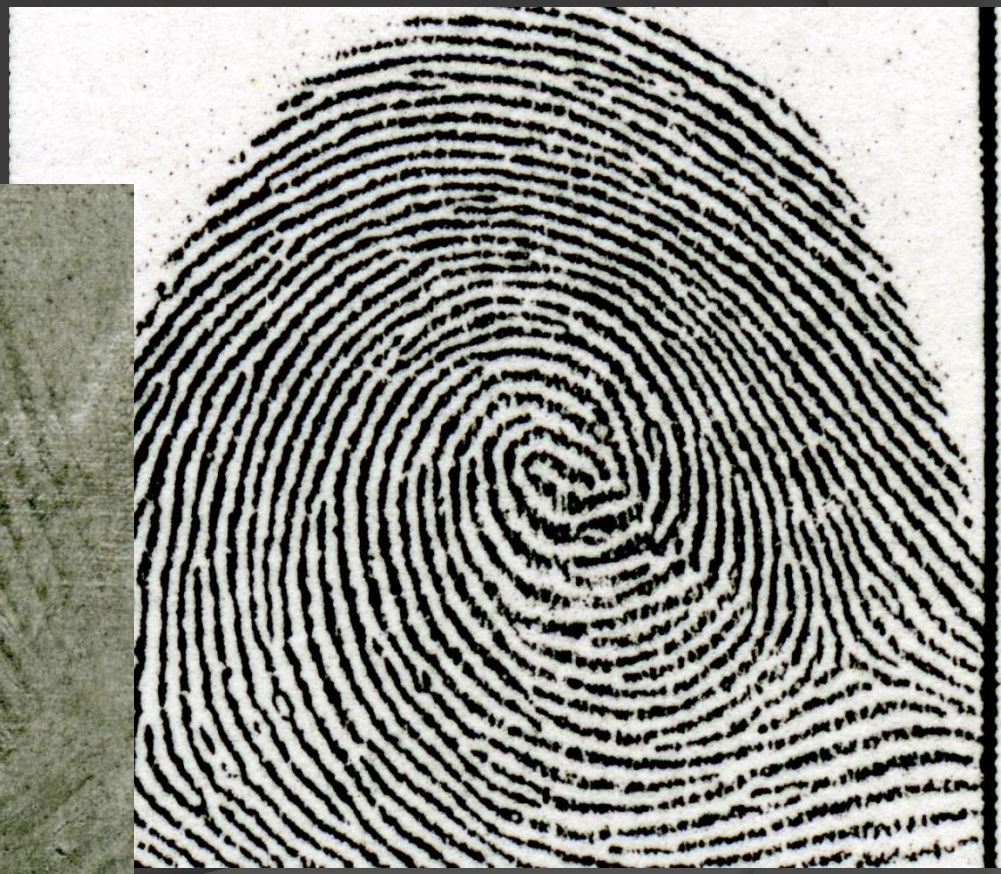
… making the latent assessment irrelevant and unnecessary

Comparison is Advanced:

The interpretation of data has slight ambiguity (may not initially be interpreted the same by others)



Conclusion may not be independently repeatable,
but it is easily demonstrable
Little risk of error



Benefits:

- Not new, a way to articulate the basis for conclusions
- QA Measures are dependent on complexity (when needed), not random (all verified, 10% technically reviewed)
- Limits personal interpretation, which limits bias and subjectivity
- More consistent conclusions because they are based on criteria, not personal beliefs
- Allows practitioners to state strength, and others to assess the risk of error
- Allows for more options for conclusions, can report out close AFIS associations

Accuracy:

- Could the conclusion be incorrect?

  Yes

- However,
  a) the only conclusion the data supports is XXX or
  b) the conclusion has been held up to scrutiny and no indication of error has been found.

  Well supported conclusions,

  not accurate conclusions

No comparison

Impression was identified to another source

No association found

Region and area not known, exhaustive search

The level of association would be considered rare but possible

The level of association would be considered non-duplicable; conclusion is easy to demonstrate

No association

Region, orientation, nor features are consistent

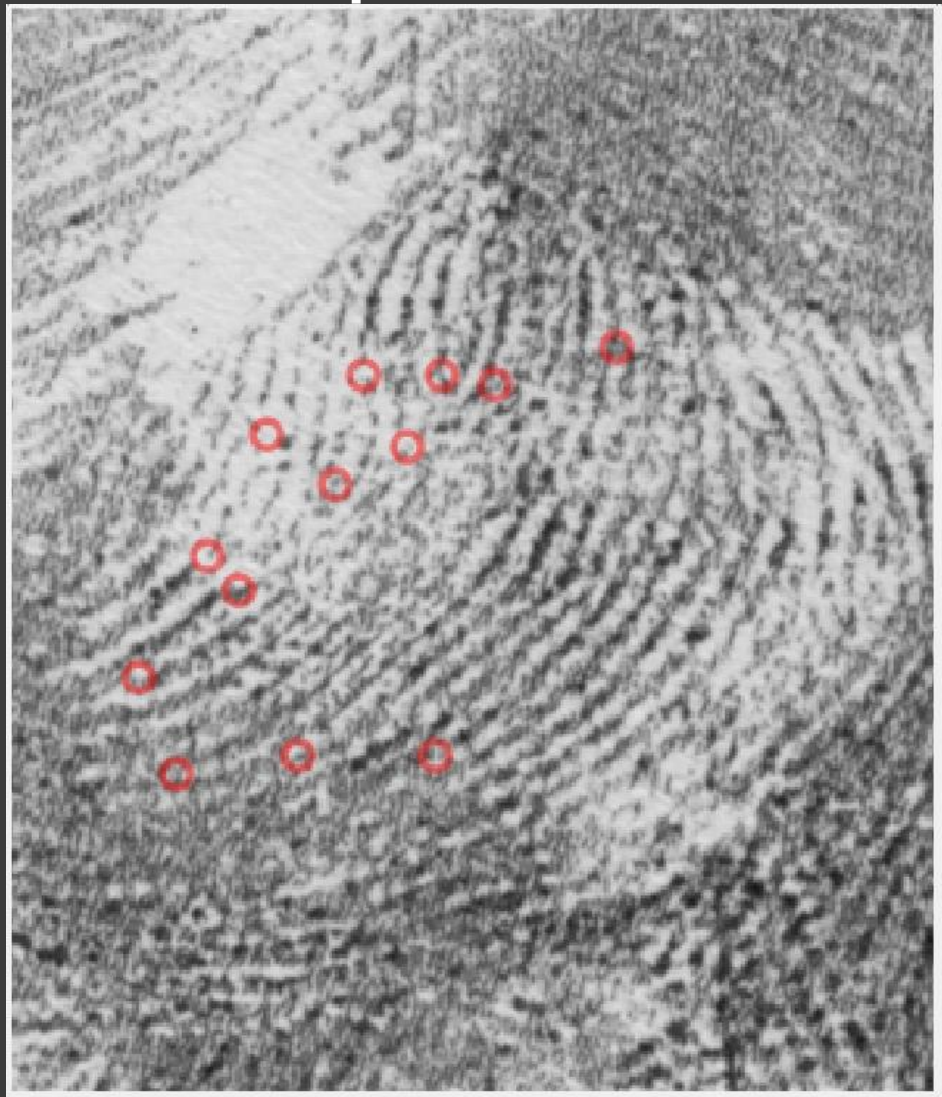
The level of association would be considered common

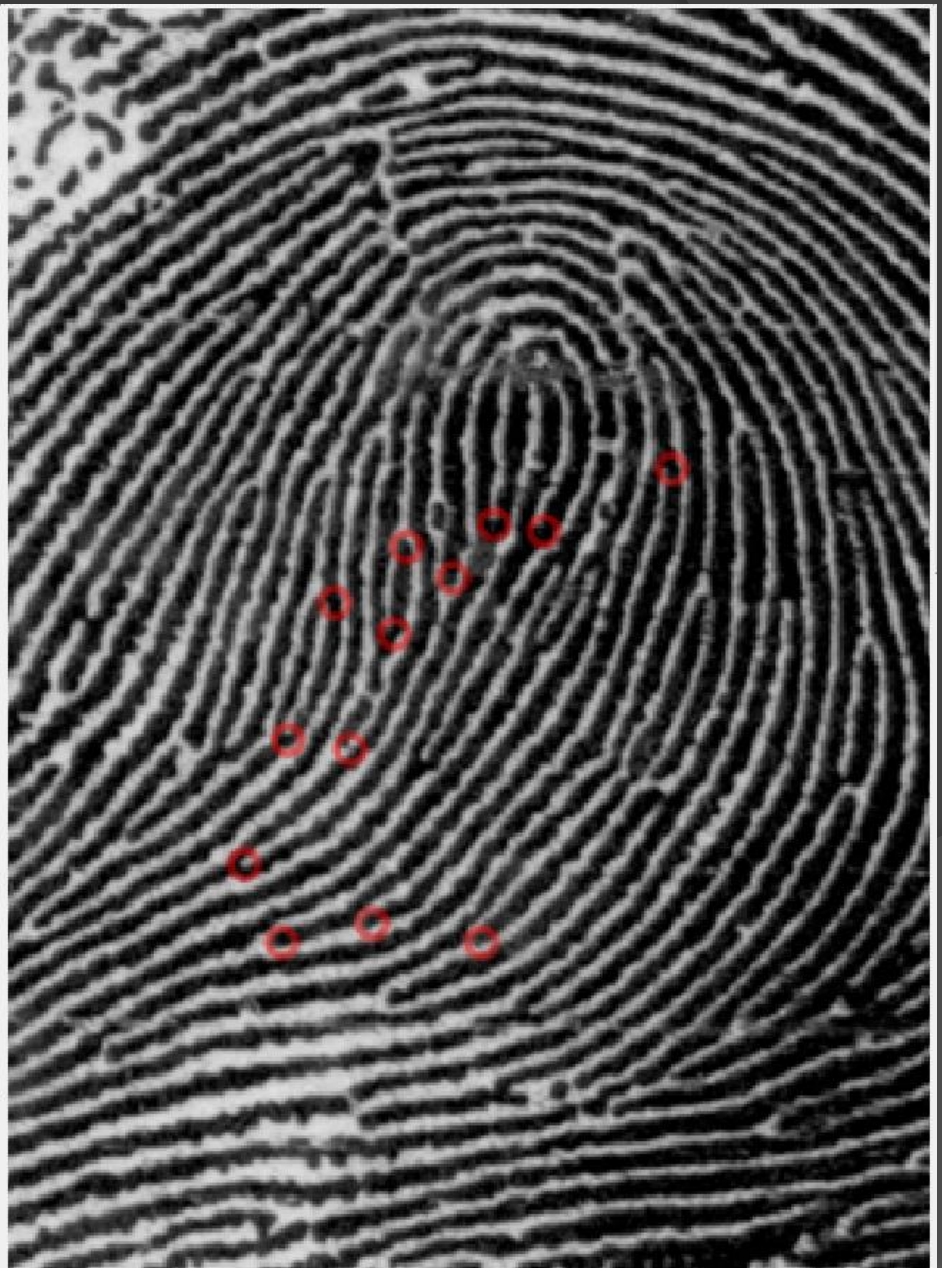
The level of association would be considered non-duplicable; conclusion is difficult to demonstrate

The level of association would be considered implausible to replicate; conclusion is easily repeatable

*Complexity levels range from light to dark

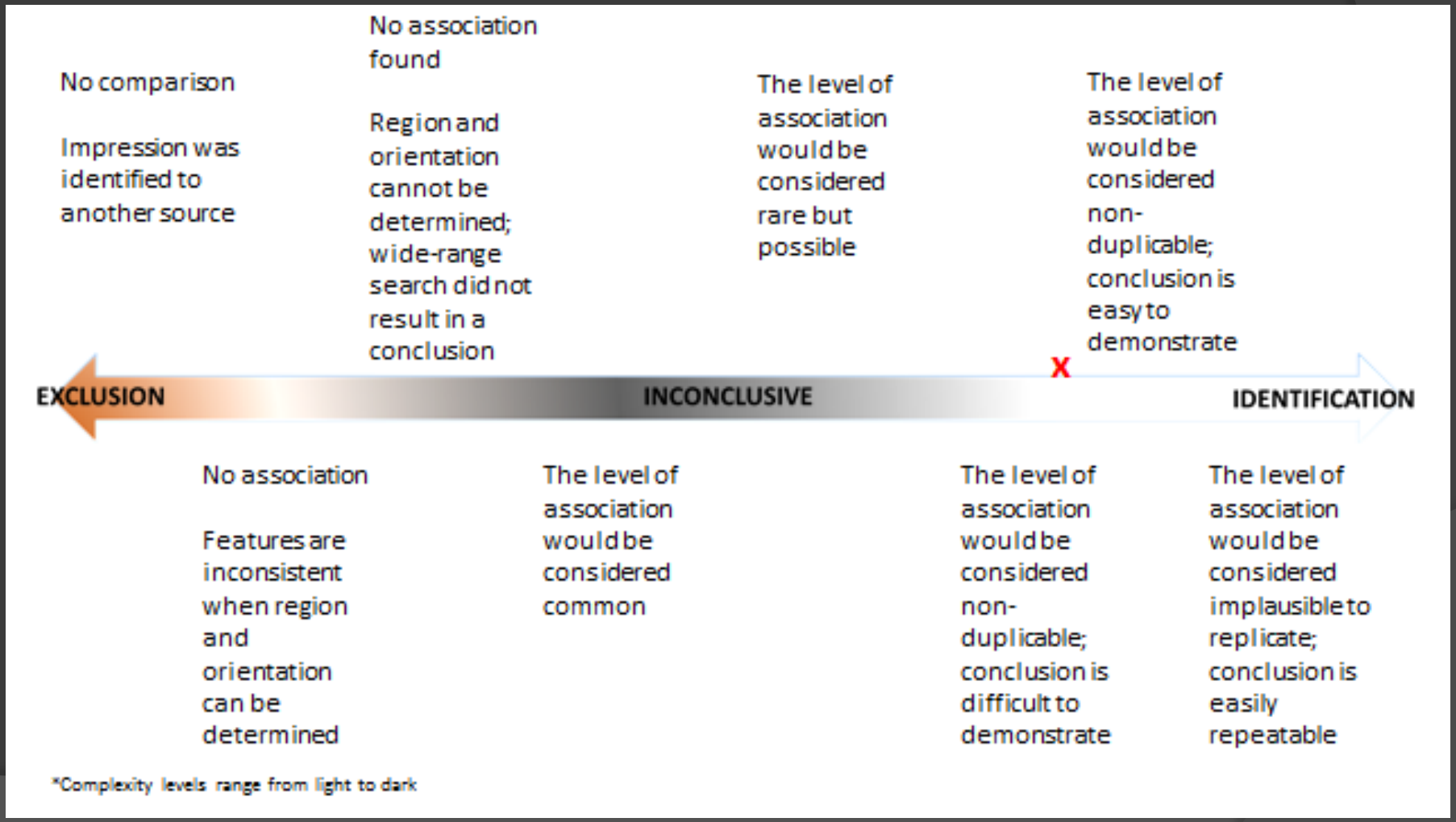
Example 2:



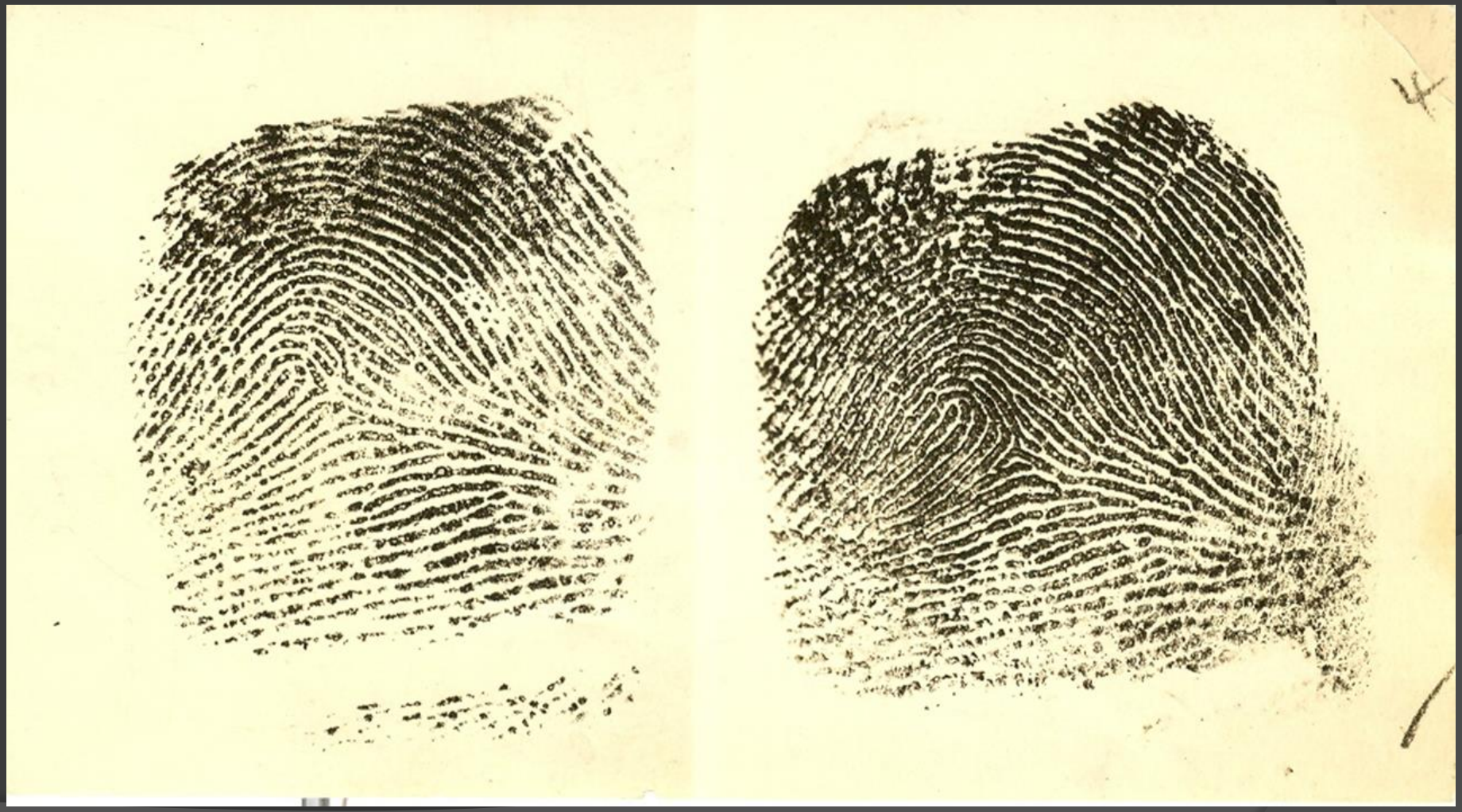


- Semi-complex due to ambiguity as a result of tonal shifting
- Persuasive amount of features that are consistent with the #2 finger (right index) of XXX. No inconsistent features viewed. The conclusion that this latent impression was deposited by XXX can be demonstrated to others and would hold up under intense scrutiny.
- Higher risk of error

Testing Determined Acceptable/Persuasive Level of Association, Higher Risk of Error

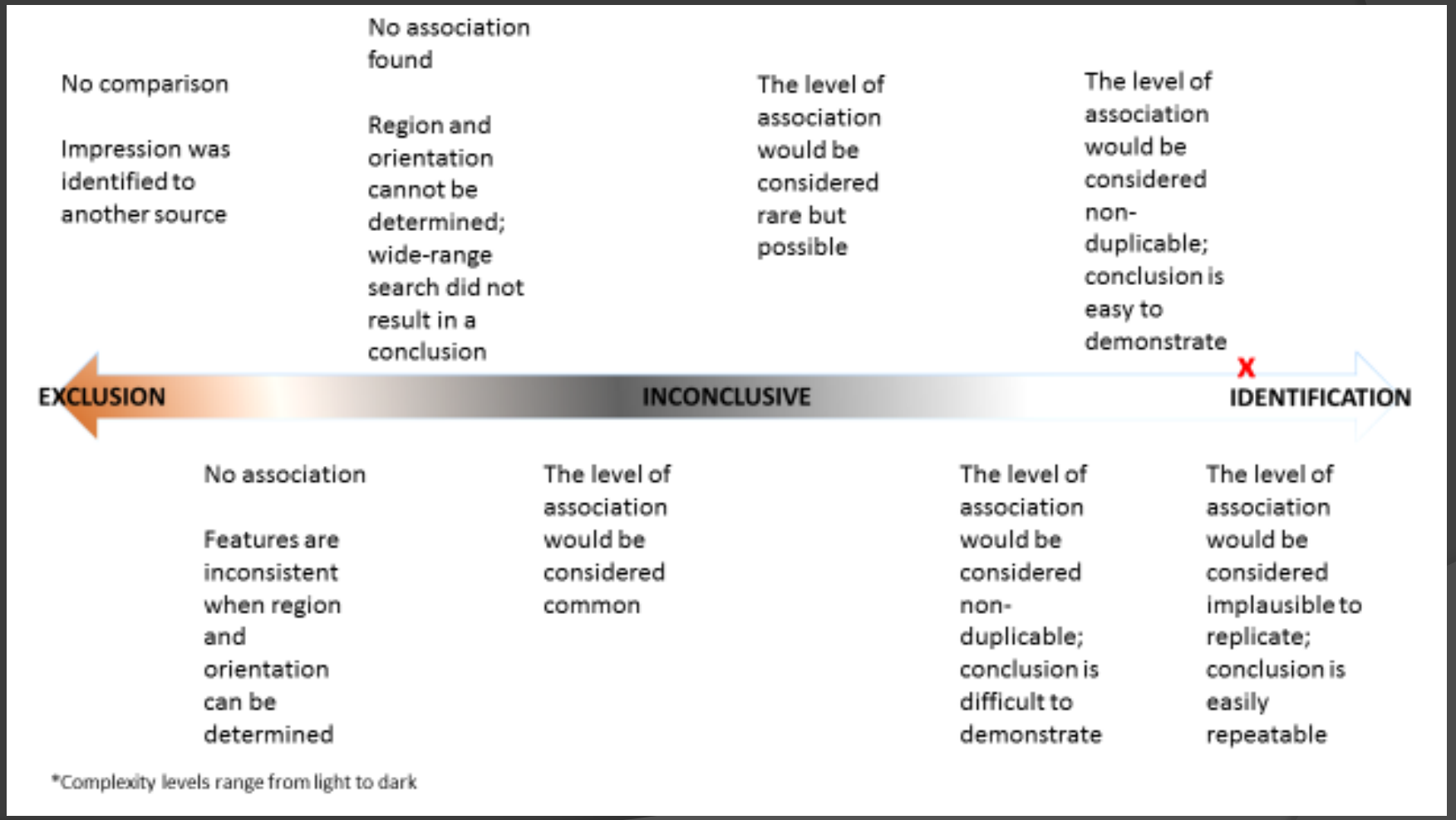


Example 3:

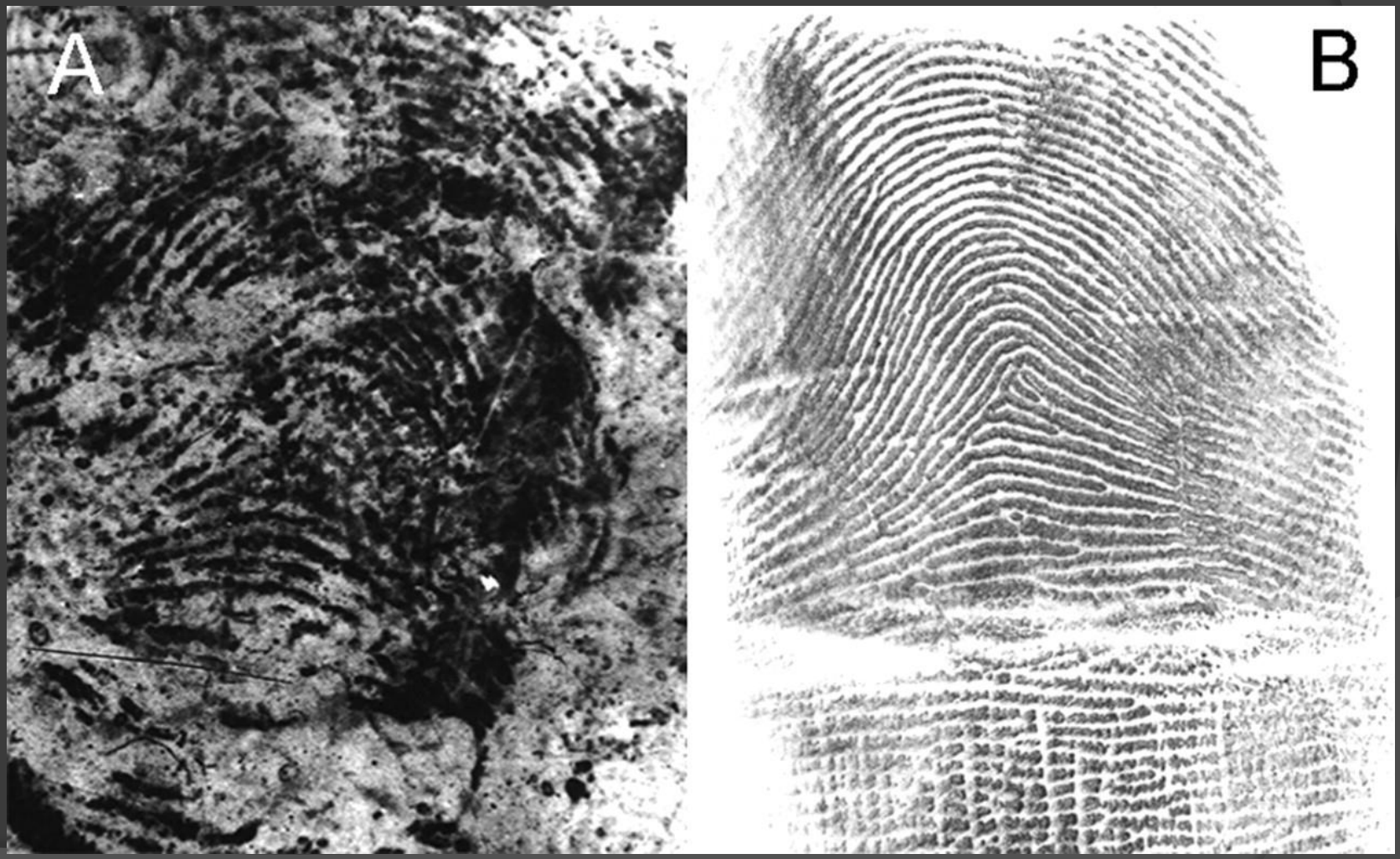


- Known area and direction
- Use of minutia and intervening ridges
- May not be easily repeatable (many would exclude on pattern type)
- Easily demonstrable
- Low risk of error

Compelling Association, Low Risk of Error

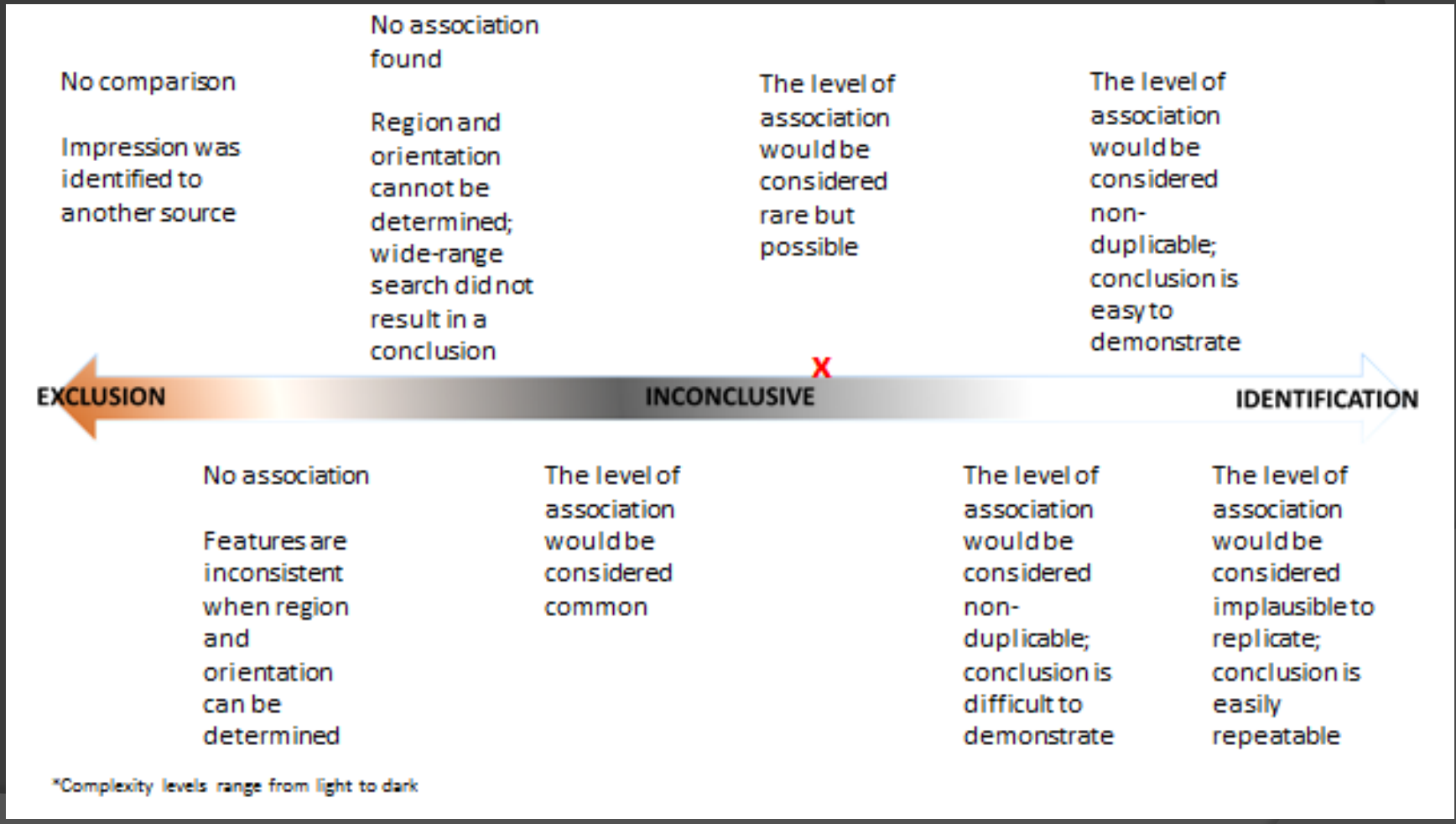


Example 4: Mayfield

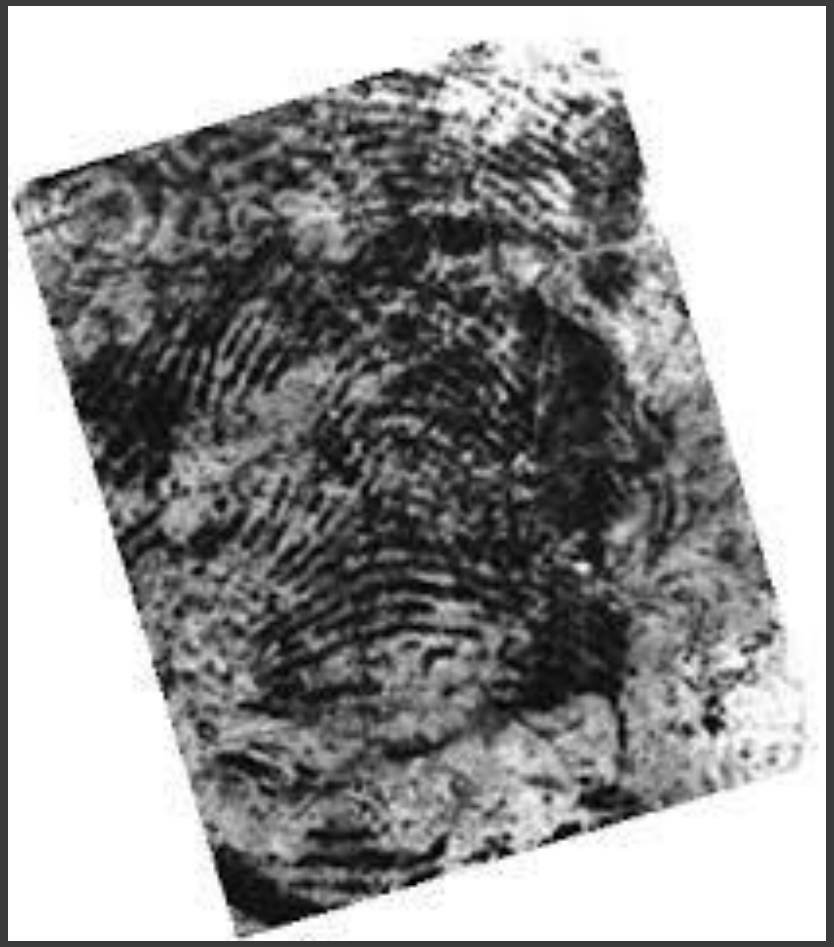


- Complex: High ambiguity (practitioner or others may assess features differently at a different time)
- Requires strong scrutiny (not simply others agreeing)
- Did not hold up to strong scrutiny
- Very high risk of error

Testing Determined Considerable (or Non-Acceptable) Level of Association, High Risk of Error as an ID

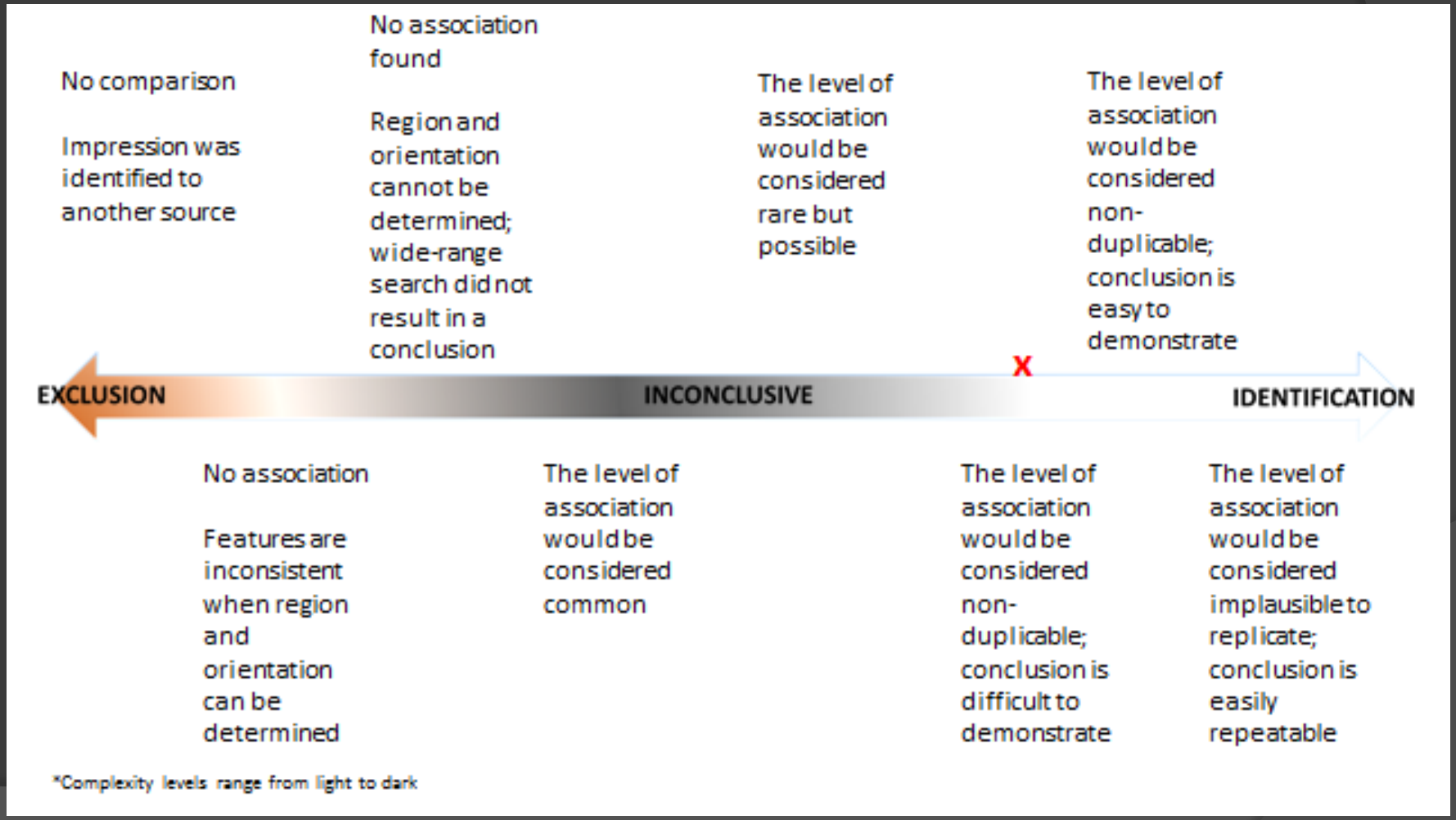


Example 5: Daoud



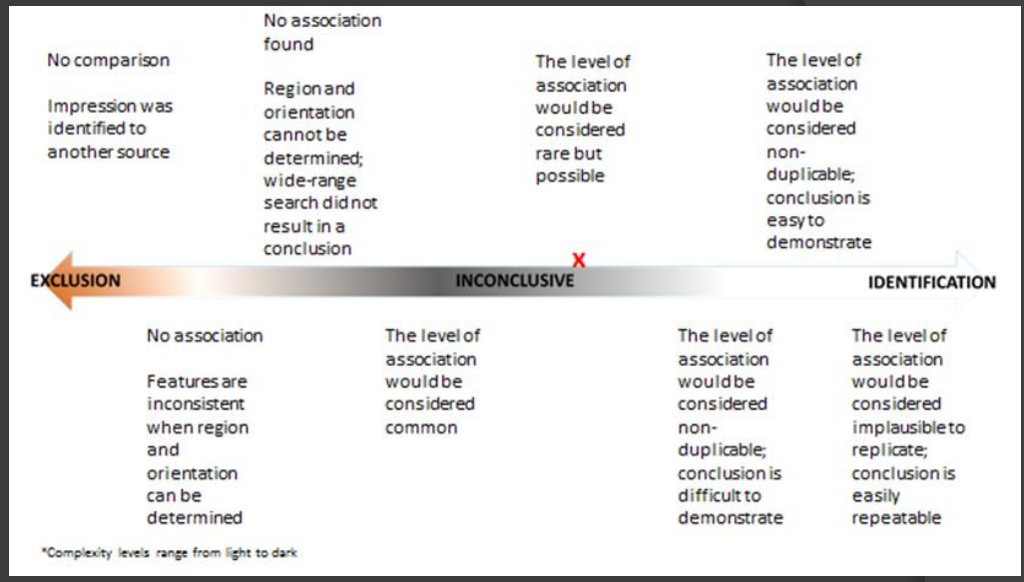
- Complex: High ambiguity (practitioner or others may assess features differently at a different time)
- Requires strong scrutiny (not simply others agreeing)
- Held up to strong scrutiny… low but acceptable level of association (not repeatable by all others but it is demonstrable to others)

Testing Determined Acceptable (Persuasive) Level of Association, Higher Risk of Error

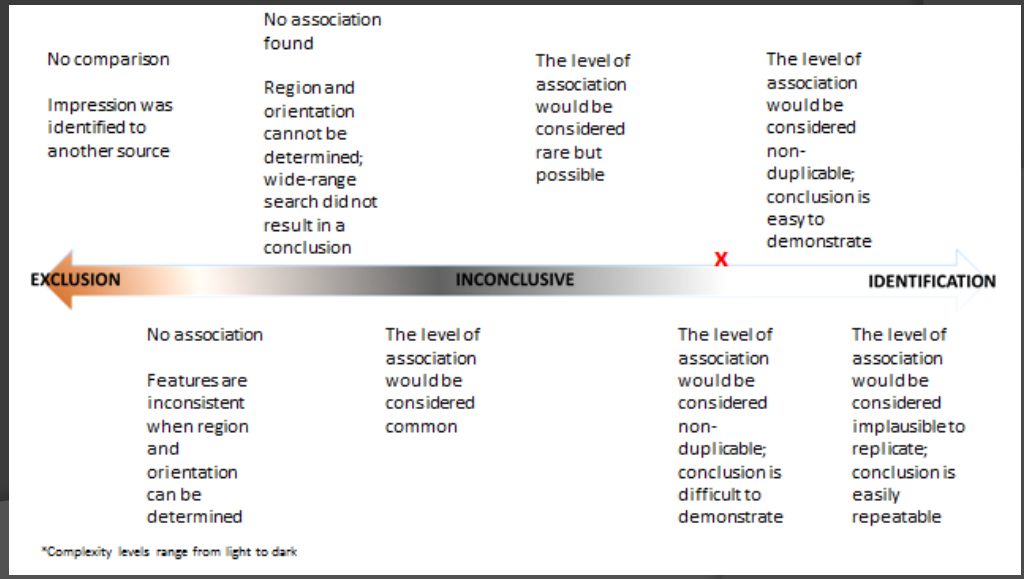


Mayfield vs Daoud

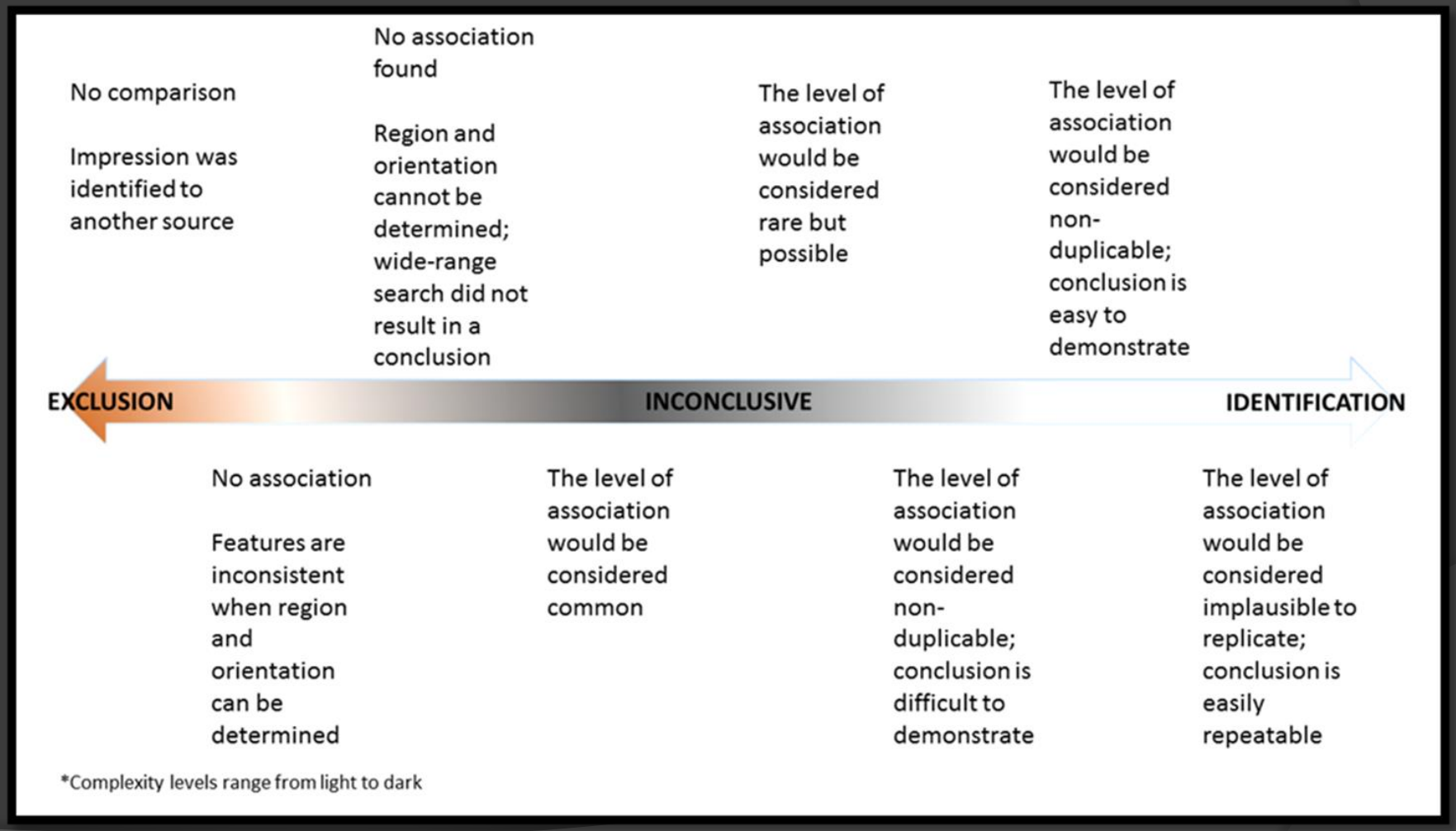
Non-Acceptable Level of Association (Inconclusive)



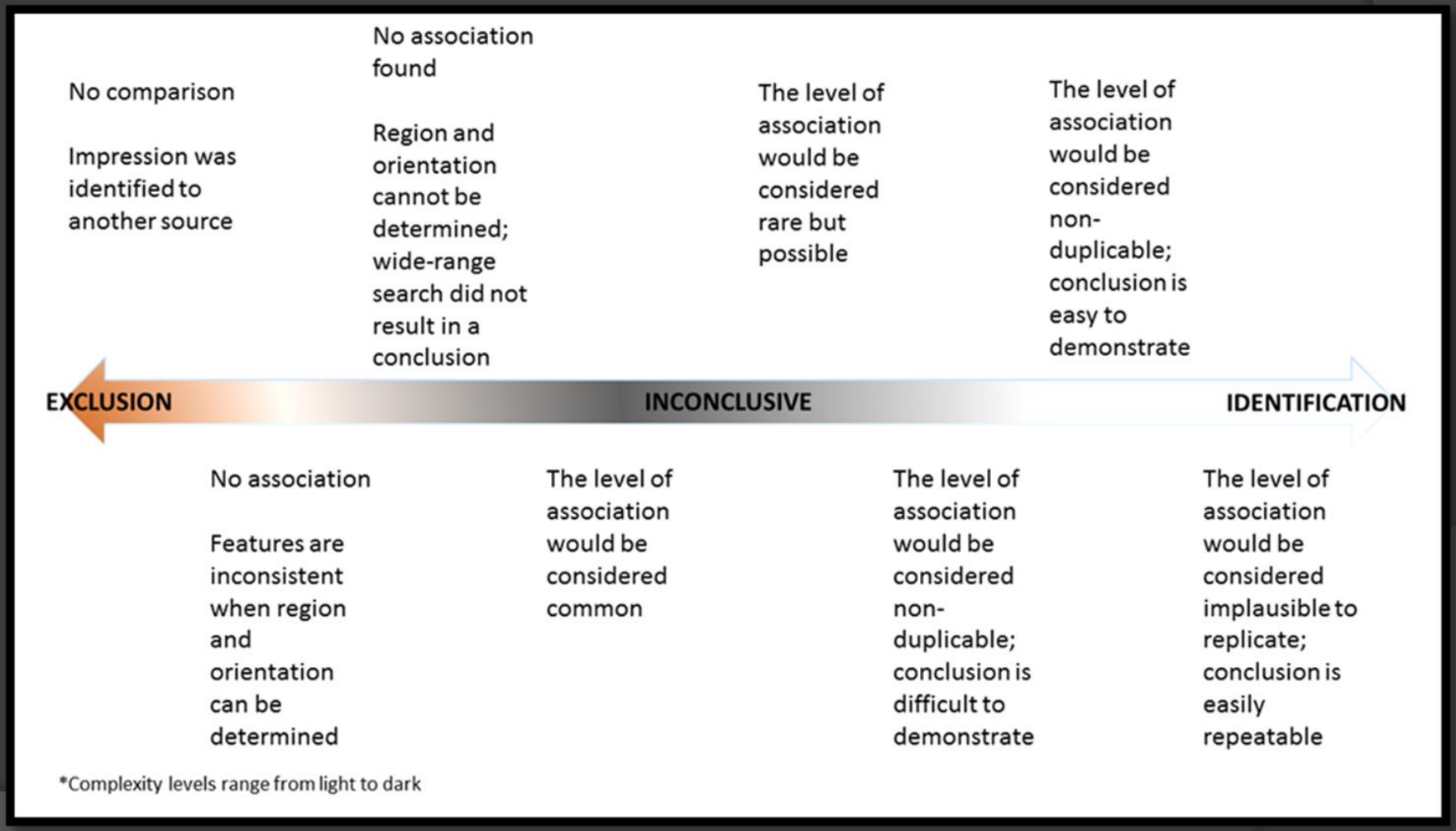
Low but Acceptable Level of Association



Entire Scale



3 Levels for Identifications
3 Levels for Inconclusive
2 Levels for Exclusions



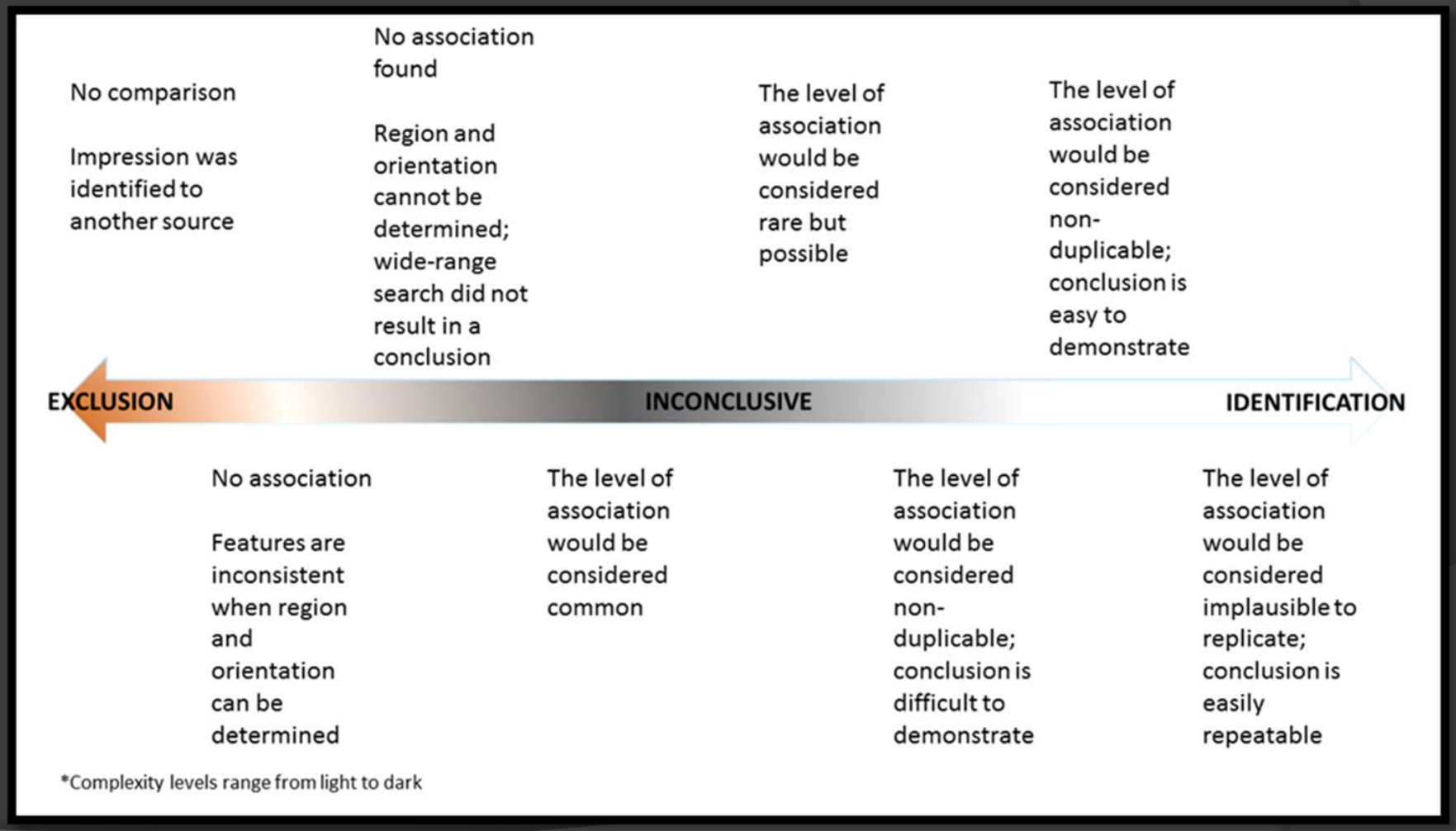
Identifications

A) Overwhelming Association, easily repeatable

B) Compelling Association, easily demonstrable

C) Persuasive Association, difficult to demonstrate but acceptable

3 Levels for Inconclusive



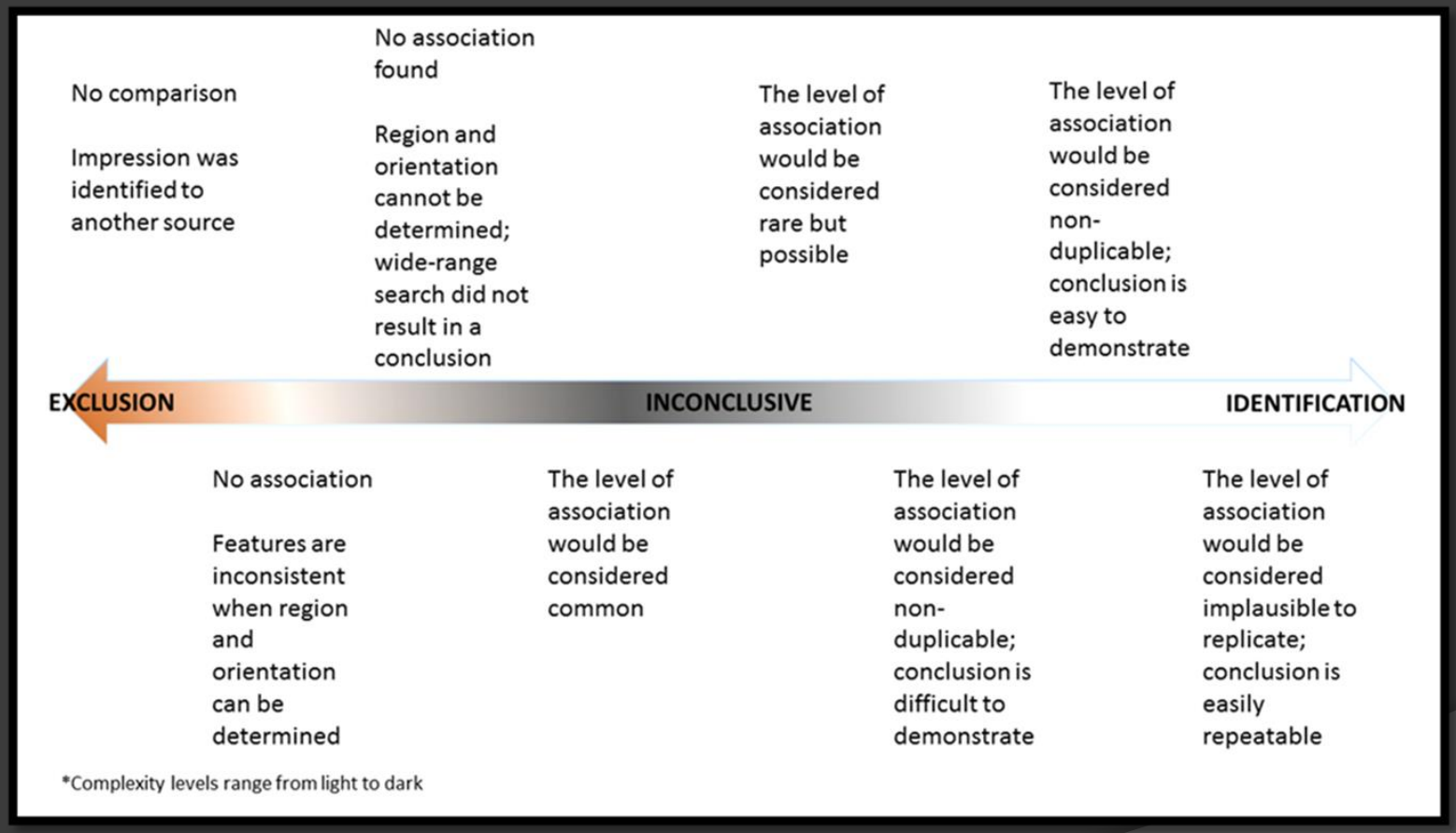
Inconclusive

A) Considerable Association but not sufficient

B) Marginal or Common Amount of Association

C) No Association Found

2 Levels for Exclusion



Exclusions

A) No comparison, ID’d to another subject

B) No Association Exists

Scale (Exclusion, Inconclusive, Identified)

- No Comparison, ID'd to another subject
- No Association Exists (or Overwhelming inconsistency exists)

- No Association Found
- Common Amount of Association
- Testing determined a High or Considerable Amount of Association, but duplication is possible (or an ID does not hold up to scrutiny - may be reported as an investigative lead

- Testing determined a Persuasive Amount of Association, duplication considered implausible, difficult to demonstrate but holds up to scrutiny
- Compelling Amount of Association, duplication considered implausible, easy to demonstrate
- Overwhelming Amount of Association, duplication considered implausible, easily repeatable

Scale (Exclusion, Inconclusive, Identified)

- No Comparison, ID'd to another subject
- No Association

- No Association Found
- Marginal Association
- Considerable Association, not sufficient (investigative lead)

- Persuasive Association, difficult to demonstrate
- Compelling Association, easy to demonstrate
- Overwhelming Association, easily repeatable

Stating the Level of Association

- Gives others more information so they can judge the relevance of the information
- Give examiners the ability to show the strength more accurately
- Should be expected in any case
- Is the professional way to give conclusions

Additional Benefits

- Allows us to critique the complexity of competency tests, proficiency tests, and certification tests.
- Allows us to hypothesize without having to say, ‘I’d have to see the print’.
- Allows us to judge the ability level of practitioners.


Reactive
Proactive

Persistent Forensics Lab Problems Undermine Faith in Our Criminal Justice System, John Malcolm, 2016

"… the day when judges and jurors no longer trust the government's experts. That would be a dark day indeed, and if it happens, the government will have only itself to blame."

Questions

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