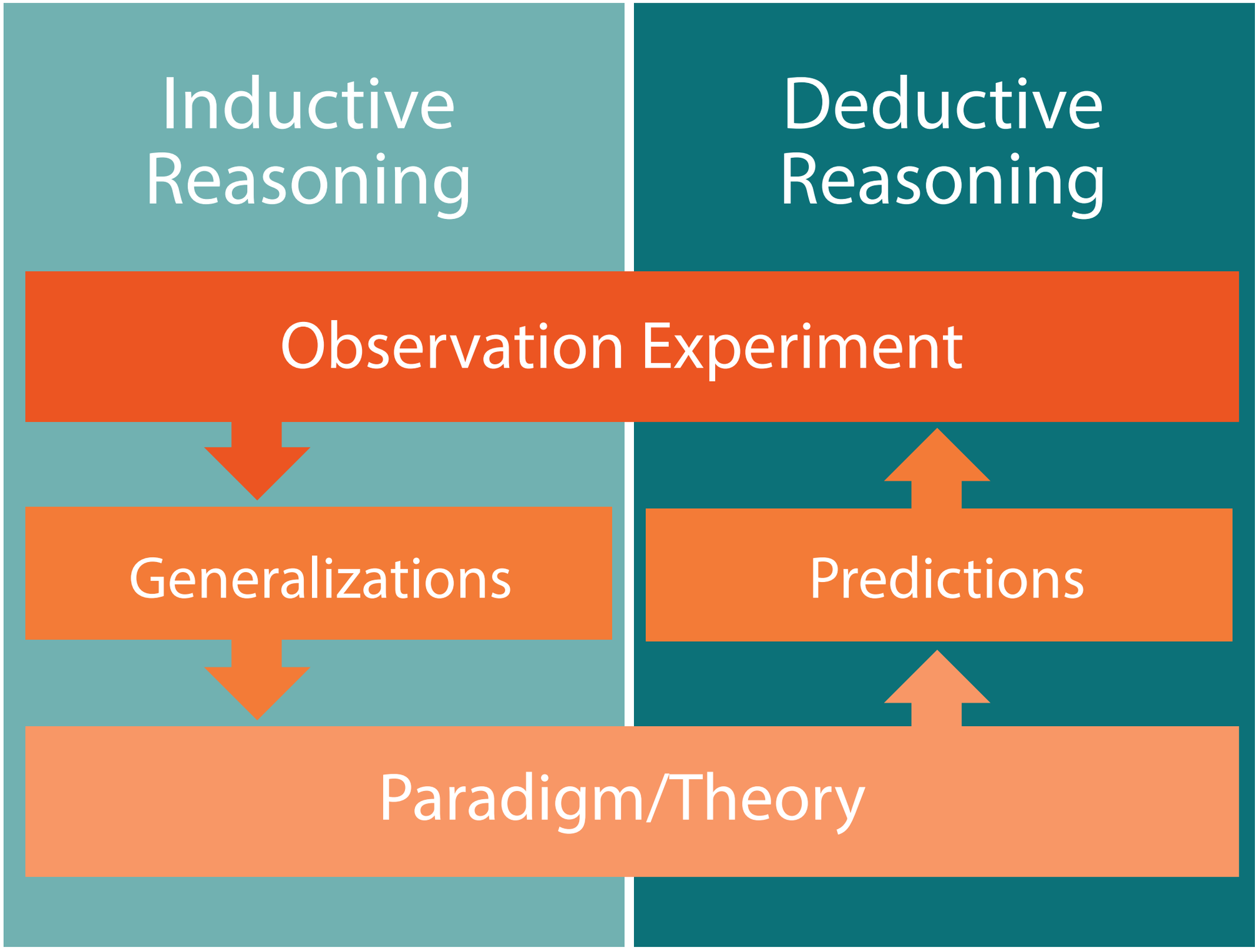
Forensic Investigation Myth

How forensic evidence can mislead us



Source: Forensics: Examining the Evidence, “Understanding the Scientific Method,”

www.forensicbasics.org/science-law/what-constitutes-science/understanding-the-scientific-method

DEDUCTION vs INDUCTION

Theory

↓

Hypothesis

↓

Observation

↓

Confirmation

Theory

↑

Hypothesis

↑

Pattern

↑

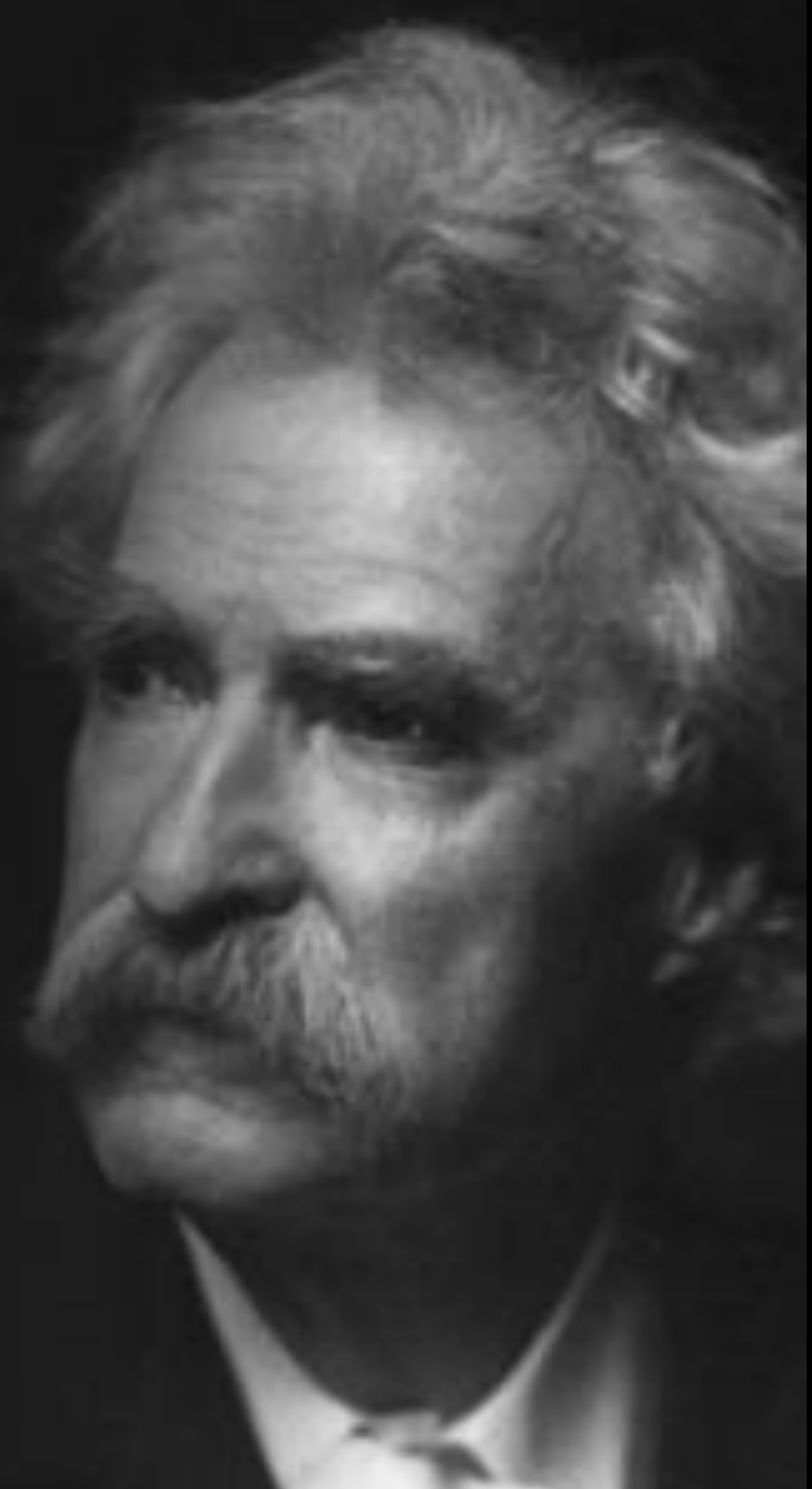
Observation

ARISTOTLE

SHERLOCK

There are three kinds of lies - lies, damned lies and statistics.

Mark Twain



INSIDE *the* CELL

THE DARK SIDE *of* FORENSIC DNA

ERIN E. MURPHY

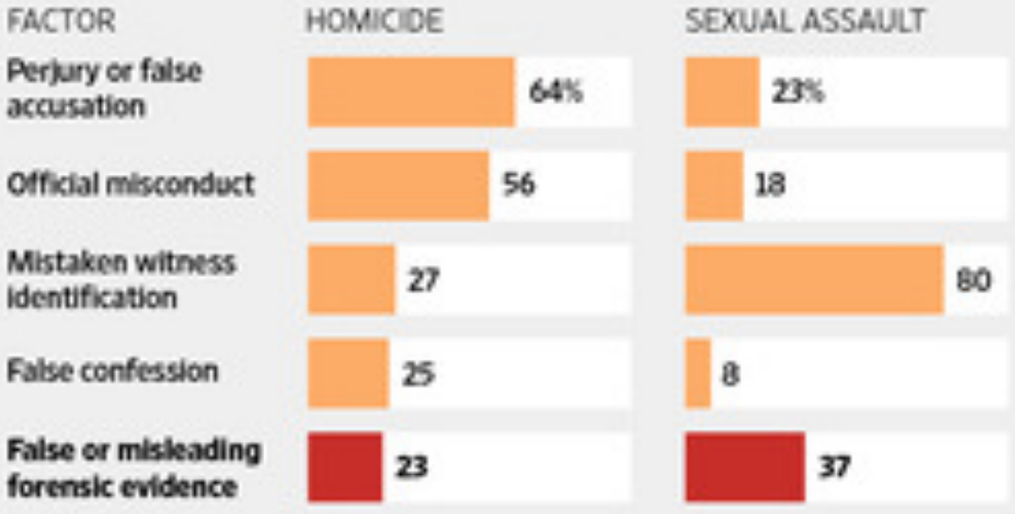

Lydia Fairchild

Polygraph machines are **not** foolproof

Convicted, Then Exonerated

Flawed forensic evidence has contributed to scores of wrongful homicide and sexual-assault convictions.

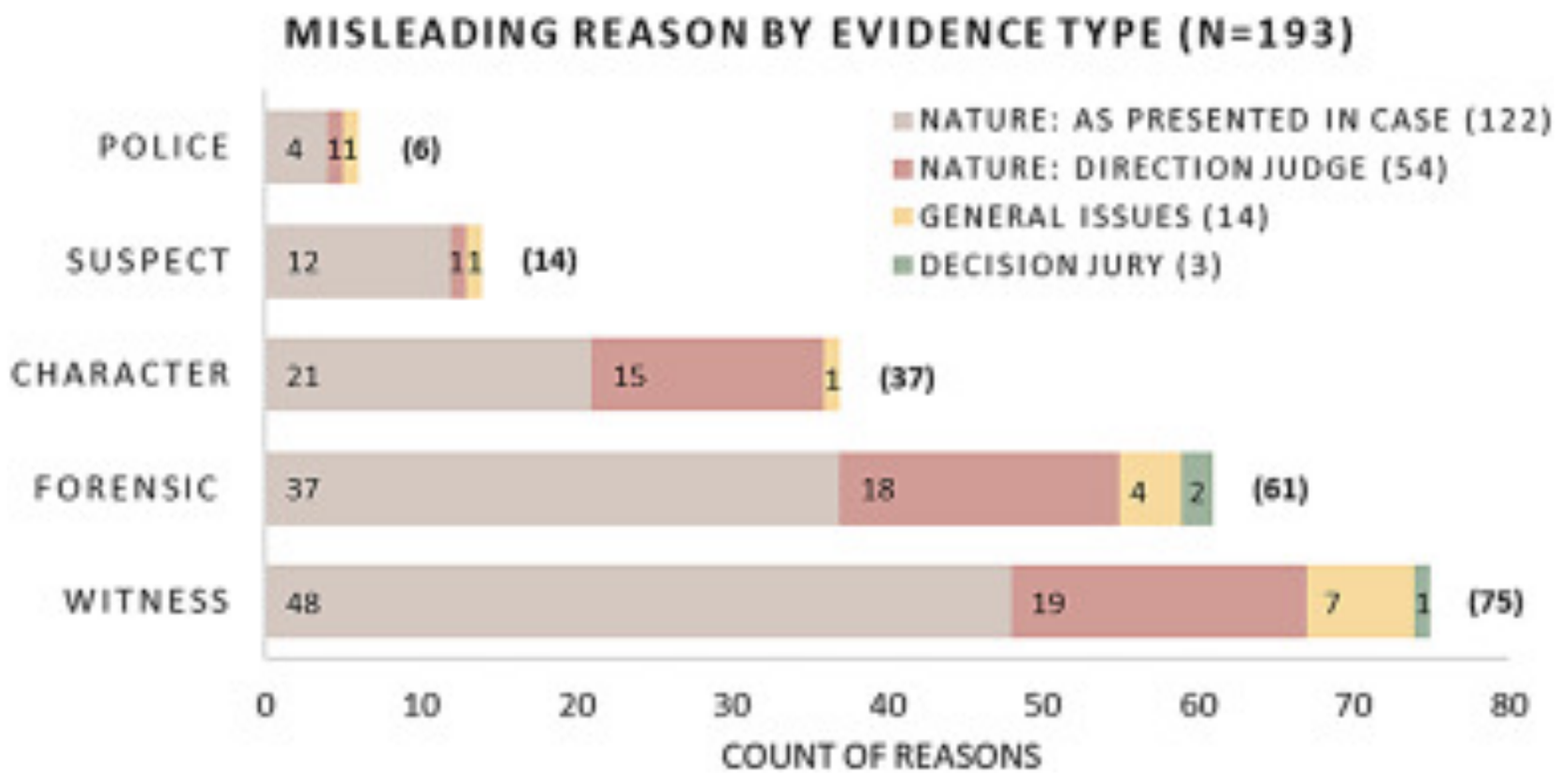
How often various factors contributed to exonerations, 1989–2012



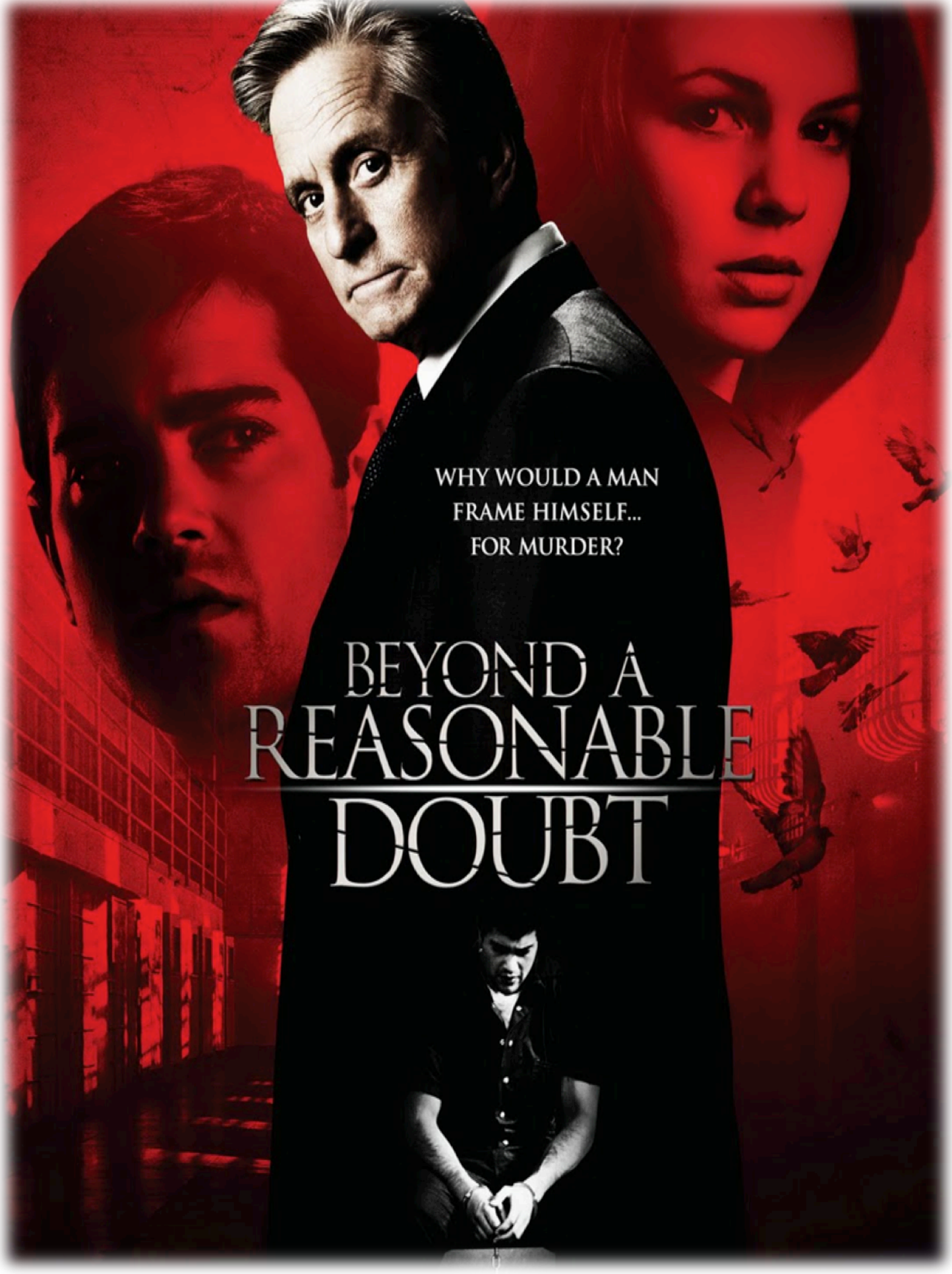
Note: Data represent 416 homicide cases and 203 sexual-assault cases; more than one factor could have contributed to a conviction.

Source: Northwestern University and University of Michigan

The Wall Street Journal




WHEN THEY SEE US
NETFLIX


WHY WOULD A MAN
FRAME HIMSELF...
FOR MURDER?
BEYOND A
REASONABLE
DOUBT

Information Security ≠ Cybersecurity

Information

- Paper
- Digital
- Intellectual Property

Digital Assets

- Networks
- Hardware
- Information systems

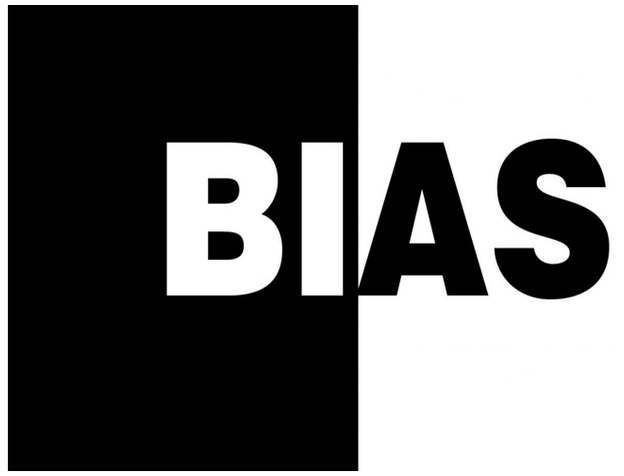
DIGITAL DUST

Biased AI

“AI can be sexist and racist — it’s time to make it fair” (Nature Mag, July 2018)

More “serious scenarios”: Justice System

- Patrolling and crime prevention: this type of applications typically suffer from a bias against ethnic minorities (i.e. African Americans)
  - With similar condition, an African American offender is classified 4 times more “risky” than a white American in a similar situation
  - Based on recommendations from AI, ethnic minority district are over-policed which exacerbate the bias already existing in the justice system



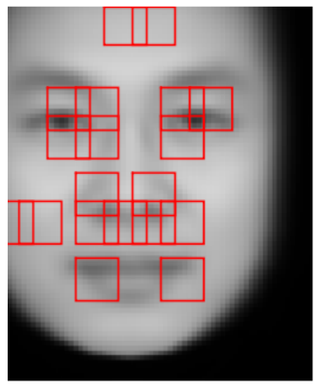
More “serious scenarios”: Criminology

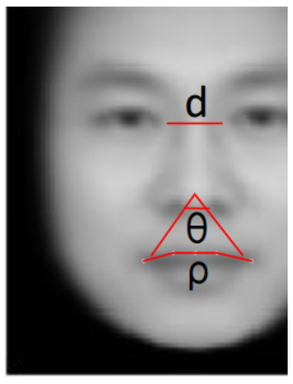
- In 2016, researchers from China published a study claiming to be able to classify criminals based on their faces (90% precision)
  - The claim here is that there exist criminal “facial features”
- the algo relies on ID photos of convicted people supplied by Chinese police
- Significant Criticism: the authors rely on photos of convicted people and call them criminals. However, bias inherent in the justice system

(a) Three samples in criminal ID photo set S_c.

(b) Three samples in non-criminal ID photo set S_n

Figure 1. Sample ID photos in our data set.





FACEPTION

Reveal personality from facial images

An emerging “biased” business?

- Based on face images, the company claim that it can
  - “Estimate the IQ”, “identify the photograph” of “academic researchers”, “terrorists” and “pedophile”
- Imagine such a service employed unofficially by an embassy to determine who gets a visa, or who is to be recruited for a job?

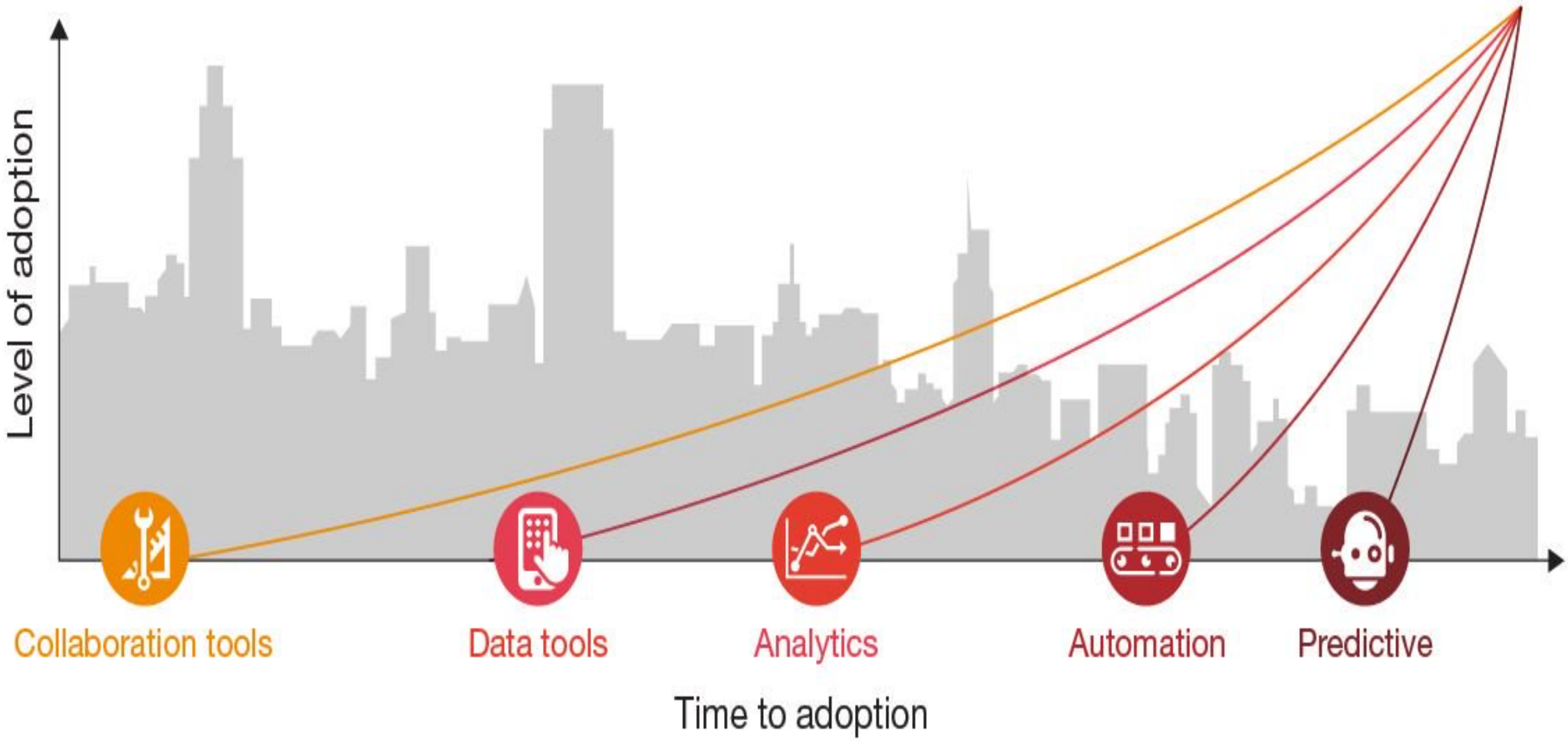
Societal Consequences

- AI Algorithms appear to be objective since the **decision is made by a machine**
- This gives their decision more **credibility** even though they might be biased
- However, since they often rely on biased training data, they reflect biased already existing in society

Possible solutions and directions

- **eXplainable AI (XAI):** it's an AI capable of explaining its decision to the human operator
  - The rationale behind the decision is exposed
  - Biased decision can be eliminated
  - This is a very hot topic for both research and industry with actors like DARPA, Google, DeepMind, Amazon, involved
- **Ethical and Fair AI**
  - Imbedding ethical values with in the AI system to make it act morally.
    - **Ethical principles govern the sensitive decisions of the AI system**

Today's future is tomorrow's foundation



Source: PwC.