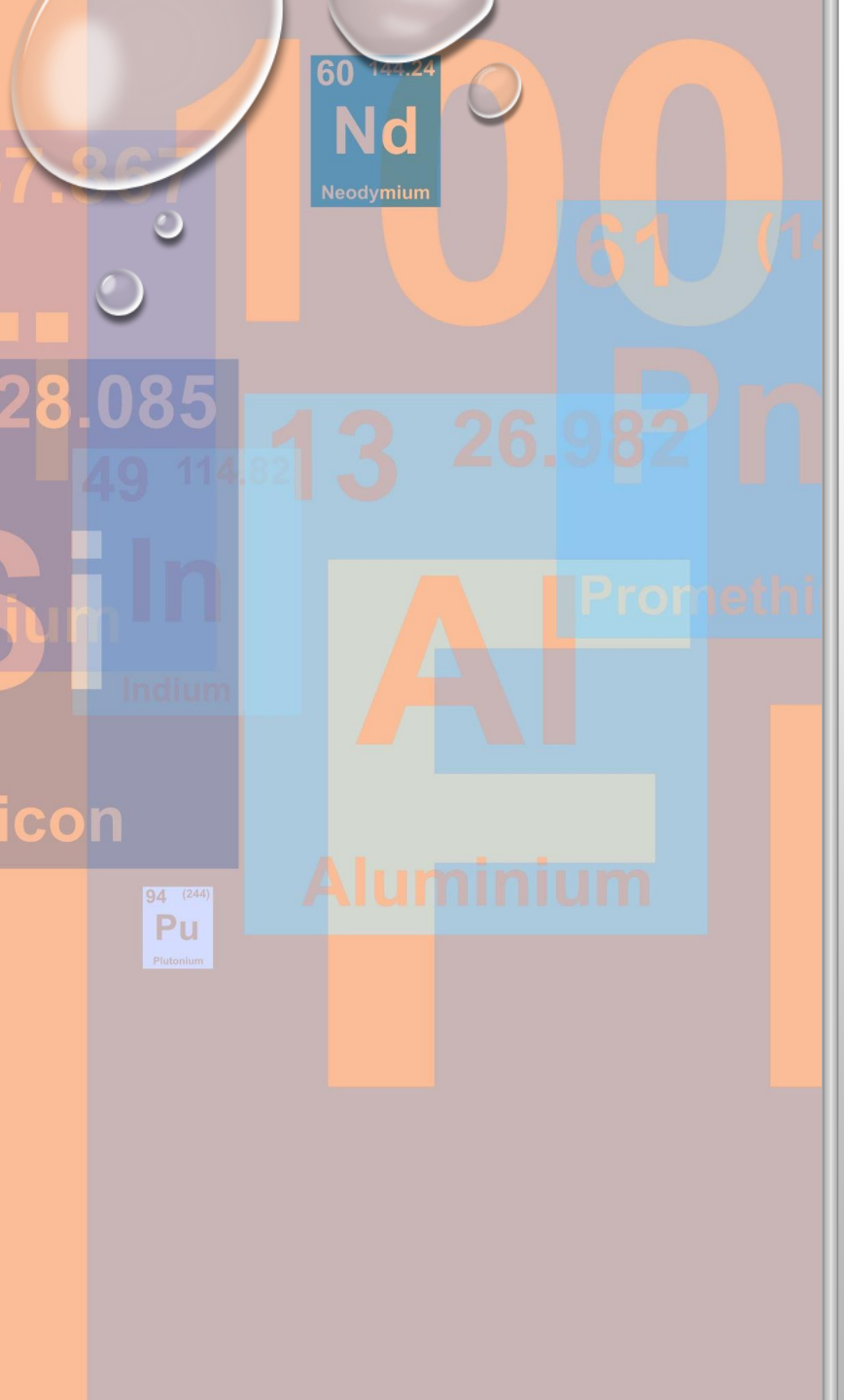
FORENSIC EVIDENCE

IN CIVIL AND CRIMINAL CASES

APPLICATION OF JUDICIAL MIND TO EVALUATE FORENSIC EVIDENCE

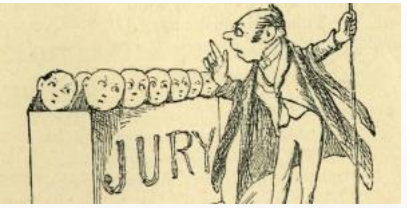
JUDGE AS A GATE-KEEPER



FORENSIC EVIDENCE

- LATIN WORD - *FORENSIS* MEANS THE FORUM.
- IN ROME, 'FORUM' WAS THE MEETING PLACE WHERE CIVIL AND LEGAL MATTERS WERE DISCUSSED BY PERSONS WITH PUBLIC RESPONSIBILITY.
- FORENSIC SCIENCE WAS IN SOME INSTANCES SUBSTITUTED IN ACADEMIC CIRCLES AS MEDICAL JURISPRUDENCE SINCE 19TH CENTURY

SCOPE OF FORENSIC EVIDENCE



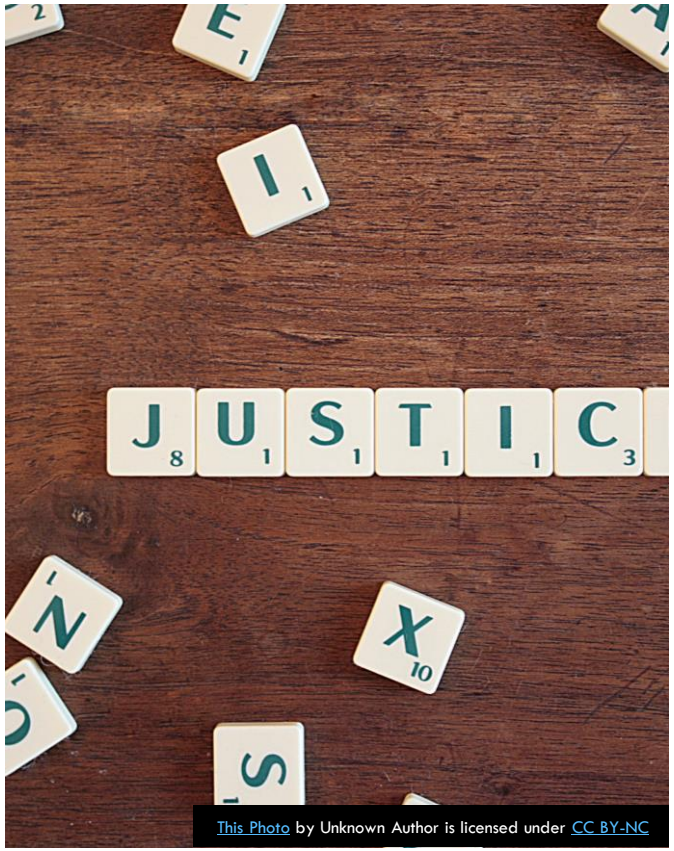
- IN CIVIL CASES
  - PATERNITY ISSUES
  - GENUINENESS OF SIGNATURES AND CONFRONTING ISSUES OF FORGERY
  - EXECUTION OF DOCUMENTS
  - DETERMINATION OF AGE FOR CUSTODY RELATED CASES
  - TRANSPLANTATION OF HUMAN ORGANS
  - MENTAL ILL HEALTH
  - MEDICAL TERMINATION OF PREGNANCY
- CRIMINAL INVESTIGATION LEADING TO ARREST
  - ASCERTAINING THE INVOLVEMENT OF ACCUSED AT THE SCENE
  - EXAMINATION OF SAMPLES OF URINE, BLOOD, FECES, SWEAT
  - BRAIN MAPPING, TRUTH SERUM, LIE DETECTOR
  - DNA
- BOMB BLAST, GUNSHOT, ETC
- SKULL IDENTIFICATION
- DETERMINATION OF AGE FOR ASSESSING JUVENILITY

MANNER OF UNDERSTANDING FORENSIC EVIDENCE

- A ROBUST EVIDENCE LAW ON ADMISSIBILITY WILL PROVIDE A FRAMEWORK FOR THE COURTS TO ASSESS (I) THE SCIENTIFIC VALIDITY OF THE TECHNIQUE UNDERLYING THE EXPERT TESTIMONY (II) WHETHER THE SCIENTIFIC PRINCIPLES HAVE BEEN RELIABLY APPLIED IN THE CASE IN QUESTION.

LEGAL CONTEXT

- FORENSIC EVIDENCE IS USED IN TWO PHASES OF THE CRIMINAL JUSTICE PROCESS
    1. INVESTIGATION, WHICH SEEKS TO IDENTIFY THE LIKELY PERPETRATOR OF A CRIME
        i. INSIGHTS AND INFORMATION MAY COME FROM BOTH WELL ESTABLISHED SCIENCE AND EXPLORATORY APPROACHES
    2. PROSECUTION, WHICH SEEKS TO PROVE THE GUILT OF A DEFENDANT BEYOND A REASONABLE DOUBT
        i. FORENSIC SCIENCE MUST SATISFY A HIGHER STANDARDS
        ii. THE EVIDENCE ACT THAT IS POSSIBLE UNDER S 46: FACTS BEARING UPON OPINIONS OF EXPERTS.—FACTS, NOT OTHERWISE RELEVANT, ARE RELEVANT IF THEY SUPPORT OR ARE INCONSISTENT WITH THE OPINIONS OF EXPERTS, WHEN SUCH OPINIONS ARE RELEVANT.



APPLICATION OF JUDICIAL MIND

THIS IS WHERE LEGAL STANDARDS AND SCIENTIFIC STANDARDS INTERSECT. JUDGE'S DECISIONS ABOUT THE ADMISSBILITY REST SOLELY ON LEGAL STANDARDS; THEY ARE EXCLUSIVELY WITHIN THE PROVINCE OF THE COURT AND NO EXPERT CAN SUBSTITUTE THAT OPINION OR FINDING.

BUT THE DECISIONS REQUIRE MAKING DETERMINATIONS ABOUT SCIENTIFIC VALIDITY. IT IS THE PROPER PROVINCE OF THE SCIENTIFIC COMMUNITY TO PROVIDE GUIDANCE CONCERNING SCIENTIFIC STANDARDS FOR SCIENTIFIC VALIDITY.

WHAT IS PROVED IN LAW IS WHAT THE JUDGE *BELIEVES* TO BE TRUE.

FORENSIC FEATURE COMPARISON

- FORENSIC FEATURE COMPARISON METHOD MEANS THE PROCESS THAT IS EMPLOYED TO FIND WHETHER AN EVIDENTIARY SAMPLE (E.G. FROM A CRIME SCENE) IS OR IS NOT ASSOCIATED WITH A POTENTIAL SOURCE SAMPLE (FROM THE SUSPECT) BASED ON THE PRESENCE OF SIMILAR PATTERNS, IMPRESSIONS, FEATURES, OR CHARACTERISTICS IN THE SAMPLE AND THE SOURCE. EXAMPLES INCLUDE THE ANALYSES OF DNA, HAIR, LATENT FINGERPRINTS, FIREARMS AND SPENT AMMUNITION, TOOL AND TOOL MARKS, SHOE PRINTS AND TYRE-MARKS, BITEMARKS AND HANDWRITING

FORENSIC SCIENCE IN CRIMINAL COURTS: ENSURING SCIENTIFIC VALIDITY OF FEATURE COMPARISON METHODS

- (I) **FOUNDATIONAL VALIDITY -** AN ANALYSIS INTO THE FOUNDATIONAL VALIDITY OF A TECHNIQUE REQUIRES AN ANALYSIS INTO**-**
  - A. WHETHER THE TECHNIQUE CAN GIVE ACCURATE RESULTS
  - B. WHETHER THE SAME RESULT WOULD BE OBTAINED IF THE TECHNIQUE IS REPEATED
  - C. WHETHER THE SAME RESULT WOULD BE OBTAINED IF SOMEONE ELSE PERFORMED THE TECHNIQUE.
- (II) **VALIDITY AS APPLIED-** AN ANALYSIS INTO VALIDITY AS APPLIED REQUIRES AN ANALYSIS INTO- A. WHETHER THE FORENSIC EXAMINER IS CAPABLE OF RELIABLY APPLYING THE TECHNIQUE B. WHETHER THE EXAMINER HAS ACTUALLY RELIABLY APPLIED THE TECHNIQUE IN THE CASE AND ACCURATELY REPRESENTED THE RESULTS

ESSENTIAL POINTS OF FOUNDATIONAL VALIDITY

IT REQUIRES THE METHOD TO BE SUBJECTED TO EMPIRICAL TESTING BY MULTIPLE GROUPS UNDER CONDIIONS APPROPRIATE TO ITS INTENDED USE.

- The method must be repeatable and reproducible
- It shall provide estimates of the method's accuracy to indicate that the method is appropriate for the intended application

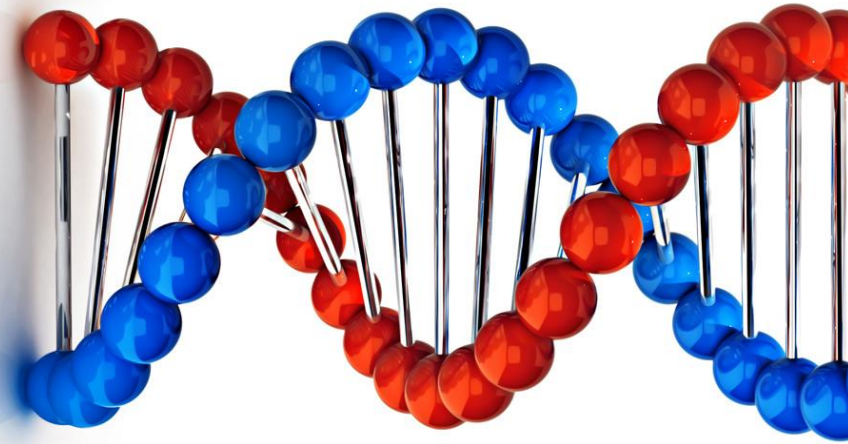
Feature comparison methods are classified as objective or subjective

- Objective method consists of certain defined, standardized, quantifiable detail performed either by an automated or human examiners exercising no judgment
- By subjective methods, we mean methods including key procedures that involve significant human judgment- for e-g, about which features to select within a pattern or how to determine whether the features are sufficiently similar to be called a probable match

WHAT TO EXPECT FROM A FORENSIC EXPERT

- IN ORDER THAT A REPORT HAS PROBATIVE VALUE, IT MUST BE MADE ON EMPIRICAL STUDIES.
- WHETHER THE EXAMINER HAS *ACTUALLY* APPLIED THE METHOD REQUIRES THAT THE PROCEDURE USED, RESULTS OBTAINED AND THE LAB NOTES ARE MADE AVAILABLE FOR SCIENCE REVIEW BY OTHERS
- EXPERT SHALL NOT MAKE CLAIMS OR IMPLICATIONS THAT GO BEYOND THE EMPIRICAL EVIDENCE AND THE APPLICATIONS OF VALID STATISTICAL PRINCIPLES TO THAT EVIDENCE

FEATURE COMPARISON METHOD AS APPLIED TO DNA



- SINGLE INDIVIDUAL & SIMPLE MIXTURE OF TWO INDIVIDUALS
- DNA ANALYSIS IS AN OBJECTIVE METHOD IN WHICH LAB PROTOCOLS ARE PRECISELY DEFINED.
- THE PROCESS IS REPEATABLE, REPRODUCIBLE AND ACCURATE
- ERRORS STILL OCCUR DUE TO SAMPLE MIX-UPS, CONTAMINATION, INCORRECT INTERPRETATION AND ERRORS IN REPORTING

- IN COMPLEX-MIXTURE SAMPLES OF MULTIPLE UNKNOWN INDIVIDUALS OF UNKNOWN PROPORTION (ARISING FROM MIXED BLOOD STAINS AND INCREASINGLY MULTIPLE INDIVIDUAL TOUCHING A SURFACE (AARUSHI CASE).
- THE FUNDAMENTAL DIFFERENCE BETWEEN THE FORMER AND THE LATTER LIES NOT IN THE PROCESS ADOPTED BUT IN THE INTERPRETATION OF THE RESULTING DNA PROFILE

FEATURE COMPARISON METHOD

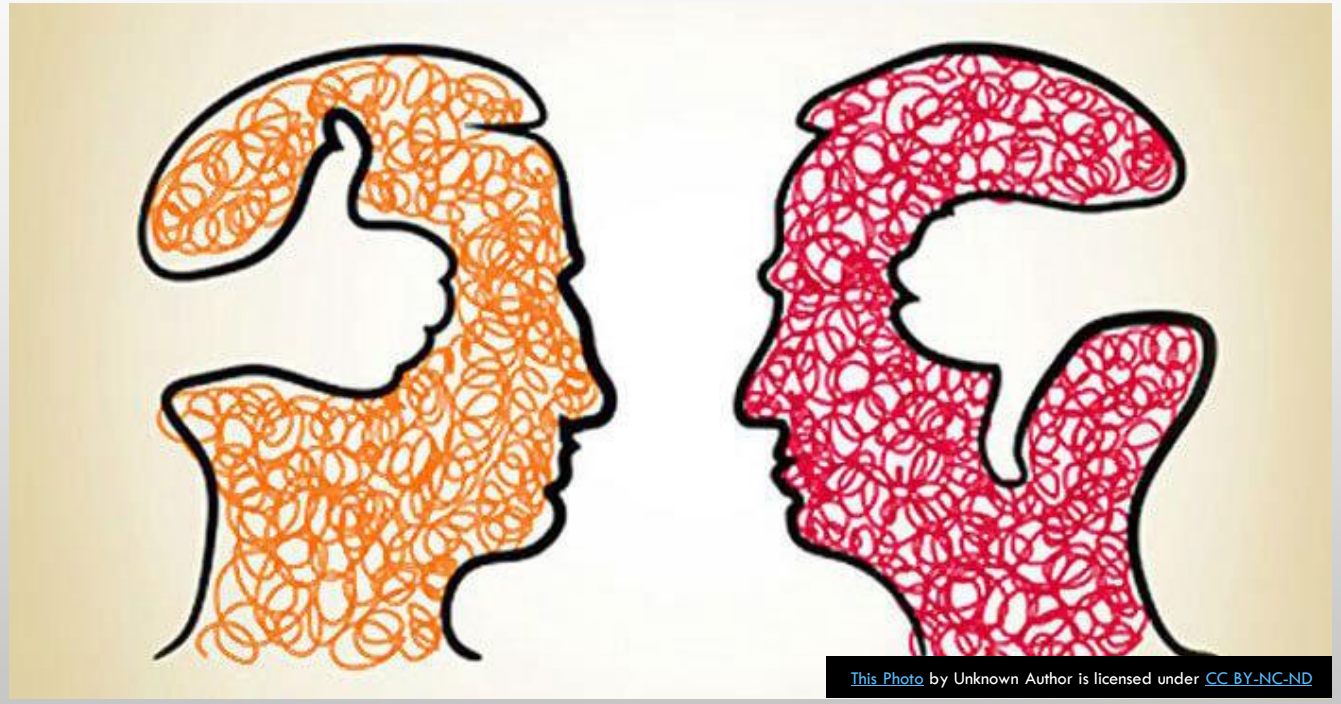
- AS APPLIED TO FINGER PRINTS
  - COMPARISON IS MADE BETWEEN A “LATENT PRINT” FROM AN UNKNOWN SUBJECT THAT HAS BEEN DEVELOPED OR OBSERVED ON AN ITEM WITH ONE OR MORE “KNOWN FINGER PRINTS”. SUBJECT METHOD ADMITS STILL A FALSE-POSITIVE RATE WITH 1 ERROR IN 306CASES
- BITE MARKS
  - BITE MARK COMPARISON IS BASED ON THE PREMISE THAT (I)DENTAL CHARACTERISTICS DIFFER SUBSTANTIALLY FROM PERSON TO PERSON; (II) SKIN CAN RELIABLY CAPTURE THESE DISTINCTIVE FEATURES. BITE MARK ANALYSIS SUBJECTIVE. FALSE POSITIVES ARE AS HIGH AS 10%
- FOOTWEAR ANALYSIS

HOW TO WRITE AN OPINION

- A UNIFORM LANGUAGE FOR TESTIMONY AND REPORTS
- WHERE THERE ARE EMPIRICAL STUDIES AVAILABLE, THE EXAMINER SHOULD PROVIDE QUANTITATIVE INFORMATION ABOUT ERROR RATES, BASED ON ADVICE FROM SCIENTIFIC COMMUNITY
- WHERE THERE ARE NO ADEQUATE EMPIRICAL STUDIES AVAILABLE, THEY SHOULD CLEARLY ACKNOWLEDGE TO COURT THE LACK OF SUCH EVIDENCE.
- IN TESTIMONY, EXAMINERS SHOULD ALWAYS STATE CLEARLY THAT ERRORS CAN AND DO OCCUR, DUE BOTH TO SIMILARITIES BETWEEN FEATURES AND TO HUMAN MISTAKES IN THE LAB

COGNITIVE BIAS

- CONFIRMATION BIAS – EXAMINERS OFTEN ALTER THE FEATURES THAT THEY MARK ON A LATENT PRINT BASED ON COMPARISON WITH A MATCHING EXEMPLAR
- CONTEXTUAL BIAS- COULD BE INFLUENCED BY IRRELEVANT INFORMATION IN THE CASE.
- PROFICIENCY TESTING IS ESSENTIAL FOR ASSESSING AN EXAMINER'S CAPABILITY AND PERFORMANCE



FALLIBILITY – ESTABLISH CHAIN OF CUSTODY

- HAS THE DNA SAMPLE BEEN STORED IN OPTIMAL CONDITIONS?

- IN 2015, FORENSIC RESEARCHERS ASKED PAIRS OF PEOPLE TO SHAKE HANDS FOR TWO MINUTES AND THEN HANDLE SEPARATE KNIVES. IN 85 PERCENT OF THE CASES, DNA FROM BOTH PEOPLE WAS FOUND ON THE KNIVES, AND 20 PERCENT OF THE CASES SHOWED MORE DNA FROM THE SECONDARY SOURCE. THIS IS EASILY POSSIBLE WITH THE CLOTHING OF A SEXUAL ASSAULT VICTIM.

- SOMETIMES IT'S THE FORENSIC INVESTIGATORS THEMSELVES WHO ACCIDENTALLY CONTAMINATE THE EVIDENCE. A CASE IN USA, ADAM SCOTT, A MAN WRONGFULLY CONVICTED OF RAPE WHEN HIS DNA WAS FOUND IN A GENITAL SWAB. SCOTT'S DNA WAS A PERFECT MATCH — A ONE IN A BILLION PROBABILITY — AND IT WAS THE ONLY EVIDENCE USED TO CONVICT HIM, DESPITE SCOTT'S CLAIM THAT HE WAS MORE THAN 200 MILES (322 KILOMETERS) AWAY THE NIGHT OF THE INCIDENT. SCOTT SPENT FIVE MONTHS IN CUSTODY BEFORE THE TRUTH CAME OUT. A TECHNICIAN IN THE CRIME LAB HAD REUSED A PLASTIC PLATE THAT CONTAINED A SAMPLE OF SCOTT'S SALIVA FROM AN UNRELATED "SPITTING INCIDENT." PHONE RECORDS ALSO CORROBORATED SCOTT'S CLAIM THAT HE WAS IN HIS HOMETOWN AT THE TIME OF THE ATTACK.

JUDGE AS GATEKEEPER

- JUDGES SHOULD TAKE APPROPRIATE SCIENTIFIC CRITERIA AND BE SATISFIED WITH REFERENCE
  - TO FOUNDATIONAL VALIDITY, THAT THE TESTIMONY IS THE PRODUCT OF RELIABLE PRINCIPLES AND METHODS
  - TO VALIDITY AS APPLIED, THAT THE EXPERT HAS RELIABLY APPLIED THE PRINCIPLES AND METHODS TO THE FACTS OF THE CASE
  - ERROR RATES SHALL BE CORRECTLY REPORTED

EXPERT AT TRIAL

- ELICIT CREDENTIALS- HIS/HER SCIENTIFIC KNOWLEDGE, HIS/HER PAST EXPERIENCE, HIS/HER PAST REPORTS
- MAKE THE WHOLE REPORT READ IN COURT – DECLUTTER TECHNICAL JARGON; SECURE CLARITY
- SEEK COROBORATION THROUGH SCIENTIFIC LITERATURE, IF THE SUBJECT IS NEW
- SEEK ANSWERS FOR PROBABLE VALUE OF CORRECTNESS/ ERROR- ENSURE RESULT IS TRUE POSITIVE/ TRUE NEGATIVE. RULE OUT FALSE POSITIVE