



IDENTIFICATION, INDIVIDUALIZATION AND UNIQUENESS: WHAT IS THE DIFFERENCE

Muradov Muxammadqodir Gaybulla ugli

Teacher at the Digital Technologies

and Information Security of the Academy of the

Ministry of Internal Affairs of the Republic of Uzbekistan

Anotatsion: Criminologists and many forensic trace evidence specialists distinguish between identification and individualization, but they do not clearly distinguish between individualization and uniqueness. This article explains these terms and discusses the relationships between identification, individualization, and uniqueness of forensic evidence.

Key words: Identification; individualization; uniqueness; forensic science; trace evidence; DNA; fingerprints.

1. Introduction

Problems of identity and uniqueness persist. Heraclitus wondered about stepping into a raging river. Is the river the same each time we step into it? Plutarch presented the ancient riddle of Theseus' ship. Is a ship whose planks have been replaced one by one over the years the original ship or a new one? Forensic scientists ask more mundane questions about the identity of objects, but do they have better answers? In the words of two eminent forensic scientists, the field "struggles with the concept of uniqueness, but so do others - philosophers, logicians, Boolean algebra mathematicians, and dealers in rare coins." Each of these groups has had a hard time coming to terms with the concept.¹

In some areas of forensic science, this world seems philosophically, logically, and mathematically fragile. Too many practitioners and academics in the fields of toolmark, bite mark, fingerprint, fiber, handwriting, and industrial product comparison throw around terms like ACE-V, ridgeology,

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* E-mail: dhk3@psu.edu.

1 John E. Thornton and Joseph L. Peterson, "General Assumptions and Rationale for Forensic Identification," in 4 CONTEMPORARY SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 29:15, p. 15 (David L. Feigman et al. eds., 2008–2009).

2 ACE-V stands for "Analysis, Comparison, Evaluation, and Verification." See David H. Kaye, The Unscience of Fingerprinting: United States v. LleraPlaza, 21 QUINNIPIAC L. REV. 1073, 1080 (2003). It is "a common protocol used by trained examiners to conduct forensic comparisons using visual recognition," Christophe Champod, Fingerprint Examination: Toward Greater Transparency, 7 L., PROBABILITY & RISK, 111 (2008), "a commonsense description of what one would see if they were examining a latent and potential source print"—in short, "an acronym, not a methodology." Sandy L. Zabell, Fingerprint Evidence, 13 JL & POL'Y 143, 178 (2005). 3 See, for example, Kay, supra. 2.

class characteristics⁴ and, most tellingly, individual characteristics⁵, as if they were clearly defined methodologies or actual constructs. Rather than undertake the complex empirical investigations necessary to establish that these objects or impressions can be traced to a common source, they resort to such tautologies as "the uniqueness of an object can be established by a collection of individual [as opposed to a class]

characteristics."⁶ Blithely postulating uniqueness, forensic textbooks contain advice such as:

- A positive identification is the conclusion that this particular shoe and not another shoe made the impression at the crime scene. No minimum number of individual identifying characteristics is required to establish a positive identification.⁷

- If a suspect cannot be excluded by the uniqueness of his teeth and bite pattern, the suspect should be assumed to be a biter.⁸

- These characteristics, if present in both the print in question and the known tire, make that tire unique and enable that tire to be positively identified as the maker of the questioned tire.

impression.⁹

- By late adolescence, a person's writing has advanced to the point where his or her writing style is unique. Individualization is a guiding principle in document examination.

These theories of uniqueness and individualization are more than mere curiosities. They shape the course of people's lives. Day after day, case after case, forensic testimony reflects this paradigm of positive, unambiguously specific identification. Commentators from other disciplines complained bitterly. Some called for a "paradigm shift"¹¹ that would replace talk of individualization with statements of probability¹², or demanded that certain testimony be excluded until better studies could be conducted of the ability of analysts to perform as claimed.¹³ Indeed,

4 "Class characteristics are the general characteristics that distinguish a group of objects from a population of diverse objects. ... Objects of a class do not and cannot ensure uniqueness." Thornton & Peterson, *supra*, 1, § 29:7, 8.

5 "Individual characteristics, on the other hand, are those exceptional characteristics that can establish the uniqueness of an object." *Ibid*.

6 *Ibid*.

7 William J. Bodziak, "Forensic Footwear Analysis," in *FORENSIC SCIENCE: AN INTRODUCTION TO SCIENTIFIC AND*

RESTIGATIVE TECHNIQUES 297, 309 (eds. Stuart H. James and John J. Nordby, 2003); see also *ibid*. at 298.

8 R. Tom Glass, "Forensic Odontology," in James & Nordby, *supra*, 7, 61, 73.

9 William J. Bodziak, "Forensic Tire Analysis and Tire Mark Evidence," in James & Nordby, *supra*, 7, 313, 325.

10 Frank H. Norwich and Howard Seiden, "Interviewed Documents," in James & Nordby, *supra*, 7, at 357, 359. Some authors are a little more reserved. For example, Thomas A. Kubik and Nicholas Petraco, "Microanalysis and Mark Study," *ibid*. at 251, 252, 264, 273.

11 Michael J. Saxe and Jonathan J. Koehler, *The Coming Paradigm Shift in Forensic Identification*, 309 *SCIENCE*

892 (2005).

12 Michael J. Saxe and Jonathan J. Koehler, *Individualization Bias in Forensic Evidence*, 61 *VAND. L. REV.* 199, 217, 218 (2008) (advocating for "an explicit reliance on probability" in the future, but acknowledging that "[i]n some areas... obtaining reliable probability estimates may be particularly difficult.")

13 For example, Simon A. Cole, *Does "Yes" Really Mean "Yes"? An Attempt to Resolve the Debate on the Admissibility of Fingerprint Evidence*, 45 *JURIMETRICS J.* 449 (2005); Lyn Haber & Ralph N. Haber, *Experimental Versus Scientific Forensics*, *L., PROBABILITY & RISK* 143 (2008); D. Michael Reisinger & Michael J. Saks, *Science and Unscience in the Courts: Dauber Meets the Handwriting Identification Experts*, 82 *IOWA L. REV.* 21 (1996); Saks & Koehler, *supra*, 12, at 218 (made concluding that "claims [about individualization that] exaggerate the state of their science will be a prime target for exclusion").

Some have written or implied that, since claims about the uniqueness of physical objects are metaphysical or not directly demonstrable, all claims about individualization are false.

This article revisits the related concepts of identification, uniqueness, and individualization. Section 2 explains that individualization is one type of identification, and that it can take two forms, "universal" and "local". It also suggests that in practice it is not easy to make a clear distinction between class characteristics and individual characteristics. Section 3 expands on the meaning of the word "uniqueness". It argues that

uniqueness must be defined relative to a particular set of elements, and emphasizes the distinction between the uniqueness of one element ("special uniqueness") and the uniqueness of all elements relative to the set ("general uniqueness"). Section 4 applies these ideas to DNA evidence and fingerprints. He argues that because specific uniqueness within a relevant subset of all existing objects is sufficient to individuate within that subset, testimony that a particular individual is likely to be the source of a DNA sample or fingerprint can be justified, at least in some cases.

2. Identification and Individualization

Forensic scientists are sensitive to the breadth of the word "identification." It can mean classification, as when "I identified the sample as *Ursus horribilis*" or "the car as a red Buick."¹⁵ It can also mean "individualization," as when a fingerprint analyst testifies that "I identified the latent fingerprint as having been made from the defendant's right ring finger."¹⁶ In the latter situation, "the term 'individualized' would be more appropriate."¹⁷

As noted above, forensic scientists distinguish between "class characteristics" and "individual characteristics,"¹⁹ but all identifications are classifications. Some classes are simply larger than others. The larger the class, the less selective the identification, but all such associations provide relevant information.

The Bayesian approach combines these two ideas. Whether a person is a source of traces depends on the prior odds and the likelihood ratio. The prior odds are affected by the size of the likely suspect population, while the likelihood ratio depends, at least in

¹⁴ Saks & Koehler, *supra*. 12.

¹⁵ Thornton & Peterson, *supra*. 1, § 29:10, at 11.

¹⁶ *Ibid*.

¹⁷ *Ibid*.

¹⁸ Forensic scientists recognize a similar but slightly different distinction when they talk about "open" and "closed sets." See, for example, John Buckleton et al., "Disaster Victim Identification, Missing Person Identification, and Immigration Cases," in *FORENSIC DNA EVIDENCE IN INTERPRETATION* 395, 431 (John S. Buckleton et al. eds., 2005); Philip Rose, *COURT SPEAKER IDENTIFICATION* 84 (2002). In an "open set," the number of possible suspects is unknown, and an identity statement is an example of universal individuation. In a "closed set," the number and characteristics of all possible suspects are known, and an identity statement is an example of local individuation. The yacht murder example below violates this distinction because it involves a known set of possible suspects with an unknown characteristic of one of them. This results in a local individuation statement, even though the set of suspects is "open" to the extent that one has yet to be examined.

¹⁹ See, for example, *Ibid.*, § 29:7, at 8 (describing the distinction and using it in the comparison process).

partly on the size of the class that shares the identifying characteristics. For example, about 4% of the populations of the UK20 and the US21 have blood type AB. Finding a blood stain of type AB at a violent crime scene, when the victim is type O and the suspect is type AB, is therefore 25 times more likely under the hypothesis S that the suspect is the source of the stain than under the hypothesis SC. that it is someone unrelated to the suspect. Therefore, the likelihood ratio involving a match of M is

$$L = P(M | S) / P(M | SC) = 25,$$

and the identification has increased the prior odds by a factor of 25.

Although this likelihood ratio means that M is relevant and has some evidential value,²² M is unlikely to be a universal individuation. This type of individualization occurs only in the limit as $1/L$ approaches 0 ($L \rightarrow \infty$). This is an idealization that, strictly speaking, is never realized. DNA

typing with a significant number of short tandem repeat (STR) loci gives a very high value.

for the likelihood ratio of the hypothesis that the suspect is the source of the bloodstain, but this number is finite. However, from a practical standpoint (when the probability that an identical twin is responsible or that a laboratory or handling error has occurred is close to 0), it becomes reasonable to believe that extensive multilocus agreement indicates that the suspect is the source of the stain. ²³ The likelihood ratio is so high that it overwhelms any realistic prior probability. This pragmatic form of universal individualization can also occur with fingerprints.

Local individualization might be possible using the ABO blood type "class characteristics" if the population of likely suspects were small. Suppose a dead body (type O) is found in the cabin of a yacht. There were ten

other unrelated people on board. There are signs of a struggle and violent death. Blood drops, identified as type AB, lead to the door. The 10 people disappear after port. The medical records of nine of them are found. They show that only one has blood type AB. He and the person with an unknown ABO type are now the only real suspects. If we assume that before considering the blood type data, both suspects are equally likely to have been the source of the blood stain, then the prior odds are 1:1.24. The presence of the blood type increases the odds as follows:

$$(S|M) = L \times \text{Odds}(S) = 25:1.$$

If the posterior probability of $25/26 = 96.15\%$ is sufficient to assign to an individual, then the serological data on class characterization have led to local individualization.

In this light, individualization is a statement that, like any other empirical statement, may be wrong. The epistemological question is whether the probability that the statement is true is high.

20 National Blood Service for England and North Wales, All About Blood Groups, <[http://www.blood.co.uk/pages/all about.html](http://www.blood.co.uk/pages/all%20about.html)> (8 March 2009).

21 Stanford Medical School Blood Centre, Blood Groups in C

David H. Kay and J. J. Koehler, Misjudging Evidentiary Value, 27 L. & HUMAN BEHAVIOR 645 (2003).

23 See IAN W. EVETTE and BRUCE S. WEIR, INTERPRETING DNA EVIDENCE: STATISTICAL GENETICS FOR FORENSIC CASES.

SCIENTISTS 241 (1998) (assuming that since the DNA analyst can provide a likelihood ratio value, there is no need to give “individualizing” DNA testimony—the jury can round $1/L$ to 0 for themselves).

24 On the choice of priors, see, e.g., A. Biedermann et al., Equal Priors: Can We Do Better? 172

FORENSIC SCIENCE. INT’L 85 (2007); Kaye et al., supra at 22; David H. Kaye, Rounding Up the Usual Suspects: A Legal and Logical Analysis of DNA Database Trawls, 87 N. CAR. L. REV. 425 (2009).

enough to justify a lawsuit. This probability will depend on how discriminative the feature set is and the size of the population of subjects. A provocative hypothetical case devised by Michael Sachs and Jay Koehler to illustrate the difficulty of demonstrating that a feature set takes on unique values in a large population also illustrates the finite probability of error in individualization. They pose a case in which:

[E]xactly 100 pairs of firearms out of approximately 100,000 guns in a Texas town have indistinguishable barrel markings. If each of 100 firearms examiners examined 10 pairs of guns from the urban population every day for 10 years ($n = 3,650,000$ pairs of guns), the probability that none of the indistinguishable pairs would show up for examination would be That is, despite 1,000 “collective years” of forensic experience (100 experts x 10 years), the failure to find even one pair of guns with indistinguishable markings does not provide grounds for drawing conclusions about whether there is a marking on the gun barrel, even in that single city.²⁵

In the example, firearms examiners consider a simple random sample of $n = 3,650,000$ pairs of guns from a population of all pairs of $N = 100,000$ guns in a city over a 10-year period.²⁶ This population consists of $N(N - 1)/2$, or about $1010/2$, possible pairs of guns. The examiners observed $X = 0$ matches in n trials. The binomial probability θ is the probability of finding 1 in 100 matching pairs in any comparison: $\theta = 100/(1010/2) = 2 \times 10^{-8}$. Thus the probability of not finding any of the special pairs of matching weapons ($X = 0$) is $(1 - \theta)^n$, which is said to be approximately $1 - n\theta = 92.6\%$.

Now let's look at this as a statistical problem. The observed number of matches, namely $X = 0$ (with $n = 3,650,000$ trials), summarizes the data in the sample. Under the null hypothesis that $\theta = 0$, the probability of obtaining data at least as unexpected as the observed value $X = 0$ is 1. We cannot reject the null assumption. the uniqueness hypothesis. Sack and Kohler's point is that we have "little reason" to accept this hypothesis, too. Since one match is enough to reject the null hypothesis that $\theta = 0$, the critical region is $X \geq 1$. If the true number of matching pairs in the population of all pairs is not 0 but 100, then using the calculation in the previous paragraph, the rejection probability is $1 - 0.926 = 0.073$. The 10-year effort has very little power (about 7%) to reject the null hypothesis, even if it is false (in the sense they postulate, namely $\theta = 2 \times 10^{-8}$).

3. Specific and General Uniqueness.

One might think that the requirement of individuation is equivalent to the assertion of uniqueness, but we have just seen that this is not the case. If an object is clearly unique, it can be individuated; however, the converse is not necessarily true. Individuation – in the sense of almost certain

source attribution – does not imply uniqueness – in the sense of a set of characteristics that are distinct for

each member of the set of objects.²⁸ In the Texas gun example, most of the hypothetical 100,000 guns leave unique marks on their bullets, but a small fraction – no more than 1 in 500 – do not. Because the set of guns can be divided into subsets of unique and non-unique items, and because the unique items are largely non-unique, there is individualization in the Texas gun case.

To generalize this idea and to clarify why evidence for the uniqueness of a particular item is a much weaker claim than evidence for the uniqueness of all items, some definitions are useful. Let γ refer to an item (e.g., a human finger) that leaves marks with distinctive features (e.g., fingerprints). How distinctive these marks are remains to be seen. Let Γ be the set of such items (e.g., all human fingers). Let y_i be a vector describing the variable features on the traces left by γ_i , the i th such element. A particular feature vector y_i marks a unique element γ_i (relative to Γ).

if for all γ_j in Γ $y_i \neq y_j$ (when $i \neq j$). This situation can be called special uniqueness. The element, γ_i , is unique in Γ that produces the label y_i . If Γ is the set of all γ in the universe, then γ_i is unique in the universe. This is "universal special uniqueness". Other γ may also be specially unique in Γ , but this is not necessary.

General uniqueness is the special uniqueness of all γ in Γ . This means that each feature vector y_i can be mapped back to one and only one γ_i capable of generating it. In other words, the elements of Γ are "unique" if for all γ_i and γ_j in Γ $y_i \neq y_j$ (when $i \neq j$). If Γ is the set of all γ in the universe, then these elements are "universally unique". There are no duplicates in the program universe. Fingerprint experts have traditionally insisted that fingerprints from the same finger are unique in this very strong sense, but this claim is extremely difficult to prove.²⁹ Section 4, which discusses the DNA evidence, shows why.

4. Uniqueness and Individualization of DNA Profiles

Biologists accept and explain the proposition that the complete sequence of over 6 billion base pairs in the diploid human genome is unique to each individual (and any clones). For example, in 1992, a National Academy of Sciences committee recommended that "courts should pay judicial attention to the scientific basis for DNA typing," including the fact that "each individual's DNA is unique (except in identical twins). . .".³⁰ Like the fingerprint community, geneticists believe in a universal, general uniqueness.

²⁸ Contra Thornton & Peterson, *supra*, 1, § 29:10, at 11 ("Individualization implies uniqueness. . .").

²⁹ See, e.g., David H. Kaye, *From Snowflakes to Fingerprints: The Dubious Forensic Evidence of Fingerprint Uniqueness*, 71 INT'L STAT. REV. 521 (2003).

³⁰ NATIONAL RESEARCH COUNCIL COMMITTEE, *DNA TECHNOLOGY IN FORENSIC SCIENCE* 23 (1992). Of course, it is impossible to sequence the entire genome. The immediate question of DNA identification is whether the fewer than 20 loci used in STR typing (on the order of 1000 base pairs) are sufficient for individualization. This section suggests that (1) they can provide universal and general uniqueness; (2) they probably create universal specific uniqueness; and (3) they almost certainly create specific uniqueness among populations that are relevant to some criminal cases.

4.1 Universal General Uniqueness

In 1996, a committee of the US National Academy of Sciences suggested that "with the increasing number of loci available for forensic analysis, we are approaching the time when each individual's profile will be unique (except for identical twins and other close relatives)."³¹ The Forensic DNA Technology Report distinguishes between specific and general statements about the uniqueness of VNTR loci.³² A particular profile may be unique: "Suppose that in a population of N unrelated individuals, a given DNA profile has probability P . The probability (prior to profiling a suspect) that a particular profile observed in an evidence sample is not unique is no greater than NP ".³³ A small probability NP indicates that the one profile in question is likely to be unique in a population containing up to N unrelated individuals. Being conditional on a given genotype, this is a specific uniqueness.

General uniqueness, as we have defined it, applies to all profiles in the population. In this regard, the committee discussed the famous "Birthday Problem"³⁴ and wrote that "the lower bound on the probability of each individual being unique depends on the population size, the number of loci, and the heterozygosity of the individual loci."³⁵ Under some simplifying assumptions, the probability of this event can also be estimated. "Neglecting population structure and close relatives, 10 loci with a 95% geometric mean heterozygosity yields a probability greater than about 0.999 that no two unrelated individuals in the world

have the same profile."

4.2 Universal Specific Uniqueness

Even if STR profiling at 13 or so STR loci (currently the norm in forensic science) does not establish a high enough probability of universal overall uniqueness, it can still be argued that individual genotypes are likely to be unique in the world. Probabilities are on the order of 10–23. 31 DNA FORENSICS COMMITTEE: UPDATE, NATIONAL RESEARCH COUNCIL, ASSESSMENT DNA EVIDENCE 161 (1996) [hereafter NRC 1996].

32 VNTR stands for "variable number of tandem repeats." VNTR alleles come in a wide range of sizes because of differences in the number of base pair sequences that are stacked one after the other, like freight trains with different numbers of boxcars. No single locus is unique in the human population, but allelic combinations from multiple loci can be very rare (depending on which alleles are present).

33 NRC 1996, *supra*. 31, 161.

34 *Ibid.* at 165. In its simplest form, the birthday problem assumes that the same number of people are born on each day of the year. The problem is to determine the minimum number of people in a room such that the probability that at least two of them were born on the same day of the same month. Here the problem is to determine, in a population of size n , the probability that no DNA type matches anyone else's. If all DNA profiles have the same probability θ and if the profiles are independent, then the probability that there will not be two or more instances of any profile in a set of n profiles is approximately $\exp(-n2\theta/2)$.

35 *Ibid.*

36 *Ibid.* The computation, "An application of the Birthday Problem with unequal probabilities," can be found in Appendix 5C of the report. To achieve the same probability of uniqueness, more STR loci (the type currently used in DNA identification) would be required. See *Ibid.* at 165; see also Kaye et al., *supra* 22, § 12.5.3.

some court cases have cited coincidental matches with unrelated individuals.³⁷ If one could be sure that the probability of a particular profile occurring by chance was really that small, then it would be fair to conclude that the profile was unique among all members of the world who were not closely related to the person known to have the profile. This is universal singular uniqueness.

However, since the figure of 10–23 exceeds the precision that can be justified by the existing data, and since the suspect populations include relatives, this claim of universal singular uniqueness of STR loci remains theoretical.

4.3 Local Uniqueness as a Basis for Local Individualization

Federal Bureau of Investigation (FBI) experts, with a particular focus on singular uniqueness, have endorsed source identification in cases where they believe the probability of a particular profile being duplicated in the U.S. population is very small.³⁸ A report by the National Academy of Sciences published in 2008 seems to be comfortable with such evidence.³⁹ The criteria for individualization are described as follows:

Instead of asking whether a profile is unique among the world population, the examiner focuses on smaller population groups that can be a source of evidentiary DNA. When the surrounding data is not If the probability of "no duplication" is 1% or less, the examiner must report that the suspect "is the source of the DNA obtained from the [evidential] sample."

calculates the probability of no duplication in each ethnic or racial subgroup that may be of interest. If this probability is 1% or less, the examiner must report that the suspect is the source of the DNA. Finally, if the examiner believes that the source may be a close relative and these individuals cannot be tested, standard genetic formulas are used to find the probability of the same profile in a close relative, this probability is multiplied by ten, and the resulting probability of no duplication is calculated for a small family (usually ten or fewer people). Again, if the probability of no duplication is no more than one percent, the examiner reports that the suspect is the source.⁴⁰

5. Conclusions

Forensic scientists often seek to establish individual identification. They call the identification of a trace or mark as coming from a single person or object "individualization". Individualization may be "local" (relative to a specific subset) or "universal" (relative to the entire world). In principle, it can be done (with high probability) without examining every member of the population.

Uniqueness may be "general" or "specific". General uniqueness implies individualization of each member of

a set of unique elements. Claims of general uniqueness of the population of all people in the world have been made for fingerprints and genomes ("universal general uniqueness"). Less grandiosely, claims of specific uniqueness (of a particular forensic DNA profile) have been made for local populations (less than for the entire world).

Statistically, universal general uniqueness is not a necessary condition for individualization. A claim of individual identification may almost certainly be correct even if the identifying features are not unique worldwide. In some circumstances, the examiner may conclude that the individual is likely to be the only one of a small group of likely suspects who matches the marks. "The question for the forensic examiner is not, 'Is this profile unique?' in the world.⁴² And, for that matter, aren't all profiles unique? "Rather, the question is, is there sufficient evidence that they all come from the same source? Or is they? Ultimately, the final question is left to the jury, and how the forensic expert should communicate the match to the jury is open to debate.⁴⁴ The conclusion that the defendant is the source may be stated as a decision (as in the acceptance sample), and it is often presented without any acknowledgement of the uncertainty inherent in identification.⁴⁵ However, if the expert's task is to describe the degree of match and inform the judge or jury of the strength of this evidence of a connection, what should the fact finder do? Unfortunately, for most pattern matching conducted by human analysts, this ideal is difficult to achieve. When the process is subjective, the underlying probabilities are not easy to quantify. The pragmatic and traditional procedure is for the expert to state a personal belief about the source of the trace and leave it to the legal system to investigate the basis for that belief. Probabilists find this strategy overly simplistic and misleading, but pragmatists defend it as a kind of "rounding off." This essay does not

41 In a Bayesian model, the size of the relevant population influences the prior odds. See above §

42 Evett & Weir, above 23, 239.

43 Ibid.

44 See, e.g., Kaye et al., above 22; above n. 23.

45 A. Biedermann et al., Theoretical Properties of Forensic Identification: Basic Logical and Argumentative Implications, 177 FORENSIC SCI. INT'L 120 (2008) (describing elements of statistical decision theory as applied to the decision to act on the hypothesis that the defendant is the source, complaining that "it is the very fact of the deliberate suppression of uncertainty, that established patterns should provide for individualization, that is contrary to the logical approach" and calling "on the key players who participate in decision processes to take responsibility for explicating their probability beliefs along with their preference matrix"); cf. ISAAC LEVI, PLAYING WITH TRUTH, AN ESSAY ON INDUCTION AND THE GOALS OF SCIENCE (1967) (using Bayesian decision theory to describe belief formation in science).

46 For a discussion of this premise in the context of presenting the results of statistical hypothesis tests, see David H. Kaye,

Is Proof of Statistical Significance Appropriate? 61 Washington L. Ed. 1333 (1986).

resolve this controversy. It simply seeks to sharpen the issues by clarifying the meanings of the concepts of "identification," "individualization," and "uniqueness," and thus disentangling the relationships between these concept

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