Proof Paradoxes and Normic Support: Socializing or Relativizing?

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Abstract Smith (2018) argues that, unlike other forms of evidence, naked statistical evidence fails to satisfy *normic support*. This is his solution to the puzzles of statistical evidence in legal proof. This paper focuses on Smith's claim that DNA evidence in cold-hit cases does not satisfy normic support. I argue that if this claim is correct, virtually no other form of evidence used at trial can satisfy normic support. This is troublesome. I discuss a few ways in which Smith can respond.

Keywords Normic support; proof paradoxes; DNA evidence; fingerprint evidence; eyewitness evidence; statistical evidence; standards of proof.

1 INTRODUCTION

Suppose we know that a bus company, Blue-Bus, operates 90% of the buses in town on a certain day, while Red-Bus only 10%. That day a bus injures a pedestrian. Although the buses of the two companies can be easily recognized because they are respectively painted blue and red, the pedestrian who was injured cannot remember the color of the bus involved in the accident. No other witness was around. Still, given the statistics about the market shares of the two companies, it is 90% probable that a Blue-Bus bus was involved in the accident. This is a high probability, well above the 50% threshold which corresponds to a common interpretation of the preponderance standard for civil cases. Yet the 90% probability that a Blue-Bus bus was involved in the accident would seem—at least intuitively—insufficient for a judgment of liability against Blue-Bus.

This intuition is puzzling because it challenges the common idea that the preponderance standard in civil cases only requires the facts to be established with greater than 50% probability. There is another reason to be puzzled here. If an eyewitness was present during the accident and testified that a Blue-Bus bus was involved, the testimony would be considered enough to rule against Blue-Bus,

at least provided the witness survived cross-examination. We exhibit, in other words, an intuitive preference for judgments of liability based on testimonial evidence compared to judgments based on statistical evidence (Wells, 1992; Niedermeier et al., 1999; Arkes et al., 2012).[1] But the latter are no more prone to error than the former, and in fact, they may well be less prone to error. So are we really justified in exhibiting this intuitive preference for eyewitness testimony?

This and similar puzzles about statistical evidence in legal proof have been around for a while (Cohen, 1977; Kaye, 1979; Nesson, 1979; Thomson, 1986). Some scholars have expressed reservations about these puzzles, noting that they are far removed from trial practice (Schmalbeck, 1986; Allen and Leiter, 2001). Despite these reservations, however, philosophers and legal scholars have shown a renewed interest in naked statistical evidence and the puzzles that it raises in both criminal and civil cases (see, e.g., Wasserman, 1991; Stein, 2005; Redmayne, 2008; Ho, 2008; Roth, 2010; Enoch et al., 2012; Cheng, 2013; Pritchard, 2015; Blome-Tillmann, 2015; Nunn, 2015; Pundik, 2017; Moss, 2018; Pardo, 2018; Smith, 2018; Bolinger, forthcoming; Di Bello, forthcoming).

Here I discuss Smith's new proposal based on the notion of normic support (§2), focusing on his claim that DNA evidence in cold-hit cases does not satisfy normic support (§3). Assuming Smith is right about that, I show that a counterintuitive conclusion follows, that is, no other form of evidence routinely used at trial will satisfy normic support (§4). This is an overgeneralization challenge that cannot be easily circumvented (§5). I discuss two ways out, namely socializing normic support (§6) or relativizing it (§7). The latter is particularly attractive because it helps to theorize about cross-examination at trial (§8).

2 NORMIC SUPPORT

Smith invokes the notion of normic support to vindicate the intuitive difference between statistical and testimonial evidence. Normic support, quite generally, reflects our understanding of what would normally happen in a given situation. It would normally happen that if, say, you put a letter in the mail, it would reach its addressee unless something unexpected—abnormal—happened. As Smith (2016) shows, the idea of normality can give us an account of epistemic justification. That is, evidence E normically supports p in the sense that if E holds, then p normally holds, and so

[1] This preference exists beyond the law; see Sykes and Johnson (1999); Friedman and Turri (2015); Ebert et al. (2018).

whenever E holds but p does not, an explanation for the abnormality is required besides the falsity of p.

Given this account, it is easy to see that eyewitness testimony satisfies normic support, while the statistical evidence in the bus scenario does not. Suppose a witness testified that the bus involved in the accident belonged to Blue-Bus, but the witness was wrong. This would require an explanation, for example, the witness was hallucinating; she confused the color of the bus; she was paid to smear Blue-Bus. It cannot just so happen—Smith (2018) contends—that the witness was wrong. By contrast, it can just so happen that 90% of the buses belonged to Blue-Bus and yet the bus involved in the accident did not belong to Blue-Bus. We would require no explanation for that.

Smith recommends that normic support be added as a condition to be met for satisfying the standard of proof at trial. With this addition, judgments of civil or criminal liability based on mere statistics should be blocked even when the probability of liability, given the statistics, is high. Smith is careful to emphasize that normic support is necessary, not sufficient for liability judgments. Normic support should be one of the conditions to be met in order to satisfy the standard of proof. The other condition could well be a threshold requirement that the evidence establish the facts with a sufficiently high probability, for example, $>$50% in civil cases and $>$95% in criminal cases.

This proposal has much to go for it. Compare normic support with an externalist condition, such as that a liability judgment based on the evidence should be sensitive (Enoch et al., 2012). A standard of proof that incorporated a sensitivity condition would be odd because its satisfaction would depend on features of the world about which the fact-finders making the decision might have no information. Recall that a belief p based on evidence E is sensitive in the sense that had p been false, the belief would not have been formed, mostly because E would not have obtained. Suppose now that unbeknownst to the fact-finders the witness who testified at trial against Blue-Bus was paid by Red-Bus to smear Blue-Bus. A liability judgment based on such testimony would not be sensitive because whether the bus involved in the accident belonged to Blue-Bus or Red-Bus, the witness would have testified against Blue-Bus anyway. Suppose, by contrast, the witness was present when the accident occurred and reported at trial—honestly and accurately—that a Blue-Bus bus was involved. In this case, had the bus involved been a Red-Bus bus, the eyewitness would not have testified against Blue-Bus. A judgment based on this testimony would thus be sensitive.

If sensitivity were a condition to be met for satisfying the standard of proof, the two cases should be treated differently. But the testimonies in the two cases, after a careful examination of the evidence, might look entirely on a par. So it is odd that the standard of proof should be responsive to differences in the evidence about which the fact-finders might have no information. Normic support, instead, avoids this problem because it only requires that the evidence pass this test: under the assumption that the defendant was not liable, we would require an explanation of the fact that the evidence incorrectly pointed to the defendant. This test should not depend on features of the world about which the fact-finders might have no information.

3 COLD-HITS

More can be said in favor of normic support, but it is not my objective to defend it against competing proposals.[2] My objective is to examine how normic support handles DNA evidence in so-called cold-hit cases. This might seem a minor detail, but raises a host of complications worth examining.

Let me begin with some background. In a traditional DNA case, the police first conduct an investigation, and this sometimes leads to the singling out of a suspect. The DNA of the suspect is later tested against the traces found at the crime scene, such as saliva, hair, blood, etc. If the test shows a genetic match between the suspect and the traces, this confirms the findings of the police investigation and the suspect is likely to face trial. In a cold-hit case, instead, the police first lift a DNA sample from the crime scene and then run it against a database in search of a match. A cold-hit occurs when an individual recorded in the database matches the crime sample.

What is striking about cold-hit cases is that the matching individual may face trial—and even be convicted—despite there being no other connection to the crime except the cold-hit DNA match. How can that be? Consider a cold-hit case that Smith mentions in a footnote, State v Toomes, 191 S.W.3d 122 (Tenn. Crim. App. 2005). Here the defendant became a suspect after the police searched a DNA database and found a match. It would be misleading to say that there was no other evidence except the cold-hit match. There was evidence that the victim was raped. There was evidence that whoever left the traces on the victim was the perpetrator. Still, this other evidence left the question of identity unanswered. Who left the traces? Relative to this question, there was no other evidence

[2] For a detailed discussion of competing accounts, and the advantages of normic support, see Gardiner (2018).

linking the defendant to the crime except the DNA match.

The appellate court who reviewed the case in *Toomes* focused precisely on the question of identity, specifically, whether someone other than the defendant could have left the crime traces. The court considered the possibility of laboratory error, but excluded it because the defense during trial made no argument to that effect. The court also considered the probability that a random person, unrelated to the crime, would coincidentally match, and this probability ranged from 1 in 5 billion to 1 in 185 billion, depending on the reference population chosen. Since the probability of a coincidental match was so low, the court was persuaded that it was the defendant who left the traces. In the end, by putting everything together, the court concluded that the low probability of a coincidental match together with the other information in the case—that is, the victim was raped; the traces on the victim could not have been left innocently; there were no manifest laboratory errors—was sufficient to support the defendant's conviction.

This is where normic support conflicts with legal practice. Suppose the defendant in *Toomes* who was incriminated by the cold-hit match was *not* the perpetrator, but routine sources of error such as mislabeling of the samples or framing were ruled out. How could the match point to the wrong individual? It could happen, by sheer coincidence, that the perpetrator and the defendant shared the same DNA profile. As Smith notes, 'this would not ... be a circumstance requiring special explanation' (Smith, 2018, 1212). So cold-hit DNA matches in cases such as *Toomes* do not satisfy normic support because no explanation for why the match coincidentally pointed to the wrong person would be required. If normic support is not satisfied, Smith is committed to saying that a conviction based on a cold-hit DNA match should be blocked. This conflicts with *Toomes* and other appellate decisions in cold-hit cases (Malcom, 2008; Roth, 2010).

4 THE OVERGENERALIZATION CHALLENGE

The fact that the theory of normic support disagrees with some appellate court decisions might seem of limited significance. But this is not so. If Smith is right that liability judgments based on cold-hit DNA matches do not satisfy normic support, this overgeneralizes to other forms of trial evidence.

First note that DNA and fingerprint evidence are similar to one another. If an innocent person is incriminated by a DNA or fingerprint match, there could be different explanations for the mistake:

error by the analyst, mislabeling of the samples, framing. But, as seen earlier, it could *also* be that the DNA match pointed to the wrong person because, by sheer coincidence, the defendant and the real perpetrator shared the same genetic profile. Similarly, it could just so happen that the perpetrator and the defendant shared the same fingerprints. There is no scientific basis for the uniqueness of fingerprints (Zabell, 2005). The analogy, in fact, extends to eyewitness identifications. If an innocent defendant was incriminated by an eyewitness, there could be different explanations: fatigue, bias, confusion, bad lighting. But the eyewitness could also be wrong by sheer coincidence. If the perpetrator and the defendant looked alike, in a way that the eyewitness could not tell, it could just so happen that the eyewitness misidentified the defendant.

Smith believes that the possibility of a coincidental match defeats normic support in cold-hit DNA cases—that is, cases in which the judgment of liability is *crucially* based on a DNA match because the match is the only evidence linking the defendant to the wrongdoing. But the possibility of a sheer coincidence also affects fingerprint matches and eyewitness identifications. It follows, by parity of reasoning, that normic support cannot be satisfied in cases in which the judgment of liability is *crucially* based on an eyewitness identification or fingerprint match.[3] And if normic support is a requirement for holding someone liable, judgments of liability crucially based on these forms of evidence should all be blocked. This conflicts with trial practice.

Smith might bite the bullet and urge that trial practice be revised. But this would be too drastic a departure from what the theory of normic support was intended to do, specifically, 'to outline a standard that makes sense of the way in which…evidence is actually treated in the law' (Smith, 2018, 1200).[4] Without revising trial practice, Smith might attempt to articulate a difference between cold-hit DNA matches, fingerprint and eyewitness evidence, and in this way block the overgeneralization challenge. We will see, however, that this route cannot be easily pursued (§5). To avoid the overgeneralization challenge, Smith will have to modify his original theory of normic support to a certain extent, either by socializing it (§6) or by relativizing it (§7). Neither modification is straightforward, but I incline toward the latter because it offers a modified theory of normic support

[3]These are cases in which, despite there being other evidence, the eyewitness identification or the fingerprint match is the only evidence linking the defendant to the wrongdoing.

[4]This is not to say that revisionary arguments about trial practice cannot be made. For example, some might argue that the probability of guilt, when it is based on a single piece of evidence, tends to be too low for a conviction to be justified on that basis alone; see Sangero and Halpert (2007).

that helps to theorize about cross-examination at trial (§8).

5 DIFFERENT FORMS OF EVIDENCE?

In an attempt to find a difference between forms of evidence, Smith might note that eyewitness testimony is informationally richer than a DNA or fingerprint match. To see what this means, it is instructive to distinguish two types of questions that are asked in a trial: questions of identity and narrative questions. Examples of the former are: Who left the traces? Who entered the house illegally? Who pulled the trigger? Narrative questions, instead, are about what happened. When did the perpetrator enter the house? How did the perpetrator acquire a gun? And so on.

Eyewitness testimony can answer both questions. An eyewitness can provide information about what happened before, after or during the wrongdoing (call this eyewitness narrative), as well as information about whether the individual seen at the crime scene shares the same characteristics as the defendant (call this eyewitness identification). By contrast, a match can tell us that an identifying characteristic is shared by the defendant and some material traces (presumably left by the wrongdoer), but can tell us nothing about how the wrongdoing occurred. So while eyewitness testimony can answer both questions, DNA and fingerprint matches can only answer questions of identity.

But this difference is not so clear-cut. DNA and fingerprint matches result from comparing two samples, one from the crime scene and one from the suspect. The crime sample is obtained by analyzing material traces. Since these traces have shapes and arrangements, they can be used to infer how the wrongdoing occurred. Even in *Toomes*, the evidence did not just consist in the cold-hit match. There were also traces whose arrangement indicated that the perpetrator left them. Fingerprint evidence and DNA evidence, then, consists of two components: a match (addressing questions of identity) and material traces (addressing narrative questions). In this sense, there is no clear informational difference between eyewitness testimony and DNA or fingerprint evidence.

Still, it could that eyewitness testimony provides more detailed information about what happened, when and how, than what can be inferred from some crime traces. This is questionable, but for the sake of argument, suppose eyewitness testimony does provide more information toward answering narrative questions compared to fingerprint or DNA evidence. The crux of the matter now is whether this alleged informational difference can block the overgeneralization challenge. It cannot.

For eyewitness testimony can still give the wrong answer to an identity question because of a sheer coincidence, and this makes it analogous to a DNA or fingerprint match in terms of normic support.

Smith might try another route. Narrative questions aside, he might argue that eyewitness testimonies and other forms of evidence differ in the information they can provide toward answering *identity* questions. Let us distinguish two types of identification. First, a piece of evidence can attest that the defendant and the perpetrator share characteristics, say, C1 and C2 (call this partial identification). Second, the evidence can attest that the defendant *is* the perpetrator (call this full identification). In the case of partial identifications, it could be that the evidence pointed to the wrong individual because it just so happened that the perpetrator and the defendant shared the same identifying characteristics. This does not apply to full identifications because these are not confined to characteristics that could be shared by more than one individual. Full identifications must rely on unique characteristics that exclude everybody else except the defendant.

But if full identification is the standard that DNA and fingerprint matches, as well as eyewitness identifications, must meet in order to satisfy normic support, no evidence routinely used at trial would satisfy normic support. DNA matches cannot because two individuals might share the same genetic profile. Fingerprint matches are no different since there is no scientific basis for the uniqueness of fingerprints. A unique identification is also an unreachable ideal for eyewitness testimony. The identifying characteristics that an eyewitness relies on to make an identification must be fined-grained, but can hardly be more fine-grained than genetic profiles.[5] So this attempt to articulate a difference between forms of evidence also fails, and the overgeneralization challenge still stands.

6 SOCIALIZING NORMIC SUPPORT

One way out of the overgeneralization challenge consists in *socializing* normic support, that is, interpreting it as part of the relations of trust and responsibility among the actors who participate in the trial. To illustrate, note that an eyewitness at trial typically provides an identification by asserting, in a full-fledged manner, that the defendant *is* the wrongdoer, or else the testimony will not be considered sufficient, by itself, to sustain a judgment of liability. DNA or fingerprint experts can hardly make such strong assertions. They can only assert, more modestly, that there is a match

[5] If any form of evidence comes close to be uniquely identifying, that is DNA evidence (Kaye, 2013).

between a defendant's characteristic and the crime traces. This difference impacts the social relations of trust and responsibility that are built among the actors participating in the trial. If an eyewitness claims that the defendant *is* the perpetrator, and this claim turns out to be incorrect, the witness would owe the defendant an explanation. This is not the case when an expert testifies, more modestly, that a characteristic is shared between the crime traces (arguably left by the perpetrator) and the defendant. The expert would owe the defendant no explanation should the perpetrator and the defendant turn out to be two different individuals who share the same identifying characteristic.

Normic support, then, can be socialized in the following way. Evidence E s-normically supports p if and only if, whenever E holds but p does not, the agent who was the source of E would owe to the other actors in the trial, especially the defendant, an explanation for the mistake. This reading of normic support vindicates the difference between eyewitness testimony and a DNA or fingerprint match. It also vindicates the intuition that a judgment of liability cannot rest on just statistical evidence. If an expert testified that on the day of the accident 90% of the buses in town belonged to Blue-Bus, and it turned out that the bus involved in the accident belonged to Red-Bus, the expert would owe no explanation to the defendant.

Socializing normic support avoids the overgeneralization challenge, but this comes at a cost. The socializing strategy draws a distinction between eyewitness identifications and DNA or fingerprint matches that is not epistemically justified. No known form of trial evidence—surely not eyewitness identifications, nor DNA or fingerprint matches—is uniquely identifying and thus able to warrant the claim that the perpetrator *just is* the defendant. This means that if eyewitness statements were made without exaggerating their evidential value, they should only assert that the perpetrator and the defendant share certain identifying characteristics. In addition, s-normic support still conflicts with sizable portions of trial practice. Since it draws a distinction between DNA and fingerprint matches, on the one hand, and eyewitness testimonies, on the other, the socializing reading would block liability verdicts that were crucially based on DNA or fingerprint matches. But appellate courts are often willing to uphold verdicts of liability when the evidence rests crucially on a genetic or fingerprint match (see, e.g., the court cases discussed in Malcom, 2008).

7 RELATIVIZING NORMIC SUPPORT

A way out of the overgeneralization challenge that is more faithful to trial practice is to recant the claim that cold-hit DNA matches fail to meet normic support. Smith endorses this claim because he takes the *mere possibility* of a coincidental match to be enough to defeat normic support. But this is problematic. As seen earlier, in the case of DNA and fingerprint matches, as well as eyewitness identifications, it is always possible to imagine scenarios in which the defendant was misidentified by sheer coincidence. If the mere possibility of such scenarios is enough to defeat normic support, then no fallible identification evidence of the type routinely used at trial can satisfy normic support.

To make progress here, note that Smith recognizes that normic support is defeasible. He writes that '[i]f the witness admits, under cross examination, that she is prone to color hallucinations, then ... normic support ... would be defeated' (Smith, 2018, footnote 14). In this sense, normic support is sensitive to the additional information one may acquire during cross-examination. This can be made explicit in the definition itself. That is, evidence E normically supports p relative to information I whenever the truth of E, the falsity of p and the availability of information I, combined, call for an explanation. In the context of a trial, we can think of I as the information presented during cross-examination about the trustworthiness of evidence E.

Let's put this definition to work. Suppose a DNA match in a cold-hit case incriminates a defendant, but no specific information about the trustworthiness of the match is available because no cross-examination has taken place yet. Relative to this informational state, the match satisfies normic support. For if the defendant was in fact innocent, this would typically call for an explanation, such as framing, laboratory error, and so on. The same can be said *mutatis mutandis* in cases in which an innocent defendant is incriminated by a fingerprint match or an eyewitness identification, absent further information about the trustworthiness of the evidence.

The relativizing strategy, then, rejects Smith's claim that cold-hit DNA matches do not satisfy normic support, and in this way avoids the overgeneralization challenge. This is promising. But there is a complication. Suppose a DNA match in a cold-hit case is scrutinized and all sources of error are excluded except a coincidental match. Relative to this richer informational state, the match would no longer satisfy normic support. Innocence would require no explanation since the only circumstance

in which the defendant could be innocent would be a coincidental match. The same applies to cases in which an innocent is incriminated by a fingerprint match or an eyewitness identification, and cross-examination has excluded all routine sources of error except sheer coincidence. Relative to these richer informational states, these forms of evidence would not satisfy normic support. This is paradoxical. A piece of incriminating evidence that survived cross-examination offers a stronger epistemic justification for the conclusion that the defendant is guilty, compared to an unscrutinized piece of evidence. Yet normic support would be satisfied in the latter case and not in the former.[6]

A way out of this paradox is to reject the tacit assumption that coincidental matches cannot be explanations. A coincidental match, in fact, can be regarded as a possible explanation among others for why a DNA match or other forms of identification evidence incriminated the wrong individual. The explanation would go along these lines: the defendant and the perpetrator share the same identifying characteristics, and since the evidence cannot distinguish people with these same characteristics, the defendant was mistakenly incriminated. Even when other routine explanations are excluded, a DNA match in a cold-hit case would satisfy normic support because the coincidental match would be the explanation called for in case of innocence. The same can be said for sheer coincidences in the case of fingerprint matches or eyewitness identifications.

Some might worry that if coincidental matches count as explanations, this would broaden the notion too much so that naked statistical evidence would satisfy normic support. But this worry is unjustified. Suppose (i) 90% of the buses in town belong to Blue-Bus, and yet (ii) the bus that injured the pedestrian belongs to Red-Bus. Pointing out that it just so happened that a Red-Bus bus injured the pedestrian would not count as an explanation of the conjunction of (i) and (ii). This would be a mere repetition of (ii) with the addition of the phrase 'it just so happened that.' By contrast, a coincidental match—the statement that the defendant and the perpetrator share an identifying characteristic—gives more information than the mere assertion that the defendant is not the perpetrator. So while a coincidental match can serve as an explanation for a misidentification, an occurrence simply marked by the phrase 'it just so happened that' cannot.

To be sure, coincidental matches are peculiar explanations. As noted earlier, neither an eyewitness nor a DNA or fingerprint expert are in a position to make a unique identification. So if a

[6]Thanks to an anonymous reviewer for pointing this out.

misidentification occurs because of a coincidental match, there is no fault in the evidence that could have been corrected short of increasing the discriminating power of the evidence itself. Other explanations, instead, do identify failures in the causal path, such as framing, mislabeling of the samples, fatigue, etc. But even if a coincidental match is a peculiar explanation, it still can be one.

8 ADVERSARIAL SCRUTINY

I have argued that in order to respond to the overgeneralization challenge, Smith can endorse a socialized reading of normic support and in this way maintain his claim that cold-hit DNA matches do not satisfy normic support, or he can recant this claim and relativize normic support. The socializing approach has a dubious epistemic foundation, and I therefore incline toward the second option. There is another reason for that. Smith notes that his account would be strengthened by showing 'that a normic standard is important for the overarching aims or purposes of the legal system' (Smith, 2018, 1215). To this end, I will outline how relativized normic support helps to theorize about cross-examination, the adversarial process that takes place at trial with the purpose of scrutinizing the evidence and screening out untrustworthy evidence.

Here are some useful notational conventions and definitions. The adversarial scrutiny of a piece of evidence E purporting to establish a proposition p is meant to elicit further information bearing on the trustworthiness of E. Let I_0 be the informational state at the beginning of the process of scrutiny. This informational state will be updated progressively as new information becomes available. Let $EX(E, p, I_0)$ be the (possibly empty) set of explanations that are called for whenever p is false while E and I_0 obtain. This set contains, relative to I_0, all reasonable explanations for why p could be false but E true. These may include routine explanations such as framing and lab errors, as well as coincidental matches. Since I_0 will be updated as the adversarial scrutiny of E progresses, the set of explanations relative to richer informational states will change accordingly.

The scrutiny of a piece of evidence E purporting to establish p can be viewed as the testing of the explanations in $EX(E, p, I)$, relative to all the progressively richer informational states I during the process of scrutiny. To illustrate, consider a piece of evidence E that normically supports p relative to the initial informational state I_0, where $EX(E, p, I_0) = \{ex_1, ex_2, ex_3\}$. If cross-examination shows that an explanation ex_i is likely (or plausible), the informational state I_0 should

be updated with ex_i. Relative to the richer informal state $I_0 \wedge ex_i$, evidence E would no longer normically support p because the set $EX(E, p, I_0 \wedge ex_i)$ would be empty. For example, if cross-examination shows that the eyewitness was hallucinating, the falsity of the proposition that the witness testimony was purported to establish, combined with the testimony itself, would no longer call for an explanation. On the other hand, an explanation ex_i can also be ruled out as unlikely (or implausible), and in this case I_0 should be updated with the negation of ex_i. Normic support would still hold so long as $EX(E, p, I_0 \wedge \neg ex_i)$ is non-empty. For example, if cross-examination made clear that the eyewitness was *not* hallucinating, it could still be that the eyewitness was paid to smear the defendant, another explanation needing adversarial testing.[7]

Understanding the adversarial scrutiny of the evidence in this way also underscores the difference between naked statistical evidence and other forms of evidence. For suppose a defendant is incriminated by an eyewitness testimony, a DNA or fingerprint match. If the defendant is not factually liable, the process of adversarial scrutiny should show—often enough, hopefully— that, for some informational state I, one of the explanations in $EX(E, p, I)$, such as framing, laboratory error, etc. is likely (or plausible). But now suppose a defendant is incriminated by naked statistical evidence. Since this evidence fails to satisfy normic support, the set $EX(E, p, I_0)$ would be empty, and thus the process of adversarial scrutiny would be unable, in principle, to test any explanation for why p could be false but the evidence true. Cross-examination could not even get off the ground.

Some might object that this difference is more apparent than real. A defendant can still respond to an accusation based on naked statistical evidence. The defendant can question the relevance of the statistics by presenting countervailing evidence, perhaps other statistics. For example, Blue-bus can respond to the 90% statistics by offering other statistics showing that accidents in the last year involved a Blue-Bus bus only 10% of the time.[8] More generally, a defendant can respond to an accusation based on an item of evidence E by pursuing one of two routes: first, by eliciting additional information about E with the goal of *undercutting* the connection between E and the proposition p that E purports to establish; and second, by offering independent evidence that *rebuts* the claim that

[7] What if the process of scrutiny shows that all reasonable explanations in $EX(E, p, I)$ are unlikely (or implausible)? The informational state should be updated accordingly with the negation of each explanation. If all the reasonable explanations have been ruled out, there is no foreseeable reason why p could be false while E obtains. The falsity of p despite the truth of E would then either be ruled out by default or require some special explanation not considered so far.

[8] For a discussion of this topic in relation to the reference class problem, see Nance (2007).

p and supports a proposition incompatible with p.[9] The second route is always available to defendants insofar they can find other independent evidence in their favor. But if the target evidence does not satisfy normic support, the undercutting route is blocked. When the evidence does not satisfy normic support, there is no explanation we would expect for why the evidence could be true but p false, and such explanations are precisely those that, if true, would serve to undercut the connection between the evidence and the proposition supported by the evidence. So failure to satisfy normic support blocks the possibility of undercutting and in this ways narrows the defense avenues for a defendant. If this is correct, the narrowing of the defense avenues would be the deeper reason why evidence that does not satisfy normic should be considered problematic.[10]

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[9] Undercutting consists in presenting information that raises doubts about the connection between evidence E and the proposition p that the evidence purports to support. Rebutting consists in presenting other, new evidence E' that supports a proposition q that is incompatible with p. See Pollock (1987).

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