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WHAT DOES IT MEAN TO BE «PLAUSIBLE»?*

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ABSTRACT: This article explores what «plausible» means in statements about legal evidence and shows that it is highly ambiguous. Twelve different meanings of «plausibility» are identified and distinguished from each other by definitions. Contrary to what has been claimed by some evidence scholars (Allen and Pardo, 2019), the article shows that all uses of «plausibility» can be captured in terms of probability. The author also shows that the exposed ambiguity is deeply problematic for legal practice and legal scholarship. The fundamental principle of justice that «like cases should be treated alike» is endangered when the standard of proof is expressed in an ambiguous way, and the scientific testability of hypotheses about legal fact-finding is undermined when these hypotheses are formulated in ambiguous terms.

KEYWORDS: plausibility, probability, evidence, ambiguity.

SUMMARY: 1. TALKING ABOUT «PLAUSIBILITY».— 2. TWELVE DIFFERENT MEANINGS.— 3. THE PROBLEMS WITH AMBUGUITY.— 4. CONCLUSIONS.— BIBLIOGRAPHY

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1. TALKING ABOUT «PLAUSIBILITY»

This is a paper about a word that has been puzzling and bothering me for a long time. The word is «plausible», and what I have been trying to grasp is what it means exactly when it is used in statements about legal evidence. Assessments of legal evidence are often made in terms of plausibility, for example when a certain hypothesis is characterized as plausible or implausible, or when a certain explanation of the evidence is said to be more plausible than a competing explanation. As a lawyer working in the Swedish legal system, I often hear statements of this kind, and I sometimes make them myself. The term plausible is used frequently by all actors in the legal system. Litigators use it in briefs and oral arguments, expert witnesses use it in their reports and testimonies, and judges use it in their verdicts. The following two examples are taken from my personal experience in the Swedish legal system:

> The only plausible explanation to how the bottle ended up in the small bag is that Henry H took it with the intention to keep it without paying for it [plaintiff's argument in a labor dispute] (AD, 1995-11-15, AD 137/1995)[1].
>
> To grant a new trial, there needs to be a plausible explanation for why the witness has changed his testimony [Supreme Court verdict in a penal case] (HD, 2008-12-18, Ö 1208-06, NJA 2008 note 63)[2].

Academics also talk about legal evidence in terms of plausible and plausibility. Here are some examples from scholarly publications[3]:

> If, after hearing all the evidence, a juror concludes that there is a plausible scenario consistent with innocence, then the juror should vote for acquittal (Allen, 1991, p. 413)
>
> That is what sometimes happens when a defendant who first invokes his right to remain silent and only much later, having knowledge of all the evidence presents a more or less plausible scenario that more or less neatly explains the evidence (Mackor and van Koppen, 2021, p. 224)

I am worried that people do not mean the same thing when they talk about plausibility. Does a forensic scientist who says that a hypothesis is plausible mean the same thing as a judge who writes in a verdict that the hypothesis in question is plausible? Does Ronald Allen mean the same thing when he is talking about a plausible scenario as Anne Ruth Mackor and Peter van Koppen in the statements quoted above?

I sometimes hear myself using the word plausible and it always comes with the uneasy feeling that I do not know what exactly I mean by it, hoping that no-one will press me for a clarification. When I say that a hypothesis is plausible I convey that I have some degree of belief in the hypothesis, but what degree exactly? If it would be expressed in probabilistic terms, would it correspond to a probability in the range of 10-25%? Or rather a probability around 50%? Or a probability in the range of 75-

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[1] My translation.
[2] My translation.
[3] For some more examples, see Josephson (2001, p. 1642) or Bex and Walton (2012, p. 116).

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90%? When I say that something is plausible I try to convey the mixed feeling that I have some reason for my belief, but I am not certain. So, what kind of uncertainty am I talking about, exactly?

Since plausibility is an important concept, one would expect to find helpful explications and definitions in the international scientific literature on legal evidence, but this is not the case. Scholars have much to say on *what makes something plausible* («evidence makes a hypothesis plausible», «coherence makes an explanation plausible» *etcetera*)[4], but they say very little on *what it means to be plausible*. This distinction is subtle but important. If you go through the literature on legal evidence in search of a precise definition of plausibility, you will be disappointed. I am well acquainted with the international literature on legal evidence and have not been able to find a definition anywhere. This absence is striking in comparison to other central concepts in evidence theory. It is particularly striking in comparison to the concept of probability. Scholars who talk about the assessment of legal evidence in terms of probability offer precise and quite technical definitions of what it means that something is more or less probable (Kadane and Schum, 1996, pp. 158-162; Aitken and Taroni, 2004, pp. 16-34; Robertson *et al.*, 2016, pp. 11-12; Fenton and Neil, 2018, pp. 87-99; Meester and Slooten, 2021, pp. 1-29). The talk about plausibility relies, instead, on some undefined intuition of what it means that something is plausible.

A prominent approach to legal evidence where the term plausibility plays a central role is the *Relative Plausibility Theory* developed by Ronald Allen and Michael Pardo (Allen, 1991; Allen, 2010; Allen and Pardo, 2019a; Allen and Pardo, 2019b). According to the relative plausibility theory, legal fact-finding is driven by explanatory reasoning. The legal system pushes the parties in a legal dispute to present competing explanations of the evidence, and the fact-finder assesses the plausibility of these explanations (Allen and Pardo, 2019b, p. 208). I will not go into this account of legal fact-finding in more detail, since the present paper is not about the claims of the relative plausibility theory. This paper is concerned with the meaning of the word plausible in statements about legal evidence, as they appear in the relative plausibility theory and other accounts of legal evidence that also use this word.

Allen and Pardo do not define what plausibility exactly stands for. That the relative plausibility theory lacks a definition of plausibility has been pointed out and criticized by many scholars, including David Schwartz and Elliot Sober (1997, p. 201)[5]. Allen (2010) has responded to this critique that plausibility does not need definition: «Identifying precisely what motivates choice is not necessary […] «plausibility» can exist happily as an undefined primitive» (p. 12).

A possible reply from scholars who are pressed to define what they mean by plausible would be to say that it just means «probable». In that way, plausibility would

[4] See, for example Allen (2017, pp. 139-140).

[5] See also the critical comments on the relative plausibility theory by Alicia Carriquiry, Reid Hastie and Eivind Kolflaath (Allen and Carriquiry, 1997, p. 467; Hastie, 1997, p. 134; Kolflaath, 2019, p. 126).

simply piggyback on the definition of probability, but Allen and Pardo have rejected this escape route. According to Allen and Pardo (2019a, p. 21), plausibility is not synonymous with probability and cannot be reduced to probability. Unfortunately, they do not explain in what way plausibility is different from probability. This has been pointed out and criticized by Dale Nance (2016, p. 81).

Another important approach to legal evidence that frequently uses the term plausibility is the Dutch *Scenario Theory*, developed by Peter van Koppen, Willem Wagenaar, Hans Crombag and Anne Ruth Mackor (Wagenaar, *et al.*, 1993; van Koppen 2011; Mackor and van Koppen, 2021). Mackor (2023) has recently published an article in Dutch that presents an explication of the term plausibility in Dutch evidence law. This is a notable exception to the lack of definitions in the literature on legal evidence but has not yet been made available in English to a broader audience. According to Mackor, plausibility is different from probability since it also captures the dimension of robustness (p. 298). That something is plausible expresses a low confidence in the assessment, due to a lack of robustness. I will return to this definition in the next section.

The present investigation is not a critique of the relative plausibility theory or the scenario theory as such. It is a critique of the undefined use of plausibility in all approaches to legal evidence, including these theories. My inquiry in this article does not concern if the statements about legal evidence that use this word are appropriate and correct. It is only a critique of the undefined use of the word plausible.

Looking at the discourse on legal evidence, it seems to me that plausible is used in a multitude of different meanings. In the next section, I will identify and distinguish twelve different meanings of plausibility. Furthermore, I will show that each of these meanings can be precisely defined in terms of probability. This means that it is false that plausibility cannot be reduced to probability, as Allen and Pardo have suggested. On the contrary, there is nothing in plausibility that cannot be clearly captured in terms of probability.

In the third section of this article, I will highlight why the observed ambiguity is deeply problematic for legal practice and legal scholarship. As we shall see, the fundamental principle of justice that «like cases should be treated alike» is endangered when the standard of proof is expressed in an ambiguous way, and the scientific testability of hypotheses about legal fact-finding is undermined when these hypotheses are formulated in ambiguous terms.

2. TWELVE DIFFERENT MEANINGS

In my studies of reasoning about legal evidence, I have come across twelve different meanings of the term plausible. I will refer them as follows.

1. *plausible-as-possible*
2. *plausible-as-degree-of-probability*

3. *plausible-as-eligible*
4. *plausible-as-probable*
5. *plausible-as-front-runner*
6. *plausible-as-predictive*
7. *plausible-as-prima-facie-eligible*
8. *plausible-as-prima-facie-probable*
9. *plausible-as-prima-facie-front-runner*
10. *plausible-as-eligible-but-not-robust*
11. *plausible-as-probable-but-not-robust*
12. *plausible-as-frontrunner-but-not-robust*

In this section we will go through these different meanings one at a time, with examples from texts on legal evidence, and see what each of them means in probabilistic terms.

When a hypothesis (H) is said to be plausible in the sense of being *possible*, the statement means that given the evidence at hand (E), there is a probability greater than zero that the hypothesis is true. I call this use *plausible-as-possible*.

$$\textit{plausible-as-possible}_{def} \qquad P(H|E) > 0$$

The following statement seems to be an example of *plausible-as-possible*[6]: «If a scenario holds that the same individual was in one place at noon and in another place 1000 km away at 12:30, the scenario can be dismissed as […] implausible» (Mackor and van Koppen, 2021, p. 219).

Sometimes, plausibility is simply used as a synonym to probability. I call this use *plausible-as-degree-of-probability*. When plausibility is used in this way, degrees of probability are expressed by adverbs that modify the plausibility of the hypothesis, for example «slightly plausible», «somewhat plausible», «very plausible» or «highly plausible».

A different use of plausibility can be seen in statements where plausible stands for a specific degree of probability, or a specific interval on the probability scale. For example, in statements where plausible means that the probability of hypothesis is clearly above zero but smaller than fifty-fifty, or statements where plausible means that the probability is over fifty-fifty but considerably less than one. I call the former *plausible-as-eligible* and the latter *plausible-as-probable.*

$$\textit{plausible-as-eligible}_{def} \qquad 0.5 > P(H|E) >> 0$$

$$\textit{plausible-as-probable}_{def} \qquad 1 >> P(H|E) > 0.5$$

[6] For a non-legal example, see Lombardi *et al.* (2016, p. 35).

Another use of plausibility can be observed in statements where the classification of the main hypothesis (H_m) as plausible means that it is the most probable hypothesis among the hypotheses considered. There is no alternative hypothesis (H_a) that is more or equally probable. I call this use *plausible-as-front-runner*.

plausible-as-front-runner$_{def}$ $\quad \neg\exists(H_a)\ P(H_m|E) \leq P(H_a|E)$

This use of plausibility is quite common and can be found in texts that deal with the so-called *bad lot problem*, where a hypothesis that is not particularly probable is classified as plausible because all the other alternative hypotheses under consideration are even less probable (Laudan, 2007, p. 298; Jellema, 2023, p. 123).

When plausible means possible, eligible or probable it refers to the probability of the hypothesis given the evidence, P(H|E), but plausibility is sometimes used with regard to the inverted conditional probability of the evidence given the hypothesis, P(E|H). This is known in statistics as the *likelihood* of the hypothesis and refers to the probability that we would see the evidence if the hypothesis at issue is true. A high probability means that the hypothesis is highly *predictive* of the evidence. I have therefore labeled it *plausible-as-predictive*. When plausibility is used in this way, it means that the observed evidence is what we expect to see in cases where the hypothesis is true.

plausible-as-predictive$_{def}$ $\quad P(E|H) \approx 1$

This meaning of plausibility is often what lawyers have in mind when they say that the hypothesis is a «plausible explanation» of the evidence. It should be noted that being plausible in this sense does not rule out that the alternative hypothesis (¬H) is just as plausible, P(E|¬H) ≈ 1. Consider, for example, a case where a woman has been killed, the hypothesis-at-issue (H) is that her husband did it, the alternative hypothesis (¬H) is that someone else killed her, and the evidence-at-hand (E) is that DNA matching the husband has been found on her clothes. This is what we expect to find if the husband is guilty, P(E|H) ≈ 1, but it is also what we expect to find if someone else did it, P(E|¬H) ≈ 1. When a hypothesis is said to be a plausible explanation of the evidence in the sense of being predictive, it is perfectly possible that the alternative hypothesis is also plausible. Hylke Jellema (2023) makes this observation by distinguishing between «plausibility in an absolute sense» and «relative plausibility» (p. 114). If we are looking for evidence that supports the hypothesis-at-issue, we should look for evidence that is more predicted by it than by the alternative hypothesis, P(E|H) > P(E|¬H)[7]. Scholars who use the term plausible sometimes say that the difference between plausibility and probability is that two competing hypotheses can

[7] It should be noted that *plausible-as-predictive* is often used in the investigation phase of a criminal case. Police investigators routinely search for evidence that is predicted by their working hypothesis (Jellema, 2023, p. 117). This will often lead to evidence being found that increases the probability of the hypothesis, but in some case the evidence predicted by the hypothesis will be absent, which will decrease the probability of the hypothesis (Josephson, 2001, p. 1642).

both be plausible, but cannot both be probable (Rescher, 1976, p. 31). This description is a bit misleading. A better way of putting it is to say that two competing hypotheses can both be plausible in the sense of *plausible-as-predictive* but they cannot both be plausible in the sense of *plausible-as-probable*, so the observed difference is not a difference between the concepts of plausibility and probability, but actually a difference between different meanings of plausibility.

The six uses of plausibility that we have seen so far are open to any kinds and amounts of evidence, but plausibility is sometimes used in ways that say something about the information on which the assessment is based. This is due to the fact that this information often changes over time. In a criminal investigation, the information changes when new evidence is gathered. In a criminal trial, the fact-finder receives more and more information as the evidence is presented in court. An initial assessment is theref ore based mainly on general background knowledge about the world (Bex and Walton, 2012, p. 117), and as more case specific evidence becomes available, the assessment is based more and more on this information and less on the general background knowledge. For example, in a criminal case where you initially only know that a woman has been found murdered in her home, you might say that it is plausible that the husband did it, based on your background knowledge of such cases (according to statistics, the most probable hypothesis when a woman is found murdered is that she was killed by her spouse). This *prima-facie* assessment might then change when you learn more about the case, as more and more case-specific evidence becomes available that either supports that the husband did it or speaks against it (forensic evidence, witness statements, etc.). To distinguish *prima-facie* assessments on the basis of general background knowledge (E_{pf}) from assessments that are based on more case specific information, plausible is sometimes used to signal the former. I call this *plausible-as-prima-facie*, and it can be added to *plausible-as-eligible*, *plausible-as-probable* and *plausible-as-front-runner* to create variants of these uses.

plausible-as-prima-facie-eligible$_{def}$ $\quad 0.5 > P(H|E_{pf}) >> 0$

plausible-as-prima-facie-probable$_{def}$ $\quad 1 >> P(H|E_{pf}) > 0.5$

plausible-as-prima-facie-front-runner$_{def}$ $\quad \neg\exists(H_a)\ P(H_m|E_{pf}) \leq P(H_a|E_{pf})$

Plausibility is used in this *prima-facie* sense by John Henry Wigmore (1904, p. 930) in his classical treatise on legal evidence, and *plausible-as-prima-facie-front-runner* has recently been employed by Hylke Jellema (2023) in his analysis of the *Simonshaven Case*[8]: «Husbands killing their wives being more common than madmen killing people establish that one explanation is more plausible than the other» (p. 120).

A related but slightly different use of plausibility can be found in statements stressing that the assessment is based on so limited evidence that it is not *robust*. The degree to which an assessment is robust depends on the amount of case specific evi-

[8] See also Salmon (1970, p. 80).

dence on which it is based (and is sometimes referred to as «Keynesian weight»). That an assessment becomes more robust when more evidence is considered means that it becomes less likely that additional information would change the assessment (Dahlman and Nordgaard, 2022, pp. 137-140). In probabilistic terms, lack of robustness is a second-order probability (Dahlman and Nordgaard, 2022, pp. 147-148)[9]. It is the probability that the probability of hypothesis given the present evidence (E_0) would decrease if an additional investigation (i) would be conducted that would produce some further evidence (E_i). The use of plausibility to signal lack of robustness can be added to *plausible-as-eligible*, *plausible-as-probable* and *plausible-as-frontrunner* to create variants of these meanings, as follows.

Plausible-as-eligible-but-not-robust means that the probability of the hypothesis is clearly above zero given the existing evidence but is not robust since there is a considerable risk that additional evidence could speak against the hypothesis and decrease its probability close to zero.

plausible-as-eligible-but-not-robust$_{def}$ $0.5 > P(H|E_0) >> 0$
$P[P(H|E_0, E_i) \approx 0] >> 0$

Plausible-as-probable-but-not-robust means that the probability of the hypothesis is higher than fifty-fifty given the existing evidence but is subject to a considerable risk of being pushed below fifty-fifty by additional evidence.

plausible-as-probable-but-not-robust$_{def}$ $1 >> P(H|E_0) > 0.5$
$P[P(H|E_0, E_i) < 0.5] >> 0$

Plausible-as-frontrunner-but-not-robust means that the main hypothesis is the most probable hypothesis given the existing evidence but not robust since further evidence could decrease its probability and make some alternative hypothesis more probable.

plausible-as-front-runner-but-not-robust$_{def}$ $\neg\exists(H_a)\ P(H_m|E_0) \leq P(H_a|E_0)$
$P[\exists(H_a)\ P(H_m|E_0, E_i) \leq P(H_a|E_0, E_i)] >> 0$

Anne Ruth Mackor (2023, p. 298) claims that *plausible-as-frontrunner-but-not-robust* is the quintessential meaning of plausibility. According to Mackor, plausible signals a low confidence in the assessment, due to a lack of robustness[10].

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[9] Some scholars who oppose a probabilistic approach to legal evidence have incorrectly claimed that robustness cannot be expressed in terms of probability (Cohen, 1986, p. 648; Stein, 2011, pp. 241-42; Haack, 2014, pp. 61-62). For a comprehensive probabilistic model of robustness, see Dahlman and Nordgaard (2022).

[10] *Plausible-as-front-runner-but-not-robust* is typically used in the early stages of the fact-finding process, but can also appear in later stages, if there still is a lack of robustness (Mackor, 2023, p. 298).

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These are the twelve different meanings of plausibility that I have been able to spot in the literature on legal evidence. I am not sure if the list is exhaustive. There may be further uses that I have not identified.

3. THE PROBLEMS WITH AMBUGUITY

That the use of plausibility in statements about legal evidence slides around between twelve different meanings is deeply problematic. A rational discourse requires that key terms are clear and precise (van Eemeren and Grotendorst, 1992, pp. 195-196). When a key term is ambiguous there is a constant risk that interlocutors will use it with different meanings, incorrectly believing that they refer to the same meaning. This effect of ambiguity is known as the problem of *pseudo-agreement* (Naess, 1966, pp. 83-96).

That an undefined use of plausibility can lead to pseudo-agreements and pseudo-disagreements is illustrated by Hylke Jellema's critique of Ronald Allen's account of the criminal standard or proof. Jellema applies the relative plausibility theory to a hypothetical murder case on a small unpopulated island. A man who was on the island when the murder took place becomes a suspect in the police investigation. Initially, he is considered unlikely to be the killer, due to a medical condition, but after a thorough investigation indicates that no one else had opportunity to kill the victim the police infer that it is highly probable that the man did it. Jellema says that although the hypothesis is highly probable it is an «implausible guilt explanation» and, therefore, concludes that the man would not be convicted if a standard of proof is applied that requires the hypothesis to be plausible. «The condition that the guilt explanation must be sufficiently plausible would sometimes lead to acquittal in cases where the defendant's guilt is highly probable» (Jellema, 2023, p. 125).

This is an absurd consequence, and it would be a strong argument against the relative plausibility theory if it had been a correct account of Allen's understanding of the standard of proof, but I seriously doubt that it is. I assume that Allen would say that the standard of proof is met in this hypothetical case since there is no plausible scenario where the defendant is innocent. Jellema and Allen are talking past each other, as they are using plausible in two different meanings. When Jellema observes that the hypothesis is implausible he talks about *plausible-as-prima-facie*, but the plausibility required by the criminal standard of proof according to Allen is not plausibility in this sense. Allen is talking about plausibility in some other sense, maybe *plausible-as-eligible*. This confusing exchange shows how ambiguous words create misunderstandings and obstruct a rational discourse.

As we have seen, statements that talk about legal evidence in terms of plausibility can be found in legal practice as well as in legal scholarship. Some of these statements are *normative* while others are *descriptive*. A statement in a legal verdict where the court assesses a hypothesis as plausible is an example of the former. A statement

where a legal scholar describes what courts do in terms of plausibility is an example of the latter. If the word plausible is used in a legal statute or verdict, the legal scholar is, off-course, constrained to use that word to quote the source in question, but in most of the cases when scholars use plausibility in descriptive statements they are not quoting any legal source, but rather trying to find a word that captures how the system works and how fact-finders think.

Ambiguity is problematic for the *rule of law* and the *principle of formal justice*. The demand that «like cases are treated alike» requires that legal norms are stated in a clear and unequivocal vocabulary (Dahlman, 2024, p. 124-126). If the standard of proof is expressed in ambiguous terms, there is a serious risk that different meanings will be attributed to it by different fact-finders. A standard of proof that instructs fact-finders to convict when the alternative hypothesis is implausible will, for example, be applied differently by a fact-finders who understands this along the lines of *plausible-as-eligible* than a fact-finder who instead understands it according to *plausible-as-front-runner.* Relying on an undefined notion of plausibility endangers the uniform application of the standard of proof that the *rule of law* and the *principle of formal justice* demands.

Ambiguity is also problematic in legal scholarship. Allen (2022) presents the relative plausibility theory as a project in «evidence science» (p. 34), but it is problematic to use an ambiguous term in the formulation of a scientific hypothesis. Scientific methodology requires that the terms used in a scientific hypothesis are clear and unambiguous. Otherwise, it will not be possible to test the hypothesis properly (Popper, 1959, p. 131). To test a hypothesis, data is gathered and checked against the hypothesis. Observations that agree with what the hypothesis predicts corroborate the hypothesis, while observations that do not fit speak against the hypothesis. The problem with a hypothesis that is formulated in an imprecise and equivocal way is that it becomes unclear and arbitrary whether observations should be classified as agreeing or not agreeing with the hypothesis. The test becomes a matter of subjective interpretation instead of objective fact-checking. A hypothesis that describes evidence assessment as a question of plausibility will agree, in one sense or the other, with legal practice, no matter what that practice is, and observations can therefore always be interpreted to «corroborate» the hypothesis.

4. CONCLUSIONS

In this article, I have explored how plausibility is used in the discourse on legal evidence, and I have exposed that it is extremely ambiguous. I have identified twelve different meanings of plausibility and defined each of them in terms of probability. There has been a debate among scholars on the relation between plausibility and probability (Walton, 2001, p. 149), where some have argued that the plausibility-approach to evidence is compatible with the probabilistic approach (Gelbach, 2019, p. 169), and others have claimed that plausibility cannot be reduced to probability (Allen and Pardo, 2019, p. 21). I have demonstrated in this article that each of the

twelve meanings of plausibility that I have identified can be reduced to probability, and captured more precisely in terms of probability.

I have also indicated why the exposed ambiguity is deeply problematic for legal practice as well as legal science. The fundamental principle of justice that «like cases should be treated alike» is endangered when the standard of proof is expressed in an ambiguous way, and the scientific testability of hypotheses about legal fact-finding is undermined when these hypotheses are formulated in ambiguous terms.

I hope that this article will be received as a call for developing a more precise vocabulary for the handling of legal evidence. The twelve meanings of plausibility that I have listed should not be seen as the end-product of this endeavor, only the beginning.

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