The Ambiguity of Justification and Support

December 14, 2010

Propositional beliefs are justified by bodies of evidence. This justification seems to depend on the rational degree of belief that we entertain in the proposition in the light of the evidence, and on the support which the evidence lends to that belief. Therefore, for a better understanding of justification, it is worthwhile to analyze how justification and evidential support relate to each other.

Evidential support is the main concept of Bayesian epistemology and usually explicated as increase in rational degree of belief: accepting one proposition raises an agent's degree of belief in another proposition. This *incremental* aspect of support is complemented by an *absolute* aspect: a proposition is supported in that absolute sense whenever an agent's rational degree of belief in that proposition, conditional on the total evidence, is sufficiently high (Carnap 1950). It has been one of the main insights of Bayesian epistemology to recognize that our intuitive, pre-theoretical concept of support is ambiguous, and that splitting it into these two sub-concepts greatly facilitates the project of explicating evidential support.

Those who believe that Bayesian and mainstream epistemology are closely related and can learn from each other (e.g., Hájek and Hartmann (2010)) might now conjecture that the same kind of ambiguity applies to justification as well. On the other hand, justification and support are different concepts at all. Moreover, in epistemology, we seem to fare reasonably well with only a single concept of justification (e.g., Goldman's (1986) reliabilism).

This note argues that our standard notion of justification is loaded with intuitions that pull into opposite directions. More formally, the argument shows the incompatibility of two plausible principles for justification and its connection to evidential support, making it necessary to rethink our use of that concept. Our result thus supports the conclusion that our ordinary concept of justification should be split into more precise sub-concepts.

We begin by stating the principles and the incompatibility result, followed by a discussion of the plausibility of the principles and the possible ways to make sense of the result.

The first principle expresses the idea that there is *some* connection between justification and support: if the support that evidence e lends to belief b exceeds a threshold value c, then e justifies b. In other words, salient evidence justifies beliefs, and strong support is a sufficient, though not forcibly a necessary condition for (partial) justification. In this formulation, I leave it deliberately open whether justification is a dichotomous notion, or whether it comes in degrees.

> `Evidential Support:` There is a $c \in [0, 1/2[$ such that for a believed proposition b, evidence e and a (probabilistic) credence function $p(\cdot)$ with support measure $S(e, b) := p(b|e) - p(b)$:[1]
>
> - If $S(e, b) > c$, then b is (to some degree) justified by e.[2]

It appears that any interesting concept of justification has to be connected to evidential support in this or a closely related way.

On the other hand, there is a widespread intuition that justification can be transmitted via logical inference relations. If perceptual evidence justifies the belief that there is a Ford standing in front of my house, it also justifies the belief that there is a car in front of my house. If I have the justified belief that a friend is on holiday in Spain, I am justified to believe that she is not at home, and that passing by her place for a coffee would be futile. Examples like this suggest a strong *closure principle*: justification is preserved under known logical entailment among the justified propositions.

While the strong closure principle is very popular and rarely challenged (a famous occurrence is in Gettier 1963), a weaker version is sufficient for our purposes. This weak closure principle states that beliefs derived from justified beliefs are, if not justified themselves, so at least consistent with justified beliefs:

> `Weak Closure:` If (i) a entails b, (ii) this entailment is known to the agent, and (iii) a is to some degree justified by evidence e, then $\neg b$ cannot be justified by e.

`Weak Closure` follows from the closure principle if we assume that no proposition and its negation can be justified at the same time. Since this assumption is uncontentious, those who feel attracted to the closure principle will endorse `Weak Closure` as well.[3]

[1] By assumption, the credence function satisfies the axioms of probability in order to avoid a Dutch Book. Moreover, the difference between posterior and prior degree of belief is a typical Bayesian support measure; we will get back to this point after stating the impossibility result.

[2] Here and below, I follow a convenient abuse of notation in saying that a proposition b is justified by e, instead of saying that a belief with propositional content b is justified by e.

[3] Note that we have not required that either a belief or its negation be evidentially justified.

The interesting and surprising result is that the two principles, although of quite broad and qualitative nature, conflict with each other:

> **Theorem:** `Evidential Support` and `Weak Closure` are incompatible.

Proof: By constructing an appropriate credence function $p(\cdot)$ for which the implications of `Evidential Support` are in conflict with `Weak Closure`. For the propositions a, b and e, we let a entail b and choose $p(\cdot)$ such that

$$\begin{array}{rlrl} p(a \wedge b \wedge e) &= (1-2c)/12 & p(a \wedge b \wedge \neg e) &= (1-2c)/12 \\ p(a \wedge \neg b \wedge e) &= 0 & p(a \wedge \neg b \wedge \neg e) &= 0 \\ p(\neg a \wedge b \wedge e) &= 0 & p(\neg a \wedge b \wedge \neg e) &= 1-(1-2c)/3 \\ p(\neg a \wedge \neg b \wedge e) &= (1-2c)/12 & p(\neg a \wedge \neg b \wedge \neg e) &= (1-2c)/12 \end{array}$$

By straightforward arithmetics, we obtain $p(a|e) = p(b|e) = p(\neg b|e) = 1/2$, $p(a) = (1-2c)/6$, and $p(\neg b) = (1-2c)/6$. Thus,

$$\begin{array}{rcccl} p(a|e) - p(a) &=& 1/2 - 1/6 + c/3 &=& (c+1)/3 \ > \ c \\ p(\neg b|e) - p(\neg b) &=& 1/2 - 1/6 + c/3 &=& (c+1)/3 \ > \ c. \end{array}$$

Hence, the premises of `Evidential Support` are satisfied for a and $\neg b$ with respect to e. We obtain that e justifies a as well as $\neg b$. This contradicts `Weak Closure` since a entails b by assumption. q.e.d.

The theorem thus shows the impossibility of a unified concept of justification that accommodates the intuitions encapsulated in both principles.

Such a result is, of course, only as strong as the principles that underlie it. Concerning `Evidential Support`, it might be objected that our analysis is sensitive to the selected support measures. There are many alternative measures of support, and our choice, the difference between prior and posterior degree of belief, may be considered to be natural, but arbitrary. But notably, our result stays robust if we switch to other reasonable measures of support that have been advanced in the literature.[4] So the only way to deny `Evidential Support` consists in denying that strong evidential support leads to *some* degree of justification. I take it that such a conclusion is unacceptable to most epistemologists.

[4] The most attractive alternatives to the difference measure are the Kemeny-Oppenheim and the Crupi-Tentori measure (Crupi, Tentori and Gonzalez 2007). But also for those measures, our construction yields strong evidential support for a and $\neg b$, leading to the same conclusion (detailed proof omitted and available on request, but the arithmetics are straightforward).

Regarding `(Weak) Closure`, the principle codifies the deeply intuitive idea that justification is an inferential relation, and since known logical entailment is the strongest such relation, justification should, at least to some extent, be invariant under it. If we give up `Weak Closure`, we would be unable to apply the concept in practice, namely to take justified beliefs as a basis for acquiring more true beliefs, rejecting false beliefs, and basing rational decisions on them.

But if both principles are sound, there is only one option left: the concept of justification is ambiguous. The intuitions underlying both principles are valid only if applied to different concepts that we commonly subsume under the header "justification". The question is then what these concepts look like, and whether there is an analogy to the incremental and the absolute aspects of evidential support.

Exploring the latter claim a bit, we first note that the concept of justification underlying `Evidential Support` resembles the incremental aspect of evidential support: Evidence justifies a belief if the rational degree of belief in the believed proposition is raised significantly. Second, `Weak Closure` – the principle that deductive inferences from highly plausible propositions conserve the justificatory status – is true of rational degree of belief conditional on the total body of evidence, too. This makes it attractive to explicate justification as evidential support with the respective sub-concepts, and to proceed to measuring justification in Bayesian terms (Shogenji 2010).

Of course, one can accept the ambiguity of justification without signing up for a particular explication project, such as the Bayesian one. But certainly, identifying the incremental/absolute aspects of justification with their counterparts pertaining to evidential support is an explicative move worthy of consideration. It would not only resolve the tension stated in the above theorem, but also increase the relevance of the powerful Bayesian machinery for the epistemologist's core tool box.

Summing up, this note shows that intuitive conditions of adequacy for an ordinary concept of justification are incompatible with each other, making the concept ambiguous. Furthermore, it argues that splitting justification into two sub-concepts, and identifying them with their counterparts on the side of evidential support needs to be considered seriously. But most importantly, the result demonstrates the need for clarifying our use of "justification" in philosophical theories of that concept.

References

Carnap, Rudolf (1950): *Logical Foundations of Probability*. Chicago & London: The University of Chicago Press.

Crupi, Vincenzo, Katya Tentori, and Michel Gonzalez (2007): "On Bayesian Measures of Evidential Support: Theoretical and Empirical Issues", *Philosophy of Science* 74, 229–252.

Gettier, Edmund Jr. (1963): "Is Justified True Belief Knowledge?", *Analysis* 23, 121–123.

Goldman, Alvin (1986): *Epistemology and Cognition*. Cambridge/MA: Harvard Unviersity Press.

Hájek, Alan, and Stephan Hartmann (2010): "Bayesian Epistemology", in: J. Dancy et al. (ed.), *A Companion to Epistemology*, 93-106. Oxford: Blackwell.

Shogenji, Tomoji (2010): "The degree of epistemic justification and the conjunction fallacy", forthcoming in *Synthese*.