A Synthesis of Hempelian and Hypothetico-Deductive Confirmation

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Abstract

This paper synthesizes confirmation by instances and confirmation by successful predictions, and thereby the Hempelian and the hypothetico-deductive traditions in confirmation theory. The merger of these two approaches is subsequently extended to the piecemeal confirmation of entire theories. It is then argued that this synthetic account makes a useful contribution from both a historical and a systematic perspective.

1. Introduction

There are two grand tradition in qualitative confirmation theory: hypothetico-deductive (H-D) confirmation and confirmation by instances, usually linked to the name of Carl G. Hempel. However, both the classical H-D account and Hempel's confirmation by instances have severe shortcomings, as has been noted a number of times (Glymour 1980a,b; Gemes 1998). These problems were partly addressed by the efforts of Glymour (1980a), Schurz (1991) and Gemes (1993), but their resolutions of these difficulties came at the expense of simplicity and transparency. For instance, the perhaps best game in town (Gemes 1993) relativizes the confirmation relation to the 'natural axiomatization' of a theory.

Therefore, this paper has two principal aims: First, it is shown that the basic Hempelian and H-D intuitions can be synthesized into a single (albeit restrictive) account, which may be regarded as the 'core' of qualitative confirmation. Notably, the logical formalism required for the synthesis is very parsimonious. The two traditions might thus be closer to each other than previously thought, in particular by Hempel himself. Second, it is shown that the synthetic account circumvents the standard objections to H-D and instance confirmation, gets the paradigmatic examples right and can be extended to the confirmation of entire theories. Thus, the synthesis is interesting from a historical and a systematic perspective.

The paper is structured as follows: Section 2 gives a brief motivation of qualitative confirmation theory vis-à-vis quantitative approaches. Section 3 presents H-D and instance confirmation, as well as their problems. Section 4 introduces the principal technical tool of the paper – Ken Gemes' content parts. Section 5 uses content parts to synthesize Hempelian and H-D confirmation, whereas Section 6 extends the definition to the confirmation of entire theories. Section 7 discusses the synthetic account and concludes.

2. Why I am not Always a Bayesian

As of today, purely qualitative, syntactic accounts of confirmation have largely been superseded by quantitative accounts such as Bayesianism. Therefore, I consider it necessary to devote some lines to motivating the pursuit of a qualitative confirmation criterion.

There is a popular prejudice that with the advent and success of Bayesianism, the study of the qualitative dimension of confirmation has become obsolete. Bayesians model the beliefs of scientists by means of probability functions, and explicate degree of confirmation as the credibility boost that a tested hypothesis receives in the face of the evidence. This seems to be a comprehensive model of learning from experience that subsumes qualitative accounts as special cases.[1]

Being a Bayesian myself, I do not want to question the merits of Bayesian inference. However, it can hardly be a *complete* theory of confirmation in science. Sure, since modern science displays a strong focus on data analysis and statistical inference, it lends itself naturally to Bayesian analysis. But most practitioners eschew Bayesian inference for its alleged lack of scientific objectivity and impartiality and prefer the frequentist account of statistical inference. In addition, even Bayesian statisticians do not always treat prior probabilities as a faithful expression of their subjective uncertainty. Recently, some of them surmised that testing complex statistical models rather follows a hypothetico-deductive than an inductivist Bayesian methodology (Borsboom and Haig 2013; Gelman and Shalizi 2012, 2013).

What is more, it may be questioned whether increase of degree of belief is a good explicatum for confirmation in strictly deterministic contexts. Think of Kepler's laws and Tycho Brahe's observations of the orbit of Mars, or Lavoisier's refutation of the phlogiston theory in his experiments on combustion. In these and similar cases, Bayesianism is, rather than an *explication* of scientific confirmation, an instrument to measure its *extent*. It does not describe the structure of confirmatory arguments in the physical sciences up to the 19th century, precisely because these arguments were usually non-probabilistic.

Moreover, the outcomes of scientific experiments often constitute intersubjectively compelling evidence for a specific theory (Glymour 1980a, 93). A Bayesian fails to explain this agreement since any posterior could be justified by choosing appropriate priors.

These problems are not unique to Bayesianism. Basically, all quantitative approaches to confirmation that are based on subjective epistemic attitudes under uncertainty (e.g., Dempster-Shafer theory, ranking functions) are vulnerable to the same objections. Moreover, many objections to qualitative confirmation theory (e.g., the tacking by conjunctions problem that we encounter in the next section) carry over to Bayesianism and other quantitative theories.

Thus, if we are interested in what scientists (and historians of science) refer to when talking about confirmatory arguments from evidence to theory, a qualitative study of logical relations between theory and evidence remains indispensable. It supplements quantitative confirmation theory in an important respect.

[1] See Kuipers (2000) for an extended discussion of qualitative vs. Bayesian confirmation theory.

Among the qualitative approaches to confirmation, there are two grand traditions. One prominent proposal has been made by William Whewell:

> Our hypotheses ought to *foretel* phenomena which have not yet been observed [...] the truth and accuracy of these predictions were a proof that the hypothesis was valuable and, at least to a great extent, true. (Whewell 1847, 62-63)

Modeling empirical support by successful (deductive) prediction is the bottom line of the *hypothetico-deductive (H-D) model of confirmation*. From the hypothesis under test and some auxiliary assumptions, we derive empirical predictions that confirm, if verified, the original hypothesis. For instance, a physicist will test the harmonic oscillator model captured by the equation $\ddot{x} + \omega^2 x = 0$ for swinging pendula by deriving its consequences for a particular pendulum. If the predictions of the oscillator model are verified, they confirm the harmonic oscillator model, if not, they refute it.

Moreover, the H-D model resembles the 'conjectures and refutations'-model of scientific progress (Popper 1934/71): hypotheses have to be subjected to severe tests in order to gain corroboration. This fact distinguishes it among all qualitative accounts of confirmation. It is thereby an attractive model for those who are reluctant to assign degrees of belief in the truth of a scientific hypothesis (a presumption of Bayesianism) but who believe that by subjecting a hypothesis to severe tests and failing to observe refutations, it can be corroborated and favored over others. H-D confirmation may be regarded as the non-probabilistic counterpart of those philosophies of inductive learning that emphasize severe testing of statistical hypotheses (e.g., Mayo 1996) vs. subjective belief updating. For these reasons, it still deserves the attention of philosophers of science.

3. H-D vs. Hempelian Confirmation

Classical formulations of H-D confirmation such as

> (H-D) Evidence E *confirms* hypothesis H relative to background knowledge K if and only if
>
> 1. $H.K$ is consistent;
> 2. $H.K$ entails E;
> 3. K alone does not entail E.

have several substantial shortcomings. First, we often want to say that the results of a scientific experiment do not only support an isolated hypothesis, but speak in favor of an entire theory consisting of several interrelated models or theories (e.g., Dietrich and Moretti 2005). (H-D) does not specify how entire theories, or major parts thereof, are confirmed, as opposed to the confirmation of single hypotheses. Second, (H-D) is unable to cope with the *tacking by disjunction* problem: if E confirms a hypothesis H relative to K, $E \vee E'$ confirms the same H for an arbitrary E' as long as K does not entail $E \vee E'$. So, the predictions of the harmonic oscillator model about a swinging pendulum *or* the observation of a single black raven would confirm that swinging pendula are harmonic oscillators.

This objection exploits the fact that any logical consequence of H, however partial it is, still counts as a prediction of H and thus confirms it. In other words, classical H-D confirmation gives no account of *evidential relevance*.

Third, there is an analogous tacking problem that already troubled Hempel in his 'Studies in the Logic of Confirmation' (Hempel 1945/65). Hempel discusses various adequacy criteria for qualitative confirmation and also considers the

> **Converse Consequence Condition (CCC):** If E confirms H and H' entails H, then E also confirms H'.

Taking the example $E = H =$ 'a is a raven' and $H' =$ 'Hooke's law holds and a is a raven', Hempel observes first that E confirms H according to what he calls the Entailment Condition and concludes: 'here, the rule that whatever confirms a given hypothesis also confirms any stronger hypothesis becomes an entirely absurd principle' (Hempel 1945/65, 32–33). Formally, this is the flip side of the problem of irrelevant disjunctions: namely the possibility of tacking *irrelevant conjunctions* to the confirmed hypothesis H. That is, if E confirms H relative to K according to (H-D), then E also confirms $H.X$ for any X such that $\{H, X, K\}$ is a consistent set of propositions.

Since CCC invites to such irrelevant conjunctions, Hempel rejects the principle and the associated hypothetico-deductive intuition in favor of a different account of confirmation that focuses on deriving *instances* of a hypothesis. This is the second grand tradition in confirmation theory. The idea goes back to Jean Nicod (1925) who modeled *l'induction par confirmation* as the discovery of instances of a hypothesis under test (see also Glymour 1980a). Planet orbits are instances of Kepler's laws. Swinging pendula instantiate the harmonic oscillator. Black ravens instantiate the hypothesis that all ravens are black. Hempel (1943, 1945/65) provided the first rigorous formalization of this idea by demanding that the evidence entail the development of the hypothesis to the domain of the evidence. This is quite different from the H-D account where the deductive arrow goes from the hypothesis to the evidence.

The core of Hempel's formalization is captured by the *satisfaction criterion*:

> (Hempel) Evidence E (directly) *confirms* hypothesis H relative to background knowledge K if and only if $E.K$ entails the development of H for E, that is, the restriction of H to the set of singular terms that occur essentially in E.[2]

Formally, (Hempel) amounts to $E.K \models H_{|E}$. However, this criterion is vulnerable to equally strong, perhaps devastating, criticism. (Hempel) is *monotonous* with respect to background knowledge, that is, the addition of more background knowledge cannot destroy the confirmation relation. This can lead to disastrous consequences. Consider the hypothesis $H = \forall x : (Rx \rightarrow Bx)$ that all ravens are black, and the evidence $E = \neg Ba.\neg Ra$ that we observe a non-black non-raven. Hempel (1945/65) makes a convincing case that such a piece of evidence may confirm the raven hypothesis as long as we do not know beforehand that a is no raven: such observations rule out potential counterexamples to the raven hypothesis. For instance, if we observe a grey bird that resembles a raven, then finding out that it was a crow confirms the raven hypothesis.

However, Hempel's own account of confirmation is inconsistent with this analysis (Fitelson and Hawthorne 2010): relative to the background knowledge $K = \neg Ra$ ('a is no raven'), $E.K = \neg Ba.\neg Ra$ implies $H_{|E} = (Ra \rightarrow Ba)$. Although the color of birds known to be crows or swans cannot tell us anything about the truth of the raven hypothesis, E Hempel-confirms H relative to K in this example, creating an unacceptable confirming instance.

Apparently, two different concepts of confirmation operate in both accounts (cf. Huber 2008, 183–186). While the H-D account follows a deductivist rationale by means of checking the predictions of a hypothesis, the satisfaction criterion (Hempel) is more inductivist: it generalizes logical entailment from evidence to theory (cf. the set of adequacy criteria in Hempel 1943, 127–128). To see this more clearly, note that if evidence E confirms H according to (Hempel), it also confirms any consequence of H. For the H-D account satisfying CCC, it is precisely the other way round.

Having both properties at the same time leads to a well-known triviality result that any evidence confirms any hypothesis. So Hempel concluded that we have to choose between the two approaches. But instead of making such a choice,

[2]Definition 2 will make this notion precise in modern logical terms. See Hempel (1943) for the original account.

I would like to characterize those cases where both approaches agree. This synthetic account may then be regarded as the core of qualitative confirmation. To this end, the next section introduces a logical tool: content parts.

4. Content Parts

The source of the problem of irrelevant disjunction is the property of first-order logic that well-formed forms (wffs) sometimes have irrelevant consequences: for instance, the conclusion in $Fa \models (Fa \vee Ga)$ contains the irrelevant element Ga. We need a means of discerning irrelevant disjuncts in the consequens of a logical entailment.

Ken Gemes' (1997) concept of content parts achieves that goal by analyzing relevance relations between wffs. For the sake of simplicity, I presuppose a first order predicate language L without identity, but the extensions are straightforward.[3]

The following definition captures an intuitive view of relevance relations between two wffs:

> **Definition 1:** An atomic well-formed form (wff) β is *relevant to a wff* α if and only if there is some model M of α such that: if M' differs from M only in the value β is assigned, M' is not a model of α.

Intuitively, β is relevant for α if in at least in one model of α the truth value of β cannot be changed without making α false. In other words, the truth value of α is not fully independent of the truth value of β. A particularly interesting application of this account of relevance is the notion of the *domain* and the *development* of a wff.

> **Definition 2:** The *domain* of a well-formed formula α is the set of singular terms that occur in the atomic wffs that are relevant for α. The *development* of a universally quantified wff α for another wff β, written $\alpha_{|\beta}$, is the restriction of α to the domain of β, that is, we evaluate the truth value of α with respect to the domain of β.

For instance, the domain of $Fa.Fb$ is $\{a, b\}$ whereas the domain of $Fa.Ga$ is $\{a\}$, and the development of $\forall x : Fx$ for $Fa.\neg Gb$ is $Fa.Fb$.

Moreover, we can define the notion of a *relevant model* which assigns truth values to all and only the relevant atomic wffs:

[3] A generalization of the content part relation to richer languages that can be used for H-D confirmation, e.g. languages with identity, is given in Gemes (1997). The definitions below are, with the exception of Definition 2, taken from Gemes (2006).

Definition 3: A *relevant model* of a wff α is a model of α that assigns truth values to all and only those atomic wffs that are relevant to α.

So relevant models remain silent on the truth values of irrelevant atomic wffs. This allows us to define the notion of a *content part*, where in addition to logical entailment, all relevant models of the consequens can be extended to relevant models of the antecedens:

Definition 4: For two wffs α and β, β is a *content part* of α ($\alpha \models_{cp} \beta$) if and only if

1. α and β are contingent;
2. α logically entails β;
3. every relevant model of β has an extension which is a relevant model of α.

The content part relation forbids irrelevant disjunctions in the conclusion. For instance, $Fa \vee Ga$ is no content part of Fa because the model that assigns 'false' to Fa and 'true' to Ga is a relevant model of $Fa \vee Ga$, but cannot be extended to a model of Fa. The content part relation marks such deductions as irrelevant. Following Gemes (1993), we can improve on our original definition of H-D confirmation by postulating

(H-D*) Evidence E *confirms* hypothesis H relative to background knowledge K if and only if

1. $H.K$ is consistent;
2. E is a content part of $H.K$ ($H.K \models_{cp} E$);
3. K alone does not entail E.

5. Synthesizing Hempelian and H-D confirmation

Unfortunately, (H-D*) does not solve all tacking paradoxes: the problem of irrelevant conjunctions persists. Observations of a swinging pendulum still confirm the hypothesis that pendula are harmonic oscillators *and* that all ravens are black. To rule out these problems, Gemes (1993) has introduced 'natural axiomatizations' of a theory.

That strategy has its merits, but also its drawbacks (Schurz 2005). First, it is not always clear which axiomatizations should count as natural and which don't. Second, Gemes' account ends up with a rather complicated definition and is hard to interpret intuitively. Keeping in mind Carnap's (1950, §3) requirement that explications should be as simple as possible, we might decide to look for alternatives (e.g., Schurz 1991). Unfortunately, these suggestions also fail to resolve all objections satisfactorily (cf. Gemes 1998).

Let us return to the problem of irrelevant conjunctions. Hempel noticed that under certain circumstances, general hypotheses may be confirmed by experimental findings that support a more specific hypothesis. For example, evidence for Galileo's principle—that bodies of different mass fall with the same acceleration—also supports Newton's Law of Gravitation. In these cases, 'the weaker hypothesis is connected with the stronger one by a logical bond of a particular kind: it is essentially a *substitution instance* of the stronger one' (Hempel 1945/65, 32, my emphasis).

Indeed, the tacking problem emerges because the evidence is only a partial instance of the tacked hypothesis: Fa is no instance of $H = \forall x : (Fx.Gx)$, etc. To cure this problem without losing the H-D spirit of the confirmation relation, I demand that the *negation* of the hypothesis, suitably restricted, be a content part of the negation of the evidence. Formally, the condition reads

$$\neg E.K \models_{cp} \neg H_{|E}.K. \tag{1}$$

Here, '$H_{|E}$' refers to the *development* of H for the domain of E – that is, the set of singular terms that are relevant to E. Now, if H is the compound of a 'relevant' and an 'irrelevant' hypothesis, then the content part relation will not hold between $\neg E.K$ and $\neg H_{|E}.K$, because the irrelevant conjunctions have been transformed into irrelevant disjunctions. For example, if $H = \forall x : (Fx.Gx)$, $E = Fa$, and $K = \top$, then $\neg H_{|E}.K = \neg Fa \vee \neg Ga$ is no content part of $\neg E.K = \neg Fa$.

Hence, (1) solves the tacking by conjunction problem and we can use this condition in a definition of qualitative confirmation that synthesizes Hempelian and H-D confirmation. Confirming evidence consists in predictions of H which form at the same time instances of H:

> (Syn) Evidence E *confirms* hypothesis H relative to background knowledge K if and only if
>
> - E is a content part of $H.K$ ($H.K \models_{cp} E$), and
> - $\neg H_{|E}.K$ is a content part of $\neg E.K$ ($\neg E.K \models_{cp} \neg H_{|E}.K$).

(Syn) successfully copes with the tacking paradoxes, and in doing so, it improves upon classical H-D confirmation as well as upon Hempel's proposal.

For instance, in the raven paradox, (Syn) goes with the H-D account: $E = Ra.Ba$ does not directly confirm $H = \forall x : (Rx \rightarrow Bx)$, but both $E_1 = Ba$ and $E_2 = \neg Ra$ confirm H relative to $K_1 = Ra$ and $K_2 = \neg Ba$, respectively. Notably, H is no longer confirmable by *known* non-ravens whose color is subsequently observed, as it used to be the case in Hempel's own account.

However, (Syn) does not explain how different parts of a theory can be confirmed by a body of composite evidence. This feature of (Syn) is particularly salient if we examine the behavior of that account with respect to the confirmation of several hypotheses at once. Assume that a biologist conducts a couple of experiments with a cell culture. Unfortunately, she can use each cell only once, that is, for one experiment. Reasonably, she partitions the cell culture into different groups and performs experiment A with group 1, experiment B with group 2, and so on. If the experiments are successful, they should, taken together, confirm the conjunction of the hypotheses. In other words, if E_1 confirms H_1 and E_2 confirms H_2 for suitably independent pieces of evidence, then $E_1.E_2$ should also confirm $H_1.H_2$.[4]

Unfortunately, (Syn) violates this desideratum. For instance, $E = Fa.Gb$ will *not* confirm the hypothesis $H = \forall x : (Fx.Gx)$ relative to $K = \top$. This is because the evidence forms no full instance of H. But clearly, if the tested hypothesis consists of two more or less independent statements, the focus on full instances of H is misplaced. Thus, while (Syn) synthesizes Hempelian and H-D confirmation, we lack an extension where the confirmation of independent hypotheses contributes to the piecemeal confirmation of a theory which is composed of the former.

6. An Extension to Theory Confirmation

For extending (Syn) to the confirmation of entire theories, let us go back to Hempel once more. For Hempel (1945/65), a theory is confirmed if it is entailed by a set of sentences that are individually confirmed by the evidence. Following this idea, I propose to construct a 1:1-match of theory and evidence: theories are decomposed into their content parts which are, individually, confirmed by a specific content part of the evidence. If all content parts of the theory are confirmed in this way, the entire theory is confirmed. For example, assume that we would like to confirm Kepler's Three Laws by means of observing the planetary orbits in the solar system. Then we use the position of a single planet (say, Mars) at different points in time to confirm the first two laws, whereas

[4] This example is due to Ken Gemes.

we use data about the orbital period and the semi-major axis of two different planets (say, Jupiter and Saturn) in order to confirm the Third Law.

In other words, I stipulate that evidence E confirms a theory T if (i) E is a content part of T, and (ii) there is a decomposition of T into content parts $H_1, \ldots, H_n$ such that for each H_i, the evidence contains an instance of H_i.

This line of reasoning is condensed in the following definition:

> (SynT) Evidence E *confirms* theory T relative to background knowledge K if and only if
>
> 1. E is a content part of $T.K$ ($T.K \models_{cp} E$);
> 2. There are wffs $H_1, \ldots, H_n$ such that $\forall i : T \models_{cp} H_i$, $H_1, \ldots, H_n \models T$, and there are wffs E_i such that
>   - $E \models_{cp} E_i$, and
>   - $\neg E_i.K \models_{cp} (\neg H_i)_{|E_i}.K$.

To illustrate how (SynT) works, consider a medical trial. We would like to test the theory T that only plasmodium parasites cause malaria in humans. More precisely, the theory consists of the individual hypotheses H_1, H_2, H_3, etc. that only plasmodium parasites cause the different forms of malaria M_1, M_2, M_3. We test these hypotheses by scrutinizing patients that have been suffering from malaria, sorting them into subtrials according to the kind of malaria M_i. If the individual trials confirm the hypothesis ($T.K \models_{cp} E$, $\neg E_i.K \models_{cp} (\neg H_i)_{|E_i}.K$), then we have also confirmed our overarching theory, since the evidence of each trial E_i is a content part of the total evidence. Furthermore, (SynT) solves our biologist's problem: if two different properties (F and G) are supposed to be demonstrated of a population, we can decompose the composite hypothesis $\forall x : Fx.Gx$ into its content parts $\forall x : Fx$ and $\forall x : Gx$, each of which is confirmed by a content part of the evidence (Fa and Gb).

Summing up, (SynT) has a number of desirable implications. It solves the tacking paradoxes, gives an account of how entire theories can be confirmed in a piecemeal fashion, and does so using only a single technical concept: content part entailment, a refinement of deductive entailment. *A fortiori*, we can also apply it to the confirmation of single hypotheses.

7. Discussion and Conclusion

In this paper, I have synthesized Hempelian and H-D confirmation, that is, confirmation by instances and confirmation by successful predictions. I contend that the reputation of qualitative confirmation as either hopeless or outdated is unjustified: it can be defended against the prevalent objections. The main competitor on the quantitative side – Bayesianism – is an attractive framework for modeling learning under uncertainty, but, as argued in Section 2, it misses the structure of logical relations between theory and evidence. Since these relations often matter for a better understanding of scientific evidence and scientific argumentation, qualitative accounts should not be dismissed out of hand.

Building on earlier work by Gemes and Hempel, this paper proposes a new account of qualitative confirmation: (SynT). This new account solves the tacking paradoxes and covers the piecemeal confirmation of entire theories. However, not all consequences may be judged desirable.

For instance, the confirmation of existential statements remains difficult. One might also object that our account is limited to theories with purely observational content: since the evidence must be stated in terms of observational properties, it is hard to see how $\neg H_{|E}$ (that may refer to unobservable properties) can ever be a content part of $\neg E$. For instance, suppose that an electron is shot into an electromagnetic field. It will then experience a Lorentz force and change its direction accordingly. Then, $\neg H_{|E}$ seems to be a disjunction of an observable and a non-observable proposition. So it cannot be a content part of the (purely observational) $\neg E$.

However, if the electron experiences an electromagnetic force, it will be deflected orthogonally to its original direction and to the electromagnetic force lines. This follows directly from the formula for the Lorentz force $\vec{F} = q\,(\vec{E} + \vec{v} \times \vec{B})$. Conversely, if the electron fails to move in that direction, we can infer that there cannot have been an (unobservable) Lorentz force, and we can infer $\neg H_{|E}$ from $\neg E$. Thus, the proposal also applies to theories with partly unobservable content.

Unfortunately, an extension of (SynT) to non-monadic predicate calculus is far from trivial. For example, $H = \forall x, y : Rxy$ is *not* confirmed by Rab relative to tautologous background knowledge because Rab does not constitute a full instance of H. After all, we have not observed Raa, Rba, and Rbb. Similarly, hypotheses without finite models cannot be confirmed. This property differs from classical accounts of H-D confirmation such as Gemes (1993) and shows that the new account is more restrictive than H-D confirmation. However, since (SynT) is a merger of two traditions, this is not too surprising. It captures the idea that there is a core concept of qualitative confirmation that can be extended into different directions (confirmation by instances, or H-D confirmation). In this sense, I concur with Gemes (1998, 8) that for accounts of confirmation, 'it is better to be too exclusive than too inclusive'. Time will tell whether (SynT) can be extended as to address the aforementioned challenges.

On the whole, (SynT) is simpler and more straightforward than the rivalling suggestions of Gemes (1993) and Schurz (1991), and it gives a satisfactory treatment of paradigmatic problems such as the tacking paradoxes, the raven paradox, and the confirmation of entire theories. Thus, it is explained how successful predictions and instances of a hypothesis can *both* matter for the confirmation of a theory, while at the same time solving the classical paradoxes and modeling the piecemeal confirmation of entire theories. That such a synthesis is possible might help to explain why philosophers such as Hempel and Glymour searched for a single account of qualitative confirmation, rather than disentangling both approaches.

All this does not imply that (SynT) is entirely unproblematic, and I have actually mentioned some sources of worry. But first, none of these examples is clear and conclusive enough to be a *refutation* of (SynT). Second, all available qualitative accounts of confirmation have to struggle with some intuitively odd implications and the charge of incompleteness.[5] Third, bringing an account in line with all our intuitions usually comes at the expense of simplicity, transparency and conceptual parsimony, as visible in the proposals by Gemes and Schurz. Given that (SynT) is so much simpler than the best proposals in the literature, I conclude that it adds considerable value to our theorizing about qualitative confirmation.

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[5]See Gemes (1998) and Schurz (2005) for such criticisms. Note that (SynT) avoids the most pressing criticisms raised in these papers (e.g., Gemes 1998, 7-8).

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