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Logical form and the link between premise and conclusion

Robert C. Pinto
University of Windsor

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Title: Logical form and the link between premises and conclusion
Author: R.C.Pinto
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1. The subject of this paper is what has been called "the widely held thesis that argument validity is at bottom a matter of form."1 I am interested in a version of that thesis in which 'validity' bears the broad sense that Trudy Govier has called "umbrella validity":

> An argument is valid if its premises are properly connected to its conclusion and provide adequate reasons for it. It is invalid otherwise.2

and which she contrasts both with deductive validity and with formal validity.3

Preliminaries

2. In what follows, I am going to operate on the supposition that arguments are invitations to inference and that *logical* appraisal of an argument (as opposed, say, to rhetorical appraisal or moral appraisal) focuses on whether it is reasonable for those to whom the argument is addressed to make the inference that the argument invites.4

When we learn to engage in argumentation, and when we learn to make all but the most rudimentary inferences, we are initiated into an intersubjective practice of criticism that enables us to appraise inferences on the basis of certain broadly or commonly recognized features and/or standards. I have argued elsewhere that this practice of criticism in its developed form cannot be reduced to the application of any simple or straightforward sets of rules.5 The case I attempt to make here will not presuppose this latter point, but is intended rather to supplement it by considering what role it is reasonable to expect logical form to play in the practice of criticism or critical reflection.

I take it to be uncontroversial that the aims of our critical practice are advanced by formulating, as best we can, the premises and conclusion of any argument/inference we wish to appraise, and then asking (a) whether its premises are acceptable and (b) whether its premises are suitably linked to its conclusion.6 The word 'valid' is often pressed into service (as in Govier's definition of 'umbrella' validity quoted above) to render a positive verdict about the link between premisses and conclusion.7

It is a common view that formal deductive logic (FDL) provides a theory of validity that can supply a theoretical basis for our assessments of premiss-conclusion link. That common view easily leads to the idea that validity in the broad sense is a matter of logical form, since for FDL to have a bearing of actual arguments and inferences, those arguments (or the statements which comprise them) must be seen as exemplifying the forms which FDL studies.

But this common view is suspect. John Woods, in a paper entitled "The Necessity of Formalism in Informal Logic," has conceded that formal deductive logic does not, as such, constitute a theory of inference; it supplies only a theory of entailment.8 And I have argued elsewhere that entailment is neither a necessary not sufficient condition for premisses to be suitably linked to a conclusion.9

The focus of the present paper is not the issue of whether all good arguments are deductively valid, or whether deductivism – the view all arguments should be understood as attempts at deductive (i.e., deductively valid)

arguments)10 – is correct. The focus of the present paper is the issue of whether *logical form* holds the key to validity It is worth noting that at least one recent defender of deductivism insists that deductive validity is a broader concept than formal validity and stresses that it is "the broader conception of validity which is the heart of the deductivism…."11

In the present paper, I shall simply try to develop two sets of counterexamples to the idea argument validity is at bottom a matter of (logical) form. The set proposed as counterexamples consists of arguments or inferences that depend on semantic entailments. The second set consists of inductive generalizations considered in the light of Goodman's paradox.

3. Before turning to the counterexamples, let me point out that our critical practice contains techniques for appraising premiss-conclusion links which do not appear to depend on the identification of logical form.

In "Logical Analogies," Trudy Govier wrote:

> The technique of refuting arguments by constructing logically parallel ones seems to me to be interesting in a number of ways….Like formal approaches, the technique is based on a perception that the argument refuted has a structure which is general. If the structure is shown to be flawed, then the original argument is refuted. Like nonformal approaches, refutation by logical analogy does not require symbolization of the argument. Nor does it involve appeals to explicit rules of inference.[12]

Govier notes that this technique "seems to be applicable to nondeductive arguments as well as to deductive ones" (p. 27), and two of her examples are of arguments that would not normally be classed as deductive arguments.[13]

Govier illustrates the technique with two examples of its use drawn from actual writings and with a couple of made-up examples. This is how she describes what happens in these examples:

> Refutations by logical analogy is based on duplicating the 'core' of an argument in another argument by varying non-essential aspects while preserving essential ones. The parallel argument is exhibited to be, or argued to be flawed. Seeing that it is flawed, we are to see the original as flawed also.[14]

Maurice Finococchiaro, in papers devoted to blunting Gerald Massey's thesis that there can be "no method whatsoever of establishing invalidity that has theoretical legitimacy",[15] appeals to refutation by logical analogy as a method of establishing invalidity which is a "way of bypassing the problem of having to deal with a logical form to attribute to the arguments in question and to be instantiated by them."[16] Though Finocchiaro does speak of the argument and its analogue as sharing the same logical form, he writes:

> However, this is still too formalist. I believe that ultimately we should take more seriously the suggestion implicit in the label which refers to analogy. That is, ultimately this method of invalidation should be conceived as analogical reasoning about arguments, that I, as meta-argument which concludes that the given argument is invalid because the counterexample argument is invalid and the two arguments are analogous. Then the alleged analogy could be discussed in the usual ways, be examining the extent and nature of the similarities and the dissimilarities between the two arguments.[17]

A point that neither Govier nor Finocchiaro explicitly acknowledges, but which seems to me to be both true and

important, is that logical analogy can be used to validate as well as to invalidate an argument or inference. Thus if you challenge an inference I make, insisting that its premisses don't genuinely support its conclusion, my rejoinder can consist in pointing to a similar argument that you yourself have used or that you are prepared to concede is a good one, and insist that it is strictly analogous to the argument or inference you object to. Our disagreement will then take the form of examining the extent and nature of the similarities and the dissimilarities between the two arguments, and may be resolved by such an examination.

I will return at a later point to the question of whether evaluative techniques based on logical analogy turn, in the final analysis, on considerations of logical form (or of argument form in some interesting, if broader, sense).

4. One final preliminary remark, on the term "logical form." Jaakko Hintikka, writing on the nature of logic in the *Encyclopedia Britannica*, says:

> [The] narrower sense of logic is related to the influential idea of logical form. In any given sentence, all of the nonlogical terms may be replaced by variables of the appropriate type, keeping only the logical constants intact. The result is a formula exhibiting the logical form of the sentence. If the formula results in a true sentence for any substitution of interpreted terms (of the appropriate logical type) for the variables, the formula and the sentence are said to be logically true (in the narrower sense of the expression).[18]

The logical form of a sentence just is what is represented by the type of formula that Hintikka describes in the passage above.[19] The logical form of an argument or inference will be a function of the logical forms of the statements that constitute its premisses and conclusion.

Notice that the definition of a logical truth in the passage from Hintikka echoes Quine's in "Two Dogmas of Empiricism":

> …a logical truth is a statement which is true and remains true under all reinterpretations of its components other than the logical particles.[20]

Notice also that what is to count as logical form (and as logical truth) will depend on which expressions we include on our list of logical constants or logical particles. If modal operators and/or set-theoretic expressions are counted as "logic constants," the extension of logical form will be considerably broader than it will be if we restrict the list of "logical particles" to the sentential connectives of standard propositional calculus together with the quantifiers and bound variables of first-order predicate calculus (perhaps throwing in the identity operator for good measure). There is, therefore, a certain elasticity in the notion of logical form, but that elasticity need not deter us in what follows.

Semantic entailments

5. One set of arguments or inferences that appear to be valid without being formally valid consist of those that depend on semantic entailments. Here is an example:

> (A1) The person standing next to the prime minister is his sister.
> (A2) Therefore, the person standing next to the prime minister is female.

On the surface, at least, A1 entails A2 and under appropriate circumstances[21] can provide good reason for believing A2. Let me consider two objections to the claim that arguments that depend on semantic entailments are examples of arguments whose validity does not depend on logical form.

6. *The first objection* is that the inference from A1 to A2 is legitimated by the proposition, principle or "meaning postulate" that

> Anybody who is somebody's sister is female

which can be rendered in "canonical notation" as

> (AMP) (x) if there is a y such that x is sister to y, then x is female.

According to this objection, the premiss set from which we conclude A2 includes both A1 and the additional premiss AMP. But then the inference or argument in question in fact exemplifies a valid logical form, namely

> (FA1) Rba (b stands is relation R [e.g., being a sister of] to a)
> (FAMP) (x) if there is a y such that Rxy, then Fx
> (FA2) Therefore, Fb

Now it is clearly possible to "convert" or "reconstruct" any inference or argument into one that exemplifies a valid logical form by adding a suitably crafted additional premiss.22 The issue is whether we ought to do so in this case, and in particular whether it serves the aims of critical practice to so construe examples like this one.

My current view is that there are no *conclusive* arguments pro or con on this issue.23 Permit me, however, to cite an argument which I believe creates a presumption in favor of not viewing inferences that depend on semantic entailments as enthymemes (and, in particular, as inferences which exhibit a valid logical form when their "suppressed premisses" are made explicit). The argument has four assumptions:

(a) in simple cases like the one in our example, so long as the inference does not beg the question the issue of whether premiss A1 is suitably linked to the conclusion A2 reduces to the issue of whether A1 entails A2

(b) the relevant concept of entailment is the concept of strict implication; that is to say, p entails q if and only if it is impossible that p and not-q;

(c) it is a truth of modal logic that *if* (p and q) strictly entail r *and* it is a necessary truth that p, *then* q strictly entails r;24

(d) the "meaning postulates" which we would add as premisses qualify as necessary truths.

From these assumptions (b)-(d) it follows that wherever A1 & AMP entail A2, and AMP is a meaning postulate, then A1 by itself entails A2. In other words, semantic entailments hold *without* the inclusion of meaning postulates as additional premisses. From this and (a) it follows that inferences which hinge on semantic entailments are not dependent on the logical form that is exemplified when a meaning postulate is brought into the picture.

What is debatable in the argument just stated is its assumption that "meaning postulates" qualify as necessary truths. When Carnap first introduced the notion of meaning postulates (as a way of understanding analyticity in the face of Quine's criticisms of that notion), he dealt with them only in relation to artificial languages and that they were "not a matter of knowledge but of decision" - though he does picture the decision to be made as a decision about whether one property is to entail another.25

Carnap's view notwithstanding, I would submit that the "meaning postulate" AMP does function as a "truth" in the proposed reconstruction, and that it cannot be construed as simple universal generalization drawn from first order predicate calculus. Simple universal generalizations do not sustain counterfactual conditionals, but AMP surely does. That is to say, in light of AMP we can conclude

If Bill Clinton had been somebody's sister, then Bill Clinton would have been female.

Whatever we make of AMP, the conditional embedded in it can't be a material condition, and is most naturally construed as strict implication. But then, in light of the definition of strict implication, AMP itself will count as a necessary truth, from which it will follow that A1 by itself entails A2.

7. *The second objection* concedes that validity in general cannot be reduced to *logical* validity – does not turn on logical form - but insists validity should be understood in terms of argument forms that don't necessarily reduce to *logical* form.

David Hitchcock, in an interesting series of papers, has articulated a notion of argument validity designed to avoid interpreting arguments like the one in our example as enthymematic.26 Roughly, he says that in any argument we can regard some components fixed and others as variable. If I understand him, the variable components are the ones such that "intercategorial" replacement of them results in an analogue which is a potential counterexample to the original argument. An analogue is an actual counterexample if any only if its premisses are true and its conclusion false. An argument is conclusively27 valid if and only if it has no analogue that is a counterexample.28

On the basis of the forgoing notion of validity, Hitchcock(1994) says we can develop an alternative conception "which we might call formal or schematic". In this alternative conception, the "form or schema produced by replacing the variable components with distinct variables has no instances with true premisses and a false conclusion" (p. 59). He adds,

> …this condition in turn is met if the universal generalization over those variables of the argument's associated material conditional…is true.29

Using the example above, the form or schema would be

> (SA1) The person standing next to the X is X's sister.
> (SA2) Therefore, the person standing next to X is female.

And the universal generalization would be

> (UA) (X) if the person standing next to X is X's sister, then the person standing next to X is female

Hitchcock observes

> Validity as thus defined is a broad concept, covering not only logical validity but also semantic validity and what we might call factual validity. We might distinguish these kinds on the basis that the covering generalization of a logically valid argument is a logical truth, containing only logical expressions and variables; the covering generalization of a semantically valid argument is a logical consequence of semantic postulates; and the covering generalization of a factually valid argument is a factual truth, true in virtue of the way the world is.30

Presumably, UA would not be counted a *premiss* of the argument, but rather a covering generalization in virtue of whose truth the original argument is conclusively valid. And presumably UA would be construed as a logical consequence of semantic postulates, thus rendering that argument semantically but not logically valid. However, Hitchcock himself appears not to take the distinction between these three "species" of conclusive validity terribly seriously, since he says (pp. 59-60):

> …the distinction between logical truths, semantic postulates and factual truths is notoriously arbitrary and not much is gained by making it.

Nevertheless, on Hitchcock's reading arguments that trade on semantic entailments would owe their validity to the argument *form* represented (in our example) in SA1 and SA2.

How serious an objection does this reading constitute to the claim that semantic entailments provide counterexamples to the idea that "argument validity is at bottom a matter of form"?

> 1) Hitchcock's reading constitutes no problem whatsoever for the claim that semantic entailments are counterexamples to the idea that all good arguments owe their validity to *logical* form.

> 2) If Hitchcock's reading is accepted without qualification, it would follow that "semantic validity" is a consequence of form in some interesting, but broader sense of form.

I consider it an open question whether Hitchcock's reading should be accepted without qualification, for the following reason. As presented in the 1995 paper (if I have interpreted that paper correctly), generating the schemata requisite for the "formal or schematic" notion of validity depends on interpreting some argument components as fixed and some as variable.31 As far as I can see, however, whether a component should be interpreted as variable depends on whether the result of substituting for it produces a genuine analogue of the argument from which we started.32 That is to say, the notion of form feeds off the notion of variable component, which in turn feeds off the notion of a logical analogue. But if that is so, then the criticism and

evaluation of arguments in terms of logical *analogy* would have to be more fundamental than the identification of validity in terms of argument *form*. And *that* result, if true, would undermine the idea that validity is, at base, a matter of *form*. But the waters are murky here, and I won't go any further than to say that it remains an open question whether Hitchcock's reading demonstrates that "semantic validity" should be understood in terms of argument form.

Inductive inferences and Goodman's paradox

8. Given that there is no generally recognized formal logic of nondeductive inference, but that we are able to reach rationally motivated intersubjective agreement in our appraisals of particular nondeductive inferences, we might be tempted to conclude straight away that appraising premiss-conclusion links in such cases doesn't depend on considerations of logical form. It would, however, be a mistake to leap too quickly to that conclusion, because for at least some cases of nondeductive inference – the cases most naturally called inductive - we certainly seem able to identify patterns or forms that, at the very least, qualify such inferences as *candidates* for the status of "inductively valid" inference. To put the matter another way, from the fact that we lack a formal *theory* of nondeductive inference we can't conclude that our pre-theoretic judgments about such inferences don't depend on formal considerations.

9. I want to argue, however, that reflection on Goodman's new riddle of induction – often called the grue/bleen paradox – ought to raise serious doubts about whether the assessment of premiss/conclusion link in inductive inferences depends on purely formal considerations.

Goodman frames the riddle in terms of its bearing on the theory of 'confirmation.' A generalization of the form

'(x) if Fx then Gx' is supposed to be confirmed by finding "positive instances" – objects that are both F and G (and disconfirmed by finding objects that are F and not G). An example would be

    (1) All emeralds are green

But not all generalizations are confirmed by positive instances. Let 'grue' be a predicate that is true of an object iff that object is green and examined before time *t* or else is blue. Goodman claims that the hypothesis

    (2) All emeralds are grue

is *not* confirmed by finding positive instances – i.e., emeralds which are grue. Thus let t be some time in the near future. Then any examined emerald which is green is also grue (since it will be green and examined before t). And if to date we have found only green emeralds, then (2) will be confirmed by positive instances to the same degree that (1) is. But if we take both (1) and (2) to be established, we will have to conclude that any emeralds found after time t will be both green and blue, an unacceptable consequence.33

Goodman takes it to be obvious that (1) is confirmed by its positive instances, but that (2) is not. He says that confirmation by positive instances must be restricted to generalizations or hypotheses that are "lawlike" as opposed to "accidental" (Goodman 1965, p. 73), or to hypotheses that are "projectible" (see pp. 81-83 and all of Chapter III).34 Goodman claims that until we have a theoretically adequate way of distinguishing hypotheses that are projectible from those that are not, we do not have a theory of confirmation. Goodman's treatment of the problem, and most treatments that have followed in its wake, try to account for the fact that (1) is projectible while (2) is not on the grounds that 'green' is a "well-behaved" predicate and grue is 'ill-behaved'.35 Solving the problem tends to be seen as requiring us to find a way of picking out the predicates (or sometimes the properties) that are well-behaved (or that are projectible36) from those that are not.

10. It is worth noting that in developing the riddle or problem, Goodman considers and *rejects* the suggestion that failure of positive instances to confirm "accidental hypotheses" can be explained by the fact that other, *additional evidence* enters the picture to counteract or cancel the confirmation provided by positive confirming instances (and to shore up the confirmation of the hypotheses that he considers lawlike).37 Without tracing the detail of Goodman's argumentation on this point, let me simply indicate its gist. Additional evidence will be

relevant to the hypothesis in question precisely insofar as it confirms further hypotheses that are relevant to the hypothesis in question (e.g., the hypothesis that the pattern of colors in various species of gems tends to be stable over time – where by colors we mean hues from *our* standard list of hues). But such hypotheses will have been confirmed only if they are lawlike rather than accidental, and hence "[w]e are faced anew with the very problem we are trying to solve: the problem of distinguishing between lawlike and accidental hypotheses" (p. 77). Goodman can make this move because of the way he defines the problem – as a problem of distinguishing between hypotheses that can be confirmed by positive instances from hypotheses that cannot.

11. I am not about to offer a "solution" to Goodman's riddle. But I want to suggest that we look at the riddle in a rather different light than Goodman does. In particular, I suggest that we consider the puzzle in abstraction from Goodman's quest to define 'confirmation.' When we do that, we will be able to see that the riddle has a moral that bears on the issue of whether "inductive validity" is a matter of logical form.

I suggest, first of all, that the inference from "positive confirming instances" to a universalized hypothesis like (1) is just a special case of projecting a relative frequency from a sample to a population – i.e. reaching a conclusion about the relative frequency of a property in a population on the basis of its relative frequency in a sample drawn from the population.

If we look at the matter this way, then we should be less tempted to assume that what creates the "problem" are ill-behaved predicates. To illustrate this, let grue be defined as 'green and found before the year 2000 or else blue and found after the year 1999.'[38] Consider a sample S_1 consisting of emeralds examined by people whose research I have consulted to date. And consider a population P_1 consisting of emeralds *found before the year 2000*. All the emeralds in the sample will presumably be both green and grue. And notice that if the relative frequency of green in the sample can be projected onto the population P_1, then so can the relative frequency of grue – since the extension of green in the population P_1 must be identical with the extension of grue in that population.

If a problem arises, it is when be try to project *grue* from such a sample onto a population P_2 consisting of emeralds generally. Why do we think there is a difference between projecting grue onto P_1 and projecting it onto P_2? I submit that we balk at projecting grue onto P_2 because

(a) we know that the sample contains no emeralds found after the year 1999

(b) we believe it is likely that emeralds will be found after 1999 – i.e. that P_2 contains such emeralds

(c) we believe that whether emerald is green does not depend on the year in which it is found (and in particular, that within the population of emeralds *green* is statistically independent[39] of *found after 1999*)

(d) we believe – perhaps as a consequence of (c) - that whether an emerald is grue *does* depend on the year in which it is found (and in particular, that within the population of emeralds *grue* is *not* statistically independent of *found after 1999*)

In short, we balk because of particular beliefs about the composition of the population and about the effect on the color of emeralds[40] of the time at which they are found. (Notice, by way of contrast, that whether or not a leaf or a piece of fruit is green *does* depend on when it is observed – in particular, on the time of year.)

Why do these beliefs cause us to balk at projecting *grue*? Because, I suggest, we accept a rule that says something like this:

(R1) Do not project the relative frequency of a property A from a sample onto a population when there is a property B such that

(1) B is underrepresented in the sample and

(2) B is likely to affect whether a member of the population has the property A.

R1 captures part of what we're getting at when we say – rather too vaguely - that we should project only from samples that are "representative" of the populations from which they are drawn. We cannot expect the composition of our samples to be like the composition of the population in every respect; but we should strive for samples whose composition is like that of the population in respect of those features we think will affect the property whose frequency we are trying to determine.

Accordingly, the moral I want to draw is this: the decision we make about the validity of a given inductive generalization depends in part on our background assumptions about logically contingent matters of fact; ergo, inductive validity cannot possibly be reduced to matters of logical form.

12. Notice that I haven't said anything about why it is OK to project green; I have merely tried to explain why we balk at projecting grue. Let me flesh out this account just a bit by saying more about (A) the background assumptions that impinge on the validity of projecting grue and (B) background assumptions that may be relevant to the validity of projecting green.

(A) The salient assumption standing in the way of projecting grue is:

(BA) Whether an emerald is grue is affected by whether it is found after the year 1999.

Notice first of all that we do not *now* have any "direct" empirical evidence to support the assumption; we are not in a position (in May of 1999) to compare the "grueness" of emeralds found before the year 2000 with those found later. But try for a moment to imagine what it would be like to reject this assumption. We would have to suppose that when emeralds are found after 1999 they will be blue rather than green. Now that is certainly not logically impossible; as far as I can see, it is not even ruled out by our current scientific understanding of natural processes. But it is something we would have a difficult time explaining on our current scientific understanding of nature. The most we can say, I think, is that the salient assumption "coheres with" our current understanding of the world, and its rejection does not.41 I do not take a stand on whether such coherence "justifies" the assumptions or beliefs on the basis of which we impugn the validity of projecting grue. But I do not see how we could discriminate as we do between the projections that are permissible and those which are not unless we permit ourselves to bring such assumptions to bear.42

(B) We might be tempted to say: projecting a relative frequency from a sample to a population is *prima facie* or *presumptively* valid, subject to caveats about, say, the size and representativeness43 of the sample. The prima facie validity of projecting *grue* is "defeated" because, given our current beliefs, such projection violates R1. The prima facie or presumptive validity of projecting *green* is not defeated and therefore projecting green is valid "all things considered." And then we might add: prima facie or presumptive validity does reduce to a matter of logical form – or something very close to logical form. However, there at least two reasons why we should resist this temptation.

(i) Presumptive validity is not validity, nor even a "species" of validity - any more than presumptive innocence is a species of innocence.44 Even if we say that any inference having the form of an inductive generalization should be *presumed* valid unless and until it is shown to violate one or more caveats, we would only be saying that having such a form is a nonconclusive (or "refutable) reason for saying that an inference is valid. And that does mean that there is a kind of validity (prima facie or presumptive validity) which reduces to a matter of mere form; it means only that the form of the inference is *one* of the considerations that enters into our judgments of its validity.

(ii) Moreover, we probably ought not to concede that merely having the form of an inductive generalization *by itself* creates even a presumption of validity. Recall Govier's definition of umbrella validity quoted earlier: "An argument is valid if its premises are properly connected to its conclusion and provide adequate reasons for it." Should we be prepared to assume we have

adequate reasons for accepting the conclusion of an inductive generalization in the absence of *any* information about the size, composition and origin of the sample? Does the knowledge merely that someone has done a survey of Canadian parents in which 60% of the respondents say they don't spank their children create even a presumption that we have *adequate reasons* for believing that approximately 60% of Canadian parents don't spank their children (or are disposed to say that they don't)? If we are inclined to say lacking a knowledge of the methodology used in the survey we lack adequate reason for accepting the conclusion, then we ought reject the idea that the mere

form of inductive generalization creates a presumption of validity.45

There are broader issues connected with the points made here that are complicated and cannot be dealt with summarily. In a recent book entitled *Argument Schemes for Presumptive Reasoning*46, Doug Walton presents a carefully developed case for the view that by virtue of their form or pattern certain classes arguments establish their conclusions presumptively and therefore shift the burden of proof in the context of dialogue. Walton's general view deserves careful consideration and cannot be dismissed on the basis of the rather simple arguments presented here. Nevertheless, I believe that those arguments cast serious doubt on the idea that having the form of an inductive generalization is by itself a sufficient condition of presumptive or prima facie validity.

13. There is an obvious line of objection to the moral I'm trying to draw out of Goodman's riddle. One can concede that background assumptions of the sort indicated are pertinent to assessing the validity of inductive generalizations, but insist that those assumptions function as additional unstated premises of projective inferences, rather than as "second order" grounds on which we pronounce such inferences valid or not.

But this objection will not work for the case at hand. The salient background assumption BA that undermines the validity of projecting grue is not an additional premiss in an argument for the conclusion "All emeralds are grue." It is rather a consideration which *undermines* the argument for that conclusion.

There is another objection involving the idea of unstated premises that cannot be dealt with quite so easily. On this objection, background assumptions are not pertinent to assessing the *validity* of inductive generalizations, but are pertinent to assessing their *soundness*. Thus it might be claimed that the projective inference from 'All sampled emeralds are grue' to 'All emeralds are grue' requires the assumption or premiss

> AR The sample is representative of the population with respect to all those properties that affect whether an emerald is grue.

The background assumptions (BA and the assumption that emeralds will be found after 1999), together with the fact that the sample contains no emeralds found after 1999, lead to the conclusion that the required premiss AR is false and hence to the conclusion that the inference is unsound. Moreover, it can be urged, the validity of these reasonings, both pro and con, can be understood in terms of their logical form.

The problem with this objection lies in the dilemma it creates. Insisting that an assumption like AR is required of every inductive generalization will force us either to deny cogency to most such inferences, or else to endorse the argument from ignorance. For an argument to be not merely sound47 but cogent48, its premises must be *reasonable* to believe. What can render premises like AR reasonable to believe? We are seldom in a position to give a complete list of the properties that affect the property Q we are interested in, and where we do know or believe that a property H affects Q, we are typically not in a position to determine whether the frequency of H in the sample approximates to the frequency of H in the population. Accordingly, in most cases we appear to have two choices:

> (i) admit that accepting AR is not reasonable – from which it follows that the inference is not cogent

> (ii) maintain that it is reasonable to accept AR so long as we don't have reason to disbelieve it – which amounts to endorsing the argument from ignorance.

which amounts to endorsing the argument from ignorance.

The effect of pragmatic considerations on the validity of inductive generalization

14. There are, I think, additional reasons for doubting that assessment of the "validity" of nondeductive inferences depends exclusively on considerations of logical form. These additional reasons are not rooted in the moral I draw from Goodman's paradox, but they may illuminate aspects of the "problem" occasioned by Goodman's examples.

Whether a particular type of evidence is adequate to warrant a conclusion depends on

(a) the stakes involved in accepting or rejecting a conclusion

(b) whether there are, in the context at hand, better means on which to base our attitude toward a conclusion.

I do not have time to develop these reasons here, but permit me to offer a few brief examples that illustrate them.

(a) When purchasing a gem – e.g., a diamond ring – typical purchasers are prepared to rely on the informal testimony of a reputable jeweler as to the genuineness, quality and weight of the stone. For purposes of an insurance claim, a more formal appraisal is almost always required, especially where the estimated value of the stone is quite large. It is very tempting say that both the typical purchaser and the insurance company are being reasonable. What is sufficient or adequate evidence in one context for one purpose is not sufficient or adequate in another context for a different purpose.

(b) In the early days of opinion surveys (from the 30's up till about 1948), Gallop and others did not base their survey results on probability samples, but used quota sampling instead.[49] Conclusions based on samples that are not probability samples would be considered risky today (though they might still be entertained where probability sampling is not feasible). Another example: a decision to approve widespread use of a pharmaceutical not based on a double-blind evaluation of the pharmaceuticals effectiveness would be considered unreasonable in most contexts today, though we would not fault those who drew conclusions based on less stringent methods several generations ago.

What I am suggesting (but not proving) here is that the issue of what kind and quality of evidence is adequate is context dependent, and therefore not exclusively a matter of logical form. It is possible, as well, that our investigatory behavior with respect to a hypothesis such as "All emeralds are green" may be tied to contextual factors and pragmatic constraints as well, and that it is only acknowledging the force of those constraints that we can see why that behavior is reasonable.

Conclusion

15. I have tried to cast doubt on the thesis that argument validity is at bottom a matter of (logical) form. Though I concede that the arguments I've offered in support of my counterexamples aren't conclusive, I think they carry enough weight to undermine any claim that the thesis in question should enjoy the status of a favored hypothesis. That being so, I offer three observations about the consequences of holding that that thesis in abeyance.

1) It is *not* a consequence of what I argue for that formal-logical techniques and evaluations have no place in our critical practice. In the appraisal of arguments and inferences, it is often important to know whether a given set of premises entails a conclusion. This is especially important where we want to assess the strength of support that premises offer a conclusion. For a large class of cases – those (a) which don't fall into the category of semantic entailments and (b) where

"translation" into canonical notation is reasonably straightforward -- formal-logical techniques are the preferred techniques for rendering a positive verdict of entailment.

2) If I am right, FDL does not constitute a normative theory of inference – or even the first installment of a normative theory of inference. As far as I can see, we carry on our critical practice in the absence of *any* normative *theory* of inference. But that doesn't mean that critical practice should eschew theory where theory is available and relevant to the issue at hand. FDL is a case in point, so is the calculus of probability, economic theory, the theory of games, to name just a few such theories.

3) In addition to the stretches of theory that can, in certain contexts, advance the aims of critical practice, there are evaluative techniques and strategies, not grounded in theory, which can be continued, cultivated and elaborated upon, and studied. I count among these non-theory-based techniques the method of logical analogy and the deployment of the concept of fallacy and of the fallacy labels. It may turn out after all that the core of our critical practice will continue to consist in techniques not grounded in a theory. If so, that perhaps ought not to surprise us, since there is a long tradition that views logic as an *organon* or art, rather than a science.

Notes

1The words are from Massey 1987, p. 163.

2Govier 1987, p. 178.

3Semantic validity holds where premisses "deductively entail" a conclusion and formal validity requires that "the conclusion is formally derivable from its premisses using the rules of a correct logical system". See Govier 1987, p. 178.

4I have defended this conception in Pinto 1996.

5See Pinto 1996, pp. 175-176: "...20th century epistemology--and in particular, 20th century philosophy of science--has made us aware that the goodness of many of our most fateful and highly prized inferences does not yield to any simple analysis in terms of pattern or guiding principle. And yet the value of those inferences is not something that is just arbitrarily accepted; rather it is something open to discussion and rational evaluattion. We move, therefore, to a broadened conception of critcism, one not tied quite so closely to logical rules or material principles of inference, but modelled in part on the discussions of the probative value of evidence that occur in contexts where articulable rules are not available."

6I have argued elsewhere that "although argument assessment can profitably be thought of as having two distinct focuses--acceptability of premisses and suitablity of inferential link--assessment of inferential link cannot be carried on in isolation from assessment of premiss acceptability." See Pinto 1994, p. 120.

7Not everybody looks kindly on this usage. Hamblyn, for example, frowns on it. See Hamblyn 1970, p. 252.

8John Woods, "The Necessity of Formalism in Formal Logic," p. 150-151. Woods' reasons for holding this view are of a piece with the reasons Harmon has for holding. By the way, my claim that semantic entailments do not depend on logical form, then FDL as we know it does not represent a general theory of entailment, but provides a theory for only a proper subset of entailments.

9See Pinto 1996, p. 170. See also Pinto 1995, section 3, for further arguments to support the contention that the "general notion of suitable inferential link--the notion that's required for argument appraisal--differs importantly fromt he formal logical notion of entailment..." (Pinto 1995, p. 120).

10This definition of deductivism is taken from Leo Groarke's recent defense of deductivism; see Groarke 1999, p. 1.

11Groarke 1999, p. 2. For Groarke "an argument is deductively valid if (and only if) it is impossible for the premisses to be true and the conclusion false" (*ibid.*). Groarke makes the same points in Groarke 1992, p.

12Govier 1985, p. 27. According to Finnocchiaro 1995, the "refutation by logical analogy" is called "the method of counterexample" in Salmon 1984, p. 21. Copi and Cohen 1990 recognize "refutation by logical analogy" in their chapter on "Analogy and Probable Inference" (see esp. pp. pp. 371-373), though they go on to say that "[u]nderlying this method of criticizing arguments is the fact that from the point of view of logic, the form of an argument is its most important aspect" (p. 371).

13I personally prefer to follow Brian Skyrms suggestion that we not try to divide arguments or inference into "deductive arguments" and nondeductive arguments," but that we rather see ourselves as evaluating arguments arguments as deductively valid, inductively strong and inductively weak. If we prefer to speak in this way, we can reformulate Govier's point as follows: this technique can be applied to arguments which are not deductively valid in order to settle the question of whether they are inductively strong.

14Govier, p. 29.

15Other than what he calls "the trivial logic-indifferent method" of showing that the argument's premisses are all true and its conclusion false. See Massey 1981, p. 164.

16Finocchiaro 1995, p. 29. See also Finnochiaro 1996, p. 156.

17Finocchiaro 1995, p. 30. See also Finnochiaro 1996, p. 158.

18See "Philosophies of the Branches of Knowledge: Philosophy of Logic: LOGIC AS A DISCIPLINE: Nature and Varieties of Logic" in *Enclyclopedia Britannica*, CR-Rom version,, 1998.

19This idea is anticipated by Russell in the early decades of this century. See for example Russell's *Introduction to Mathematical Philosophy* (London: Allen & Unwin, 1919), pp. 199ff.

20Quine 1961, pp. 22-23.

21A1 can provide good reason for believing A2 only if our reasons for believing A1 to be true don't depend on our knowing antecedently that A2 is true.

22The obvious way to do this, of course, is to add a conditional proposition whose antecedent is the conjunction of the pre-existing premisses and whose consequent is the conclusion of the argument.

23Nor do I think there can be. What is at stake here are issues that turn on which way of reconstructing or construing arguments best serves the interests of criticism. There will be advantages and disadvantages to either (or any) technique of interpretation or reconstruction, and one's position on this matter will depend on the relative weights one gives to the pros to the cons.

24This can be proved as follows, where R is the rule that whatever is strictly implied by a necessary truth is a necessary truth:

1) p & q --> r	premiss
2) Necessarily p	premiss
3) Necessarily if (p & q then r)	from (1) by definition of '-->'
4) Necessarily if p then (if q then r))	from (3) by exportation
5)p --> (if q then r)	from (4) by the definition of '-->'
6) Necessarily if q then r	from (2) and (5) by R
7) q --> r	from (6) by the definition of '-->'

'-->'

QED

QED

25Carnap 1967, p. 225.

26See Hitchcock 1985, 1987 and 1995. Strictly speaking, it is not until the 1995 paper that semantic entailments are drawn into the story. The exposition that follows is based on the 1995 paper.

27Hitchcock says (p. 60) that in addition to the notion of validity here defined, it is necessary to recognize a notion of validity that applies to arguments that are not conclusively valid. The main business of the 1995 paper is to work out a notion of non-conclusive validity for the class of arguments that Wellman called conductive arguments.

28Hitchcock 1995, p. 59.

29Hitchcock 1995, p. 59. The universal generalization is to be "interpreted as a lawlike generalization, capable of being rebutted by counterfactual truths."

30Hitchcock 1995, p. 59.

31Since the schema are generated by substituting variable letters for the variable components. See Hitchcock 1995, p. 59.

32Admittedly, Hitchcock, recognizing that there is identifying variable components, introduces an alternate definition of conclusive validity that does not invoke the notion of variable component (see bottom of page 58). However, that only shows that the "substitutional" version of conclusive validity does not require the concept of variable component. It does not show that the formal or schematic conception can get off the ground without the notion of a variable component.

33Goodman (p. 74) calls (1) and (2) incompatible, but strictly speaking that's not so. (1) and (2) could both be true, but only if no emeralds will be found after time t.

34Goodman applies the terms 'projectible' and 'not projectible' to hypotheses. In much of the ensuing literature, those terms are commonly applied to the predicates or properties that are constituent to the hypotheses under discussion. Thus it is common to ask why 'green' is projectible but 'grue' not.

35A point admitted, in just these terms, in the exposition of the problem on p. 79. Goodman's solution to the problem, in Chapter III, depends on classifying certain predicates as "entrenched" and considering hypotheses projectible only if the predicates that they contain are entrenched. It also matters that 'emerald' is "well-behaved" - see Goodman's examples of ill-behaved terms such as 'emerose' occurring in the antecedent of a generalization - e.g. in footnote 10 p. 74.

36In the terminology of those writing on the problem after Goodman; see footnote 34 above.

37See Goodman 1965, pp. 75-77.

38This differs, of course, from Goodman's definition of 'grue'. I use this definition to simplify the reasoning below. In this slightly altered conception, the predicate grue creates virtually all the same problems as did Goodman's original predicate.

39A is statistically independent of B (within a class K) if the relative frequency of A within K is equal to the relative frequency of A with the intersection of K and things that are B.

40We believe that among emeralds - perhaps among precious stones generally - whether something has the "color" grue is affected by discovery date, but whether it has the color gree is not affected by the discovery date.

41A necessary condition of coherence is logical consistency with other things we believe. But additional

41A necessary condition of coherence is logical consistency with other things we believe. But additional factors affecting the degrees of coherence will include the extent to which the hypothesis is explained by other things we believe and the extent to which it explains other things we believe.

42This is, in my view, the ultimate moral to be drawn from Goodman's puzzle. Note that despite superficial similarity, it is different from Goodman's "solution" to the riddle. Goodman's solution in Chapter III makes the projectibility of hypotheses dependent on the "entrenchment" of predicates, and leads him to say, "Thus the line between valid and invalid predictions (or inductions or projections) is drawn upon the basis of how the world is and has been described and anticipated in words" (Goodman 1965, p. 119). In Goodman, the body of fact which creates the line between valid and invalid projections is a body of facts about our linguistic practices. In the moral I want to draw, it is our background beliefs about extra-linguistic fact to which we must revert in distinguishing between invalid and valid projections.

43Where the relevant requirement of representativeness is captured by something like R1.

44If S is a species of kind K, then everything that is S is also K. But not every person who is presumptively innocent is innocent, and not every inference that is presumptively valid is valid.

45In her definition of umbrella validity, Govier presumably has in mind adequate reasons for *accepting or believing* the proposition that is the conclusion of an argument or inference. I have argued elsewhere that the notion of argument should be generalized to include attempts to induce doxastic attitudes weaker than belief or acceptance - e.g., to the presentation of evidence with the intent of getting someone to *suspect* that something is so (see Pinto 1991). Accommodating this view would require a somewhat more complicated presentation of the point I am making here.

46Walton 1995.

47Valid with true premisses.

48A cogent argument is on that provides good reasons for accepting its conclusion. Even though an argument should in fact be sound (because it has true premisses and is valid), it will fail to be cognent if we have no reason to believe one or more of its premisses.

49In probability sampling, the researcher uses a method in which each member of the population is supposed to have an equal chance of being selected (drawing names from a hat, using a table of random numbers in connection with a list of population members, etc.). Simple random sampling is the most obvious way of generating a probability sample, but somewhat more complex methods (stratified random sampling and cluster sampling) make it easier to generate probability samples for very large populations. Gallop and others today attempt to obtain probability samples, but the samples generated are not true probability samples (the homeless have no chance of being selected, not every body who is selected is actually interviewed, etc.). In quota sampling, one uses non-randomized methods for generating a sample that is representative of the population with respect to key variables: gender, geography, economic class, urban vs. rural.

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