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Finally, it is important to point out that the determination of a theory's empirical consequences is not just an abstract conceptual problem but is a serious issue in scientific practice. The suspicion or conjecture that two theories are empirically equivalent has been notoriously difficult to adjudicate in important historical cases, for the very reason that whether a theory carries a particular observational commitment or not is a hypothesis whose evaluation depends on changing auxiliary knowledge. The classic case of the competition between special relativity and Lorentz' electron theory is a sufficient example. The completion of his theorem of corresponding states, together with Poincaré's correction of his charge density transformation, brought Lorentz' theory into a form that was arguably empirically equivalent to relativity. But the lack of independent warrant for the assumptions needed to achieve this equivalence – the assumption that intermolecular forces transform as electrical forces, in particular – left it far from clear that the theory could adequately handle the null results of Michelson-type experiments, let alone that these were observational consequences to which the theory was committed.

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## ON MIXED INFERENCES AND PLURALISM ABOUT TRUTH PREDICATES

By JC BEALL

### I. BACKGROUND SKETCH

Some philosophers have held that sentences about the moral or comical are non-descriptive: such sentences express condemnation or emotion but, allegedly, they are not truth-assessable. Against this view Peter Geach famously argued that such 'non-descriptive sentences' can figure as the antecedent of conditionals; but only truth-assessable sentences can do that, in which case the so-called non-descriptive sentences are only so-called.<sup>1</sup>

In response to Geach's argument Crispin Wright has proposed that there are different truth predicates, which in turn afford different ways in which sentences are truth-assessable.<sup>2</sup> To put it crudely, sentences may be assessed in terms of

<sup>1</sup> See P.T. Geach, 'Ascriptivism', *Philosophical Review*, 69 (1960), pp. 221–5, and also 'Assertion', *Philosophical Review*, 74 (1965), pp. 449–65.

<sup>2</sup> C.J.G. Wright, 'Realism, Anti-realism, Irrealism, Quasi-realism', in P. French *et al.* (eds), *Midwest Studies in Philosophy*, Vol. XII (Univ. of Chicago Press, 1988), pp. 25–49, and *Truth and Objectivity* (Harvard UP, 1992).

'lightweight' or 'heavyweight' truth. The latter involves realism about the entities of the given discourse; the former does not. The key point is that non-descriptive sentences are truth-assessable in the 'lightweight' sense. Accordingly a non-descriptive sentence may, *pace* Geach, figure in conditionals without thereby giving up its non-descriptiveness. (I assume familiarity with the debate, which is why this review is brisk. Still, I hope enough has been said to give the uninitiated reader a flavour of the background.)

Recently Christine Tappolet has advanced the debate by arguing against Wright's proposed pluralism.<sup>3</sup> In defence of Wright's approach I shall argue briefly that the pluralist has a ready reply to Tappolet's argument.

## II. TAPPOLET'S ARGUMENT

Tappolet's argument turns on so-called *mixed inferences*, inferences which involve a mix of descriptive and (allegedly) non-descriptive sentences. She points to the following argument:

1. Wet cats are funny
2. This cat is wet
3. Therefore this cat is funny.

The argument appears to be valid, which is precisely Tappolet's point (p. 209):

The validity of an inference requires that the truth of the premises necessitates the truth of the conclusion.... For the conclusion to hold, some unique truth predicate must apply to all three sentences. But what truth predicate is that? And if there is such a truth predicate, why isn't it the only one we need?

Tappolet appears to land pluralists in a dilemma. The apparent dilemma for pluralists is this: they must either deny the validity of all mixed inferences, or they must reject the Tarskian idea that validity is necessary truth-preservation. Neither horn is attractive.

This is an ingenious objection to the pluralist response to Geach. None the less pluralists have a short and compelling reply.

## III. THE PLURALIST REPLY

Pluralists should reject the claim that their pluralism is incompatible with the usual semantic account of validity; it is not. In the standard semantics for familiar many-valued logics the usual semantic account of validity, the idea that validity is necessary truth-preservation, is precisely the account generally used. Suppose, as pluralism claims, that there are two ways of being true, which we may represent by 1 and  $\frac{1}{2}$  respectively. Suppose further that there is precisely one way of not being

<sup>3</sup> C. Tappolet, 'Mixed Inferences: a Problem for Pluralism about Truth Predicates', *Analysis*, 57 (1997), pp. 209–10.

true, which we may represent by  $o$ . (There may be more ways of not being true; however, this will not matter for present purposes.) How is *validity* to be understood? In the jargon of many-valued logic, validity is to be understood in terms of *designated values*, these being the different ways of being true, as it were. Specifically, an argument is valid iff (necessarily) if all the premises are designated, then the conclusion is designated. Equivalently, an argument is valid iff there is no case in which all premises are either  $1$  or  $\frac{1}{2}$  but the conclusion is  $o$ .<sup>4</sup>

The pluralist's reply, then, is straightforward. Pluralists are committed to there being two different ways of being true. This, however, does not conflict with the usual semantic account of validity. Validity is still necessary truth-preservation; however, 'truth-preservation' must be understood pluralistically – as the preservation of any way of being true. Specifically, pluralists may agree with Tappolet that the (wet cat) argument from (1) and (2) to (3) is valid provided that there is no case in which (1) and (2) are designated but (3) fails to be designated.

One might ask about which of the numerous many-valued logics pluralists should endorse. For now, however, this question may be left aside. The only point of this paper is that Wright's proposed pluralistic approach need not founder on mixed inferences; Tappolet seems to have posed a false dilemma. By following the framework of many-valued logics, pluralists can have their mixed inferences and their pluralism too. Given that pluralists are so-called because they recognize different truth predicates, the lead of many-valued logic is a natural one for them to follow.<sup>5</sup>

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<sup>4</sup> I assume familiarity with many-valued logic, but for detailed discussion see N. Rescher, *Many-valued Logic* (New York: McGraw-Hill, 1969); for a brief discussion see J. Beall and G. Restall, 'Logical Consequence', in E. Zalta (ed.), *Stanford Encyclopedia of Philosophy* (CSLI, Stanford Univ., forthcoming).

<sup>5</sup> I am grateful to Mark Colyvan, Bas van Fraassen, Jay Garfield and Ed Gettier, each of whom has contributed to this paper in various ways.

## TRUTH PLURALISM AND MANY-VALUED LOGICS: A REPLY TO BEALL

BY CHRISTINE TAPPOLET

### I. THE TRILEMMA

Truth pluralism, as defended by Crispin Wright, is the view that there are different truth predicates corresponding to different sorts of sentences. Briefly, whereas descriptive sentences are claimed to be assessable in terms of 'heavyweight' truth,