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“Empiricist Criteria of Cognitive Significance: Problems and Changes”

By Carl Hempel

Background:

End of Logical Positivism/Empiricism

1. **Empiricist conception of Cognitive Significance:**

“a sentence makes a cognitively significant assertion [i.e. is meaningful], and thus can be said to be either true or false, if and only if either (1) it is analytic or contradictory–in which case it is said to have purely logical meaning or significance–or else (2) it is capable, at least potentially, of test by experiential evidence­–in which case it is said to have empirical meaning or significance” (101)

Purpose of this thesis is the rejection of “speculative metaphysics” (101) and bad science

Hempel still believes in the general conception, but the rest of the article is a discussion of why he thinks there are no sharp lines between (1) and (2) and between (2) and ~(2).

1. **Sentential Approaches**

Necessary conditions of adequacy for any criteria of cognitive significance

1. If P is cognitively nonsignificant, then so is any compound sentence in which P features

(A1) If P is nonsignificant, then ~P must be as well

(A2) If P is nonsignificant, then so is P & Q and P v Q

An observation sentence is a sentence “which asserts or denies that a specified object, or group of objects, of macroscopic size has a particular *observable characteristic*” (102-103)

Empirically significant sentences must be either observation sentences or in the right sort of relationship with them. What is this relationship?

*Verifiability*

(2.1) A sentence is empirically significant iff it is not analytic/contradictory and is, in principle, capable of complete verification by observation.

or

P has empirical significance iff P is not analytic/contradictory and there is a finite number of observation sentences O1, O2, . . ., On which logically entail it.

3 Problems

1. Universal quantifiers are not verifiable
2. Their negations–existential quantifiers–are, violating (A1)
3. If P is verifiable and Q is not, then P v Q is logically entailed by P, and is verifiable, violating (A2).

*Falsifiability*

(2.2) A sentence is empirically significant iff its negation is not analytic/contradictory and is entailed by a finite number of observation sentences.

The same problems arise for as before, only:

1. Existentials are not falsifiable
2. Universals are falsifiable, violating (A1)
3. same as iii above, but with conjunction
4. **Subsentential Approaches**

A sentence is cognitively significant iff it contains only terms that are logical or have empirical significance.

This would fit our necessary conditions (A)-(A2)

But again, how is “empirical significance” connected to observation?

*Definability*

(3.1) A term is empirical significance iff it is definable by *observation terms*

Observation terms are terms are either observation predicates such as ‘blue’ or the names of macroscopic objects.

However, dispositional terms such as ‘fragile’ are not observation predicates because something can have a certain disposition without ever satisfying the relevant conditional

Ex. Something is fragile iff when struck, it breaks

*Reducibility*

(3.2) “Every term with empirical significance must be capable of introduction, on the basis of observation terms, through chains of reducing sentences” (110)

Reducing sentences provided necessary and sufficient conditions for the applicability of a term

This is implausible because theoretical terms such as ‘length’ in Euclidean geometry do not reduce to observation terms, but can only be given empirical significance with reference to the whole theoretical system

1. **Systems Approaches**

In order to avoid appending metaphysical nonsense to a scientific theory:

*No Isolated Sentences*

(4.1) A theoretical system is cognitively significant if and only if none of its primitive sentences are isolated

An *isolated sentence* is a sentence which are not merely a formal truth, nor does it have empirical import

However, whether a certain sentence is isolated will vary depending on context

Additionally, a system with an isolated sentence in its primitive sentence could just conjoin that sentence with a non-isolated sentence to make the system cognitively significant

*No Isolated Equivalents*

(4.2) A theoretical system is cognitively significant if and only if no logically equivalent system has an isolated primitive sentence

However, then any theoretical terms that rise above observation terms would rule out their respective systems

Ex. Any system with primitives such as ‘gravity’ and its rules for application are equivalent to that system plus its deduced applications. This new system is explanatorily/predictively equivalent to a system consisting purely of the deduced applications, leaving the original theoretical sentences isolated

In closing, cognitive significance in the empiricist tradition can only plausibly be attributed to theoretical systems, but there is no sharp dividing line between significant/nonsignificant systems, only degrees

Gems



Logical clarity



This quote: “the system of scientific theory as we know it would be reduced to a clumsy, unmanageable torso” (111).



Ability to weaken one’s thesis in light of good counterarguments

Discussion Questions

After reading Hempel, do you think that the empiricist criteria of meaning is still worth defending? Is there something to be salvaged?

Did anything about Hempel’s style of writing/argumentation stick out to you?