

Confirmation 4

Reasoning by Analogy; Nicod's Condition

(pp. 11–14)

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Reasoning by analogy

If two individuals are known to be alike in certain respects, and one is found to have a particular property, we often infer that, since the individuals are similar, the other individual probably also has that property. This is a simple example of reasoning by analogy and it is a kind of reasoning that we use every day. (p. 11)

Example

My neighbor had her carpets cleaned by Klean Rite, and the company did a good job on them. That is reason to think Klean Rite would do a good job on my carpets.

Notation

- “ a ” and “ b ”: Individual things.
- “ F ” and “ G ”: Logically independent properties.
- “ Fa ”: Individual a has property F .

Example

- a = the cleaning job done on my neighbor's carpets
- b = the cleaning job that will be done on my carpets
- F = done by Klean Rite
- G = good
- Fa = The cleaning job done on my neighbor's carpets was done by Klean Rite.
- $Fa.Ga$ = The cleaning job done on my neighbor's carpets was done by Klean Rite and was a good job.

Conditions C should satisfy to be a good explicatum

$$(6) C(Gb, Fa.Fb, Ga)$$

$$(7) C(Gb, Fa.Fb, Ga.F'a.\sim F'b)$$

$$(8) C(Gb, Ga, F'a.\sim F'b)$$

Here F' is a property that is logically independent of both F and G .

- Carnap (1945, 1950, 1952) proposed explicata for inductive probability that satisfy (6) but not (7) or (8).
- For the case where there are only two properties, Maher (2000) showed that certain foundational assumptions pick out a class of probability functions, called P_I , that satisfy (6) and (8) and are otherwise satisfactory.
- Finding a fully satisfactory explicatum for the case where there are three properties remains an unsolved problem (Maher 2001).

Nicod's condition

From now on, “confirms” means “incrementally confirms.”

Nicod's condition

“All F are G ” is confirmed by finding that something is both F and G .

Examples

- “All metals conduct electricity” is confirmed by finding that some metal conducts electricity.
- “All ravens are black” is confirmed by finding a black raven.

Background evidence

- Nicod did not mention background evidence.
- His condition is false for some backgrounds.

A black raven *refutes* “All ravens are black” when the background evidence is “If there are any ravens, then some of them aren’t black.”
- Hempel (1945) claimed Nicod’s condition is true when there is no background evidence.
- I.J. Good (1968) argued that Hempel is wrong:
 - Given no evidence, it is improbable that ravens exist, in which case “All ravens are black” is (trivially) true.
 - Given only that ravens exist, they are probably not all the same color.
 - So given no background evidence, finding a black raven increases the probability there is a non-black raven and hence *disconfirms* “All ravens are black.”

Hempel relied on intuition and Good's argument isn't rigorous.

Analysis using precise explicata

- “No background evidence” is explicated by taking the background evidence to be a logically true sentence; call it T .
- Let $A = \text{All } F \text{ are } G$.
- Hempel's claim expressed in explicatum terms is:
(9) $C(A, Fa.Ga, T)$.
- Maher (2004) showed (9) is false for some $p \in P_I$ and the intuitive reason is the one identified in Good's argument.
- This confirms that Nicod's condition is false even when there is no background evidence.

Why does Nicod's condition seem plausible?

- People might not distinguish between Nicod's condition and:
"Given that an object is F , finding that it is G confirms that all F are G ."
- In explicatum terms that is:
(10) $C(A, Ga, Fa)$
whereas Nicod's condition is:
(9) $C(A, Fa.Ga, T)$.
- (10) is true provided only that p satisfies the laws of probability, $0 < p(A|Fa) < 1$, and $p(Ga|Fa) < 1$.
- Failing to distinguish these could make it seem that Nicod's condition is true.

Questions

- 1 State two conditions that C should satisfy if it is to adequately reflect reasoning by analogy. Give an intuitive justification for each condition.
- 2 State Nicod's condition and show that it is false for some background evidence.
- 3 How did Good argue that Nicod's condition is false when there is no background evidence?
- 4 Express in explicatum terms the claim that Nicod's condition holds when there is no background evidence; say what the symbols you use mean. What did Maher show about this?
- 5 Under what conditions is $C(A, Ga, Fa)$ true? Explain why.