Lecture 28
Lange on Counterfactuals and Laws

Patrick Maher

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Subjunctive conditionals

- The *indicative mood* is the verb form used for factual statements about what is, was, or will be the case. E.g., "John is here."
- The *subjunctive mood* is the verb form used to express hypothetical possibilities. E.g., "If John were here . . ."

Definition

A subjunctive conditional is an if-then statement in which the antecedent and consequent are in the subjunctive mood.

Examples

- If John were here, then Mary would be here.
- If Oswald had not shot Kennedy, then somebody else would have.

A subjunctive conditional can be expressed in the form: "If it were the case that p, then it would be the case that q," where p and q are indicative sentences.

Examples

- If it were the case that John is here, then it would be the case that Mary is here.
- If it were the case that Oswald did not shoot Kennedy, then it would be the case that somebody else did.

Notation (43)

"$p > q$" represents the subjunctive conditional "If it were the case that p, then it would be the case that q," where p and q are indicative sentences.

A counterfactual conditional ("counterfactual" for short) is a subjunctive conditional with a false antecedent, i.e., it can be written as "$p > q$," where p is false.

The relation of laws and counterfactuals

Lange's "initial proposal":

P1 (47; "P1" is my terminology)

p is a law iff $q > p$ is correct for all q consistent with the laws.

iff = if and only if

Example

Let $p =$ "All the pears on the tree are ripe," $q =$ "There is an unripe pear on the tree." Then q is consistent with the laws and $q > p$ isn't correct, so by P1, p is not a law.

Some logical consequences of the laws aren't laws.

Fodor's example (47)

All objects that are emeralds or pendulums are green emeralds or pendulums having a period of $2\pi\sqrt{l/g}$.

P1 (again)

p is a law iff $q > p$ is correct for all q consistent with the laws.

Refutation of P1

- Suppose that if p is a law then $q > p$ is correct for all q consistent with the laws.
- Then if p is a consequence of the laws, $q > p$ is correct for all q consistent with the laws.
- Since not all consequences of the laws are laws, it follows that there are non-laws p such that $q > p$ is correct for all q consistent with the laws. Therefore, P1 is false.

Definition

p is physically necessary iff p is a logical consequence of the laws.

Examples of physical necessities

- All pendulums have a period of $2\pi\sqrt{l/g}$. (A law)
- All objects that are emeralds or pendulums are green emeralds or pendulums having a period of $2\pi\sqrt{l/g}$. (A non-law)

A second proposal:

P2 (not stated by Lange)

p is **physically necessary** iff $q > p$ is correct for all q consistent with the laws.

This avoids the objection to P1.

P2 (again)

p is **physically necessary** iff $q > p$ is correct for all q consistent with the laws.

Refutation of P2

Let $p =$ "Every object accelerated from rest travels at less than the speed of light," $q =$ "p isn't physically necessary." Then:

- p is physically necessary.
- q is consistent with the laws, since p could be true even if it isn't physically necessary.
- $q > p$ isn't correct, for if p weren't physically necessary, our particle accelerators probably would have accelerated a particle from rest to the speed of light or more. This violates P2.

Definition

A nomic claim is a claim about what the laws are.
(Greek: “nomos” = law)

Examples of nomic claims

- It’s a law that all emeralds are green.
- It isn’t a law that all emeralds are green.
- It’s physically necessary that all emeralds are green.
- It isn’t physically necessary that all emeralds are green.

Examples of non-nomic claims

- All emeralds are green.
- Some emeralds are not green.

Lange proposes:

P3 (52, simplified; "P3" is my terminology)

p is physically necessary iff $q > p$ is correct for all **non-nomic** q consistent with the laws.

This avoids the refutation of P2.

Questions

1. Explain what a subjunctive conditional is and give an example. How are counterfactual conditionals related to subjunctive conditionals?
2. What does Lange mean by the notation "$p > q$"?
3. (a) What does it mean to say that something is physically necessary? (b) Are all laws physically necessary? Justify your answer. (c) Are all physically necessary facts laws? Justify your answer.
4. For each of the following, say whether it is true and justify your answer.
   - P1. p is a law iff $q > p$ is correct for all q consistent with the laws.
   - P2. p is physically necessary iff $q > p$ is correct for all q consistent with the laws.
5. State Lange's proposal about the relation between laws and counterfactuals.

Reference

Marc Lange.
Natural Laws in Scientific Practice.
Oxford University Press, 2000.
Limited access at Amazon Online Reader.
Numbers in parentheses are page numbers of this book.