Lange 4
The Relation of Laws to Counterfactuals

(pp. 43–52)

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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

"$p > q$" 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. (p. 43)

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.

If p is true, then $p > q$ is correct iff q is true.

Example

If my car were out of gas, then it would not start.

Suppose my car really is out of gas; then this conditional is correct if my car won't start, incorrect if it will start.

For counterfactuals, correctness is not so straightforward.

Goodman's example (pp. 44-45)

Consider a dry, well-made match that is surrounded by oxygen, never struck, and never lights.

- "If the match were struck, then it would light." (Correct)
- "If the match were struck, then it would not be surrounded by oxygen." (Incorrect)

Both have the form $p > q$, with p and q false. Correctness of counterfactuals isn't determined by the truth value of q.

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. If p is true, what determines whether "$p > q$" is correct, according to Lange?
4. If p is false, does the truth value of q determine whether "$p > q$" is correct? Justify your answer.

The relation of laws and counterfactuals

Lange's "initial proposal":

P1 (p. 47; "P1" is my terminology)

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

Example

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

Some logical consequences of the laws are not laws.

Fodor's example (p. 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, for all q consistent with the laws, $q > p$ is correct.

Counterexample to P1

Let p be a logical consequence of the laws that is not a law.

1. P1 implies that, for all q consistent with the laws, $q > l$ is correct for all laws l.
2. So if P1 is correct then, for all q consistent with the laws, $q > p$ is correct, since p is a logical consequence of the laws.
3. Since p is not a law, this violates P1.

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, for all q consistent with the laws, $q > p$ is correct.

This avoids the objection to P1.

P2 (again)

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

Counterexample to P2

Let $p =$ "Every object accelerated from rest travels at less than the speed of light." Let $q =$ "p is not a law." Then:

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

Definition

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

Examples of nomic claims

- It is a law that all emeralds are green.
- It is not a law that all emeralds are green.

Examples of non-nomic claims

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

Lange proposes:

P3 ("P3" is my terminology)

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

This avoids the counterexample to P2.

Notation

U	the set of all non-nomic claims (p. 50)
Λ	the non-nomic claims that are physically necessary (p. 52)
$\in$	is an element of

P3 restated using this notation (p.52, last displayed sentence)

If $p \in U$, then $p \in \Lambda$ iff, for all $q \in U$ consistent with Λ, $q > p$ is correct.

Questions

5. (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.
6. The following are three proposals about the relation between laws and counterfactuals.

   P1. p is a law iff, for all q consistent with the laws, $q > p$ is correct.

   P2. p is physically necessary iff, for all q consistent with the laws, $q > p$ is correct.

   P3. If p is non-nomic, then p is physically necessary iff, for all non-nomic q consistent with the laws, $q > p$ is correct.

   (a) Give a counterexample to P1 that is not a counterexample to P2; explain why it is a counterexample to P1. (b) Give a counterexample to P2 that is not a counterexample to P3; explain why it is a counterexample to P2.
7. What does Lange mean by U and Λ? State P3 using these symbols.