Lange 9
Revised Definitions

(pp. 177–178)

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Λ is inconsistent

Example (pp. 212–213)

- Boyle's law: $PV = k$.
- van der Waals's law: $(P + a/V^2)(V - b) = k$, where a and b are constant for a given type of gas.

For real gases, a and b are non-zero, so not both can be true.

- Propositions that are inconsistent with one another together imply every proposition. *Proof:*
  - Suppose p and q are inconsistent with one another and let r be an arbitrary proposition.
  - p implies "p or r" and q implies "not-p."
  - "p or r" and "not-p" together imply r.
- So every proposition is a logical consequence of the laws.
- So *every* proposition is "physically necessary," according to Lange's definition, and $\Lambda = U$.

Lambda is not NNS

Definition from Lange 6

A set Γ of statements is non-nomically stable (NNS) iff:

1. Γ is a subset of U.
2. Every member of Γ is true.
3. If $p \in U$ is a logical consequence of Γ, then $p \in \Gamma$.
4. If $p \in \Gamma$ and $q \in U$ is consistent with Γ, then $q > p$ is correct.

Lange said the special relation between laws and counterfactuals is that Λ is the only nontrivially NNS set. But we now see:

- Since there are false laws, Λ doesn't satisfy (2).
- Therefore, Λ is *not* NNS.
- So Lange's account of the special relation between laws and counterfactuals is wrong.

Lange's repair strategy

- Lange's previous account of laws is in a shambles.
- He claims he can fix it up by changing the definitions of various concepts he used.
- The new definitions are complex, vague, and poorly explained.
- Lange says:

  > *Having thus refined these various concepts . . . I can retain all of the conclusions involving these concepts at which I arrived earlier.* (p. 178)

  However, he does not even *attempt* to show that his previous claims remain true with the new definitions.

In the remainder of this class we'll look at some of this mess.

Inference rules

- Lange assumes that for each claim there is an associated *inference rule* that specifies what inferences may be drawn from this claim in what circumstances.
- The inferences allowed by one of these rules will depend on what other premises are being used. E.g., the rule associated with Boyle's law won't allow drawing all the conclusions that follow from this law together with van der Waals's law.
- Lange never gives an explicit statement of one of these rules. I suppose he would say they cannot be stated explicitly.
- Lange gives no reason to believe these rules exist.
- Of course, scientists know how to sensibly use Boyle's law, but that is because they know its limits of accuracy, not because there is an inference rule associated with Boyle's law.

Reliability

Lange says:

- An inference rule is *reliable* if it leads to "conclusions that often enough are accurate enough for our purposes." (p. 176)
- Laws do not need to be true; instead they need to be associated with a reliable inference rule.
- Contradictory laws, such as Boyle's law and van der Waals's law, can both be associated with reliable inference rules.

I say

- This requires claims to have associated purposes as well as associated inference rules. This is implausible and Lange gives no reason to believe it.
- Even if the purposes existed, the terms "often enough" and "accurate enough" have no determinate meaning, so reliability would be an extremely vague concept.

Revised definition of Λ

Lange gives a revised definition of a set's "logical closure in U" (p. 178). This leads to the following:

Revised definition of Λ (Λ' is my notation)

Λ' is the set of claims that correspond to inference rules (mediating inferences among claims in U) that must be reliable if the inference rules corresponding to the laws are all reliable.

I say this doesn't pick out any definite set because:

- It assumes the existence of an inference rule corresponding to each claim, which is unsupported and implausible.
- It is unclear what it means for a rule to "mediate inferences among claims in U."
- For rules to be reliable or not, claims must have purposes, which is unsupported and implausible.
- Even if reliability was coherent, it is too vague to pick out a definite set of claims.

Revised definition of NNS

Lange's definition of NNS is to be revised in a similar manner. The result is a long-winded definition full of vague terminology and based on dubious presuppositions. (I'll spare you the details).

Reasons to doubt that Λ' is NNS$'$

- Neither Λ' nor NNS$'$ are well-defined concepts.
- Lange's argument, that no set other than Λ is non-trivially NNS, depended on logical properties that don't carry over to Λ' and NNS$'$. He doesn't attempt to give a new argument.
- Let b be Boyle's law and w van der Waals's law. For Λ' to be NNS$'$, $w > b$ must be "close enough for the relevant purposes to being correct." I see no reason to believe that.

Lange's account of "the special relation between laws and counterfactuals" has evaporated—but he pretends it hasn't.

Farewell to Lange

- Because Lange's account has collapsed, this is the last lecture on Lange's book.
- Although his account of laws didn't work out, we learned many things from him, e.g.:
  - Not all true generalizations are laws.
  - Not all laws are true.
  - Laws can be inconsistent with one another.
  - The relation between laws and counterfactuals is not that only laws support counterfactuals.

Questions

1. Prove that $\Lambda = U$.
2. Lange's revised definition of Λ is:

   > Λ' is the set of claims that correspond to inference rules (mediating inferences among claims in U) that must be reliable if the inference rules corresponding to the laws are all reliable.

   State three reasons for doubting that this picks out any definite set.
3. What did Lange say is the special relation between laws and counterfactuals? Why is this not correct on his original definitions? State two reasons for doubting that it is correct on his revised definitions.