

Lange 8
There are False Laws

(pp. 170–176)

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Review of the problem of provisos

- Many laws are not true as stated (e.g., the law of thermal expansion, Snell's law).
- Assuming that what are ordinarily called laws really are laws, and that laws are true, it follows that laws must contain unstated restrictions, called *provisos*, to exclude situations where they don't hold.
- The problem is what these provisos say. Last time we saw several unsatisfactory answers.

Lange's solution to the problem of provisos

- Laws have intended practical purposes (often unstated).
- Laws have provisos that exclude factors that prevent the law being accurate enough for its intended purposes (also often unstated).
- These provisos don't exclude all factors that affect the phenomena the law deals with; hence laws are not true, in general.

Example: The law of thermal expansion

- Lange says its intended purposes were limited to certain sorts of practical applications, e.g., bridge construction. (p. 170)
- The proviso excludes “someone hammering hard on the bar,” and “the sorts of conditions that would be encountered at the bottom of the sea or above the atmosphere.” (pp. 170, 171–172)
- The proviso doesn't exclude factors, e.g., from relativity theory or quantum mechanics.

How this solves the problem

- Lange accepts that laws are not true. Instead, laws are reliable for their intended purposes.
- Scientists generally know the factors that are significant for the intended applications of a law, hence they can know what the proviso says, and hence they can know what the law is.

My criticisms

- There is no good reason to believe that laws have intended purposes or provisos of the sort Lange claims.
 - Lange gives no argument that they do.
 - He acknowledges that these are usually not stated.
 - He himself expresses uncertainty about the exact purpose of the law of thermal expansion (p. 170) and the proviso of Galileo's law of falling bodies (p. 171).
- On Lange's account, laws are not what scientists say they are, and their content is vague and obscure.
- Once we accept that laws are false, as Lange does, there is no need postulate unstated provisos. We can just say that false laws are useful because in many situations they are close enough to being true to be useful for practical purposes. What those situations are need not be built into the law.

Laws can't be made true with provisos

Review

Lange argued:

- Laws contain unstated provisos but these don't exclude all disturbing factors.
- Therefore, some laws are false.

I argued:

- Laws don't contain even the provisos that Lange supposes.
- Therefore, some laws are false.

I now add

- Many laws are false for reasons other than disturbing factors.
- Therefore, even with all the provisos you like, many laws would still be false.

Example: Galileo's law of falling bodies

Galileo said that bodies falling “naturally” are uniformly accelerated, and that the main reason to believe this was experimental evidence.

- Lange observes that this is not strictly true unless we exclude air resistance and other disturbing factors. He claims Galileo did not mean to exclude air resistance. (p. 176)
- But even if we exclude air resistance, etc., Newton's law of gravitation implies that Galileo's law is still not strictly true; acceleration increases slightly as the body gets closer to the earth.

Example: Boyle's law (pp. 25, 176)

Boyle's law is that for a fixed quantity of gas at constant temperature:

$$\text{pressure} \times \text{volume} = \text{constant.}$$

Boyle stated the law for atmospheric air; at the time it was not known that there are different gases.

- The law is not even approximately true for real gases at high pressures and low temperatures.
- It is not exactly true for any real gas in any circumstances.
- The law discovered by Boyle is not about ideal gases. He said he was talking about air. The concept of an ideal gas was developed centuries later.
- So the law cannot be made true with a proviso that excludes "disturbing factors."

Example: Kepler's first law (not discussed by Lange)

This law says that the planets have elliptical orbits, with the sun at one focus of the ellipse.

- Newton's laws imply this is not strictly correct because:
 - The planets are attracted by each other and by their moons.
 - The sun is not stationary.
- There are additional deviations predicted by general relativity.
- A proviso that excluded all these factors would exclude every real planet. But Kepler's law is about real planets!

Questions

- ① Lange believes that many laws contain a proviso that is usually unstated. (a) What is the content of these provisos, according to Lange? (b) Does the inclusion of these provisos prevent laws from being false? Why, or why not?
- ② State three criticisms of Lange's solution to the problem of provisos.
- ③ Suppose provisos could exclude all disturbing factors; would that be enough to make laws true? Justify your answer with an example.