

Papineau 2

Modal Contexts; Refinements

(pp. 12–19)

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- Papineau proposes that only some of the assumptions in a theory contribute to the definition of a T -term.
- It can be unclear whether a particular assumption contributes or not.
 - T_y : The assumptions that are unquestionably in the definition of F .
 - T_n : The assumptions that are unquestionably not in the definition.
 - T_p : The assumptions for which it is unclear whether they are in the definition.
- If T_y has a unique realization, and it also realizes $T_y \cdot T_p$, then no matter how the ambiguity is resolved, F will refer to the same thing.
- Hence sentences involving F can have truth values, even though their definition is imprecise.

Example (p. 13)

Suppose that for “atom,” T_y is:

- Atoms are the smallest parts of matter separable by chemical means.
- Atoms are different in different elements.
- Atoms combine in simple whole number ratios.

Suppose T_p is:

- Atoms have nuclei.

If T_y has a unique realization that also realizes $T_y \cdot T_p$:

- “Atoms have nuclei” is true.
- “It is physically necessary that atoms have nuclei” is true.
- “It is logically necessary that atoms have nuclei” is indeterminate in truth value.

The general point

Even if a T -term has a determinate reference, indeterminacy in its definition means that claims about what is logically necessary will lack a determinate truth value.

Significance (p. 13)

This kind of indeterminacy ought to be unworrying. For, as far as I can see, it is unimportant to science, or anything else, to resolve such questions as whether it is necessarily true that atoms have nuclei. That it is true that atoms have nuclei is of course a matter of great significance, but nothing seems to hang on whether this truth is in addition necessary . . .

It is important that I am talking here about necessity tout court, not about "physical necessity." Questions of physical necessity are, of course, central to science, and indeed, scientific theories can be read simply as delineations of what is physically necessary.

Necessary refinements

My full view is that imprecise theoretical definitions are usually benign, in that they do not usually lead to indeterminacy of truth conditions . . . But at the same time I admit that there are also cases where such definitional imprecision does lead to claims which lack determinate truth-conditional content. When this happens, our discourse is flawed. So when we identify such cases, we ought to remedy the imprecision. (p. 17)

Cases where reference is indeterminate (pp. 17–18)

- 1 T_y has more than one realization but $T_y \cdot T_p$ has only one.
- 2 $T_y \cdot T_p$ has no realization but there is a realization if some assumptions in T_p are dropped.

Examples of the second kind (p. 18)

Here $T_y \cdot T_p$ has no realization but there is a realization if some assumptions in T_p are dropped.

- The caloric theory said that heat consists of a fluid called “caloric” that flows from hotter to colder bodies. It was later found that heat is not a fluid (or even a substance). If the assumption that caloric is a fluid is in T_p then it is indeterminate whether “caloric” refers to anything.
- Straight lines were held to be the shortest distance between two points and to satisfy the postulates of Euclidean geometry. It was later found that if straight lines are the shortest distance between two points, then they don't satisfy the postulates of Euclidean geometry. If the assumption that straight lines are Euclidean is in T_p then it is indeterminate whether “straight line” refers to anything.

Examples of the first kind (p. 18)

Here T_y has more than one realization but $T_y \cdot T_p$ has only one.

- *Modern microbiology tells us that various kinds of chunks of DNA satisfy the undisputed criteria for “gene,” and that further assumptions are needed to narrow the referent down.*
- *Relativity shows that both rest mass and relativistic mass satisfy the original Newtonian definition of mass as proportional to the amount of matter, and that further criteria are required to render the referent of “mass” unique.*

Need to refine the definition (p. 18)

In both these kinds of cases, some new discovery makes it manifest that the looseness in the definition of some term F is not benign after all. Previously we did not worry about exactly what was required to be an F , because it seemed not to matter . . . But now we realize that we were wrong, and that this definitional imprecision means [e.g.,] that nothing decides which of “there are no straight lines in physical space” or “there are physically straight lines, but they are not Euclidean” is true.

The obvious remedy in this kind of situation is to refine the definition so as to resolve the question. We can include the assumption of Euclideanism in the definition of straight line (which will make “there are no straight lines” true), or we can exclude it (which will make “there are straight lines, but they are not Euclidean” true).

No right way (pp. 18–19)

- Scientists may decide that F 's don't exist, or that there are F 's but the assumption at issue is false of them.
 - We now say that caloric doesn't exist.
 - Electricity was also originally thought to be a fluid, but we now say it exists.
- The choice may be motivated by sociological factors.
 - Theorists who want to present themselves as continuing the tradition of those who previously studied F will retain the term F for the thing that satisfies the basic criteria T_y .
 - Theorists who want to distance themselves from the existing theoretical establishment will urge that F does not exist.
- This intrusion of sociological factors does not interfere with finding truth; the question at issue concerns how to use words, not what the facts are.

- 1 Suppose that T_p contains “All F are ϕ .” What is a claim about F that has indeterminate truth value, even if F has a determinate reference? According to Papineau, is indeterminacy of this kind something to worry about? Why, or why not?
- 2 Describe two circumstances that would make it indeterminate whether a theoretical term refers to something or not, on Papineau’s account. What should be done when this happens, according to Papineau?
- 3 When the reference of a theoretical term is indeterminate, what are two ways in which this can be rectified? If the decision about which way to choose is influenced by sociological factors, does that undermine science’s claim to be getting at the truth? Why, or why not?