Is All Abstracting Idealizing?

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Steffen Ducheyne ("Abstraction vs. Idealization," *The Reasoner* 1:5 (September 2007): 9-10) proposes the following definitions of abstracting and idealizing:

ABSTRACTING: We *abstract* from property *P* of a physical system *x iff:* in our corresponding scientific model, *P* is not included.

IDEALIZING: We *idealize* a property *P* of a physical system *x iff:* in our corresponding model, *P* is not included and *P* is replaced by a different property *Q* which is not exhibited by *x*.

(These definitions omit Ducheyne's symbolism but otherwise follow his wording.) According to Ducheyne's definitions, there is a difference between a model for a planet not including the planet's actual temperature and the model including an incorrect temperature: one obtains the former model by merely abstracting from the planet's actual temperature, whereas one obtains the latter by idealizing the planet's temperature.

Whether Ducheyne understands properties as physical parameters or physical quantities is unclear. (Following Frederick Suppe (*The Semantic Conception of Theories and Scientific Realism* (Chicago: University of Illinois Press, 1989): 93), physical parameters are "*kinds of attributes* which certain particulars may possess"--such as mass and temperature--whereas physical quantities are amounts of certain physical parameters--such as 260 grams.) Accordingly, I stipulate that Ducheyne's definitions refer to properties in the sense of physical quantities and, perhaps, their negations--such as not-260 grams. (The added disjunct is important for not settling by fiat an issue that I raise below.) This seems to agree with the ordinary usage of "idealizing." And it entails that abstracting *in Ducheyne's sense* need not involve involve omitting a physical parameter from a model.

As Ducheyne notes, his definitions entail that every instance of idealizing a system's property is an instance of abstracting from that property. Hence, there is a significant distinction between abstracting and idealizing only if some instances of abstracting from a property are not instances of idealizing that property. The following argument shows that this is so only if omitting a property from a model need not involve including the contradictory of that property in that model. (For any property *P*, I call not-*P* the *contradictory* of *P*.)

1. Suppose that there is a property *P* of a physical system *x* and that abstracting from *P* does not involve idealizing *P*.
2. No physical system has both the property *P* and the property not-*P*.
3. Hence, *x* does not have the property not-*P*. [1-2]
4. Suppose, for *reductio*, that if a model *M*(*x*) of physical system *x* does not include the property *P*, then *M*(*x*) includes the property not-*P*.
5. If one abstracts from the property *P* of *x*, the resultant model *M*(*x*) does not include the property *P*. [ABSTRACTING]
6. Hence, if one abstracts from property *P* of *x,* the resultant model *M*(*x*) includes

a property that *x* does not have. [3-5]
7. Thus, if one abstracts from property *P* of *x*, one idealizes property *P* of *x*. [6, IDEALIZING]
8. Therefore, it is not the case that a model *M*(*x*) of physical system *x* includes the property not-*P* if it does not include the property *P*. [1, 2, 4, 7]

This argument relies upon the assumption that for any property *P,* no physical system has both the property *P* and the property not-*P*. This is nearly irreproachable. For it is true unless some contradictions are true of physical systems.

Since it is unclear whether there are true contradictions and less clear whether, if there are, some contradictions are true of the systems that scientists investigate, denying the above assumption is implausible. Accordingly, I assume that the significance of the distinction between abstracting and idealizing does not depend upon some contradictions being true of some physical systems. Hence, some instances of abstracting are not instances of idealizing (as assumed in the argument's initial premise) only if the following assumption is false:

Absences Entail Properties: For any property *P*, any model that does not include the property *P* includes the property not-*P*.

If true, this assumption guarantees that a model of a physical system does not include a property of that system only if the model includes the contradictory of the omitted property. For example, it guarantees that if a model of an object with a temperature of 300 Kelvin does not include the object's actual temperature, it thereby includes the property of being not 300 Kelvin.

Ordinary ways of speaking seem to support *Absences Entail Properties*. Compare, for instance, the claim that a cat does not have a full-length tail and the claim that the cat has a tail that is not full-length. (To make the similarity more pronounced, compare the claim that a cat is not black with the claim that the cat is not-black.) These seem to have the same content: both seem to attribute the property of having a non-full-length tail to a cat. But they need not have the same content. For if "The cat does not have a full-length tail" characterizes a model obtained by abstracting from the actual length of a cat's tail, this claim's content is that the cat's tail lacks the property of being full-length; and if *Absences Entail Properties* is false, this need not entail that the cat's tail also has the property of being not full-length. Accordingly, one should expect that if there is a significant difference between abstracting and idealizing, it is one that ordinary ways of speaking easily can obscure.

Against ordinary ways of speaking, some metaphysical accounts of properties seem to refute *Absences Entail Properties*. For example, according to David Armstrong (*A Theory of Universals* (Cambridge: Cambridge University Press, 1978): 19-29), a property is whatever plays some sort of causal role (or would play a causal role in the right circumstances), and this entails that there are no negative properties. (The putative property of being not white is a paradigm instance of a negative property.) If Armstrong is correct, a model that lacks the property *P* does not thereby have the property not-*P*, because being not-*P* is not a property.