

**On the twofold nature of artefacts: As response to Wybo Houkes and Anthonie Meijers,
“The ontology of artefacts: the hard problem”**

“Form follows function,” the slogan of modernist architecture, could well be a slogan of artefacts generally. Since the choice of material for a tool is guided by the function of the tool, we may be tempted to think that having a functional nature distinguishes artefacts from natural objects. But that would be a mistake. Certain natural objects—especially biological entities like mammalian hearts—have functional natures too.

What makes artefacts unique, in my opinion, is not just that they have functional essences, but that their functions are determined by the *intentions* of their producers and users. Unlike natural objects, artefacts have natures, essences, that depend on mental activity. But any kinds of things that have a dual nature of function and structure—whether natural or artefactual—will raise what Houkes and Meijers rightly call ‘the hard problem’ for an ontological theory of artefacts. Not only do artefacts have a dual nature, but also the relations between function and material base are both flexible in some respects and rigid in others. To accommodate this complexity, Houkes and Meijers formulate two criteria of adequacy on an ontology of artefacts. (p. 4)

The criteria are illuminating and thought-provoking: (i) Two-way Underdetermination (UD): An ontology of artefacts must allow that a single function may be realized in different structures, and that a single structure may realize different functions. (ii) Realizability Constraints (RC): An ontology of artefacts should “enable us to understand the possibility of deriving conclusions about the material basis from claims about an artefact and its function, and vice versa; and...should provide insight into the interaction of the material basis and the artefact.” (p. 14) Houkes and Meijers’ methodology is refreshing and welcome. They explicitly take epistemic concerns as a guide to ontology. In particular, successful patterns of reasoning from structure to function and from function to structure are no accident. “It would be passing strange if these patterns were not, in some minimal way, matched by ontological constraints.”¹ p. 5

¹ Although they say that they are not presupposing a contentious metaphilosophical position, I do not see how they can avoid such presupposition—even though I share the view (that I think is) presupposed. See my “Everyday Concepts as a Guide to Reality,” forthcoming.

Houkes and Meijers discuss two kinds of accounts of the relation between artefacts and their material bases: a supervenience account and a constitution account. They find both wanting.

Supervenience: Supervenience accounts have trouble with both criteria of adequacy. (UD) requires two-way “multiple realizability:” a function can be realized in multiple structures, and a structure may realize multiple functions. However, Houkes and Meijers rightly point out that supervenience is an asymmetrical relation: No form of supervenience (weak or strong) has room for two-way underdetermination of function and structure. (6-7)

One response to this concern is to enlarge the supervenience base to include context of design and use. Houkes and Meijers point to two difficulties with such a response: (i) Enlarging the supervenience base to include context would invite circularity by making it impossible to specify the supervenience base without referring to the artefact’s function (which supposedly supervenes on the base). (ii) Another difficulty with enlarging the base to include context is that artefacts are (what I call) intention-dependent objects, or ID objects: They essentially have relation properties of a mental kind: “Being an artefact means, among other things, being designed, produced, used and regarded as an artefact by intentional agents.” (p. 7) So, Houkes and Meijers say, mental properties would have to be included in the supervenience base—thus undercutting the motivation for invoking supervenience in the first place.

Although the first of the two criticisms of a supervenience approach to (UD) is right on target, the second, I believe, can be countered by the supervenience theorist. The supervenience theorist would not have to include mental properties in the supervenience base (as the second criticism charges), but only the microphysical properties on which the mental properties supervene.

However, Houkes and Meijers are correct to point out that enlarging the supervenience base to global supervenience (so that the functions of an artefact supervene on the whole world and its history) is unilluminating. If materialism is true, then global supervenience is trivially true, and is no source of insight into specific relationships, such as those between structure and function, at all. And even if functions of artefacts do supervene on microphysical properties of the artefacts together with contexts, such a supervenience relation would not be supervenience of function on structure. For the supervenience base would include not only structural

properties, but also contextual properties that are independent of structure. So, I believe that Houkes and Meijers are correct to point out that enlarging the supervenience base to include context would not allow a function of an artefact to supervene on its structure. And including context would make the supervenience base vast and unspecifiable—hence rendering the supervenience account uninformative about the nature of artefacts. So, a supervenience account of artefacts founders on (UD).

According to Houkes and Meijers, a supervenience account fares no better with respect to (RC). Since supervenience posits one-way, bottom-up determination, it is not rich enough to account for the kind of top-down dependency that reasoning patterns about artefacts suggest. We can reliably reason from function to structure. Given (RC), an adequate theory of artefacts will account for top-down dependency indicated by the success of top-down reasoning patterns (from function to structure) for artefacts. (Recall that successful reasoning patterns are a guide to ontology.) I think that a supervenience theorist might reply by rejecting (RC) as a criterion of adequacy. If (RC) is interpreted in such a way that an ontology of artefacts is supposed to account for the success of top-down reasoning, then (RC)—a supervenience theorist may say—is no criterion of adequacy on a theory of artefacts.

Whether or not (RC) should be accepted as a criterion of adequacy depends, I think, on exactly how (RC) is formulated. In the text, (RC) is underspecified. Initially, (RC) is described only as a constraint on the “two-way underdetermination of artefact and material basis,” with a comment about reasoning patterns from function to structure, as well as from structure to function. Later, (RC) is elaborated as requiring that an ontology of artefacts “enable us to understand the possibility of deriving conclusions about the material basis from claims about an artefact and its function, and vice versa;” it should “provide insight into the interaction of the material basis and the artefact.”

Although I share with Houkes and Meijers the view that metaphysics cannot be cut off from epistemic concerns, it is unclear to me how a general ontology of artefacts generally could help us understand specific patterns of reasoning from function to structure. Surely, the content of such reasoning is not covered by any general theory, but depends on the specific function in question: Given some specific function—say, to peel carrots—what kind of material will perform it and how should it be shaped? A general theory of artefacts will have to be

supplemented by specific theories of various kinds of materials to satisfy (RC). So, I think that a supervenience theorist would be within her rights to reject (RC) as a criterion of adequacy on an ontology of artefacts. Nevertheless, as far as I can see, Houkes and Meijers' earlier argument that (UD) is a criterion of adequacy that is violated by a supervenience account still stands.

Constitution: One alternative to a supervenience account is a constitution account, such as the one I have proposed. Houkes and Meijers give a clear statement of my view. They point out that the constitution relation relates things of fundamentally different kinds, and they astutely point out that the idea of constitution is not doing the work of the theory by itself; also important are the ideas of primary kind, having properties nonderivatively or derivatively, and circumstances.²

Before turning to their criteria of adequacy, Houkes and Meijers accuse the constitution view of “ontological stacking—i.e., the existence of multiple spatially coincident artefacts.” (ms. p. 12) Note that the criticism must concern multiple spatially coincident artefacts at the same level of constitution. My view explicitly countenances multiple spatially coincident artefacts at different levels of constitution. For example, the paper that US dollars are printed on is manufactured. Yet, a piece of that paper—itsself and artefact—constitutes a US dollar bill, a higher-level artefact. The piece of paper and the dollar bill are spatially coincident artefacts at different levels.

The criticism is not aimed at this sort of case, but rather at a sort brought out well by the aspirin example. If the Constitution View is correct, then the proper function of *x* helps determine the identity of *x*. So, where there are two proper functions, there seem to be two spatially coincident artefacts. By now, let us suppose, aspirins have two proper functions: to relieve pain and to thin blood. So, the Constitution View seems to imply that tablets containing

² Two minor caveats: (i) The distinction between having properties nonderivatively and having them derivatively should not be construed as a distinction between having the essentially or having them derivatively. A clock has its market value nonderivatively, but not essentially. (ii) A constituted object and its constituter do not have “the same set of properties.” They share many, but not all, the same properties. E.g., if an *F* constitutes a *G*, then although the *F* is a *G*, properties like being of primary-kind *F*, or being necessarily *G*, are not borne by both the *F* and the *G*. See P&B, p. 46ff.]

Another minor point. In fn. 6. Houkes and Meijers say that I hold constitution not to be transitive. At the prompting of Dean Zimmerman, I have since recanted in “On Making Things Up.”

acetyl salicylic acid³ constitute two spatially coincident artefacts—a pain reliever and a blood thinner—at the same level.

My first response to this criticism is to admit that I was cavalier in my reference almost willy-nilly to makers, producers, and designers as sources of an artifact's proper function. Usage also plays a role. Even if we cleared up these matters, however, Houkes and Meijers' point would remain. Their point concerns multifunctions (whatever their source). Aspirin, originally produced to be a painkiller, is now prescribed as a blood thinner. So what is the proper function of aspirin?

Here's the story that I would try to tell: Imagine that aspirin was first produced to be a pain killer. At that point, the primary kind of aspirin was pain-killer; being a blood-thinner was just an ancillary property, a side-effect. Over time, however, the situation changed, so that by now, (I suppose) tablets made of the same chemical aggregate as aspirin are produced to be a blood-thinner as well as a pain-killer. These tablets are also called 'aspirin.' I would say that, ontologically speaking, now we have a slightly different artefact—*aspirin**—that is also called 'aspirin,' but *aspirin** has a multifunctional essence: pain-killer-cum-blood-thinner. Here is a counterfactual test to show that *aspirin** is not identical to aspirin: If aspirin were to stop relieving pain, production of aspirin would have ceased even if it still would have thinned blood. But if *aspirin** were to stop relieving pain, but continued to thin blood, it would continue to be produced. So, artefacts do not seem subject so much to ontological stacking as to complexity of essence.

If we countenance functional essences at all, we should be prepared for things to have multifunctional essences. Think of Swiss Army-style “knives”: they are corkscrews, saws, nail-files, and so on. Many kinds of artefacts have multiple intended functions. Generally, adding an intended function requires a change of structure—as adding a pair of scissors to a Swiss Army-style knife. The aspirin case is distinctive only because difference in function (pain-killer vs. pain-killer-cum-blood-thinner) is not correlated with difference in structure.

Houkes and Meijers see problems for the Constitution View both from (UD) and (RC). With respect to (UD), they cite my example of an anvil used as a doorstop. In *Persons and Bodies*, I said that the piece of metal that constituted the anvil used as a doorstop did not thereby

³ I infer from Houkes and Meijers' footnote 7 that this is the chemical structure of aspirin.

cease to constitute an anvil and come to constitute a doorstep.⁴ Rather, the anvil constituted by that piece of metal simply acquired the property of being a doorstep. So, this example does not show that the constitution view violates (UD). And there is no ontological stacking, since the piece of metal constitutes only the anvil, and nothing else. So, I think that the Constitution View is comfortable with (UD).

With respect to (RC), Houkes and Meijers have two criticisms of the Constitution View. Both stem from the schematic nature of the Constitution View. The first criticism is that the Constitution View gives no guidance to engineers or product designers selecting materials; it refers only to ‘appropriate’ aggregates ‘suitably’ assembled. Right. But since different kinds of artifacts have different material requirements, a general account of artifacts can hardly be expected to do much more. (My comment on their argument that the supervenience theorist violates (RC) also applies here.) The second criticism, I believe, is a very deep one about the nature of malfunction that deserves much more space than I can give it here.⁵ Let me say only that I appreciate the suggestions of Houkes and Meijers about how the Constitution View may handle type-level malfunctions. But I think (and certainly hope) that the Constitution View can avoid “exaggerat[ing] the intentional nature of artefacts at the cost of their material nature.”

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⁴ *Persons and Bodies: A Constitution View* (Cambridge: Cambridge University Press, 2000): 40.

⁵ I shall explore the phenomenon of malfunction in “The Metaphysics of Malfunction,” in preparation..