

The Ontological Significance of Artefacts

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Artifacts are objects intentionally made to serve a given purpose; natural objects come into being without human intervention. As technology has grown more sophisticated, technical artefacts—from iphones, to fMRI machines, to ATMs, to cochlear implants—have come to play a large role in our lives. The prevalence of technical artefacts raises the question: Ontologically speaking, how should we understand these objects? If we take basic ontology to be an inventory of what must be mentioned in a complete account of reality, then the question becomes this: Do artefacts belong in basic ontology? My answer is yes.

Technical artefacts are objects intentionally made to serve a given purpose; natural objects come into being without intervention by entities with intentions. Artefacts have intentional properties essentially; natural objects do not. I shall argue that this difference does not signal any ontological deficiency in artefacts qua artefacts. My thesis is that artefacts have the same ontological status as natural objects.

The paper is organized as follows: First, I say what I mean by ‘ontological significance’. Then I answer the question “Are Artefacts Ontologically Significant?” by responding to five ways of distinguishing between natural objects and artefacts; I

conclude that none of these conditions show that artefacts are ontologically deficient. Next, I present a theory of artefacts on which they are ontologically significant. Then, I briefly show what makes artefacts unique. Finally, I suggest that philosophers have downgraded artefacts because they think of metaphysics as resting on a distinction between what is “mind-independent” and what is “mind-dependent.” I’ll challenge the use of any such distinction as a foundation for metaphysics.

Ontological Significance

To have ontological significance is to be an ineliminable part of basic ontology—a complete inventory of all that exists. Let ‘Ps’ stand for ‘xs that have property P.’ Then, we can define ontological significance like this:

Ps are ontologically significant if and only if a complete inventory of everything that exists must include Ps as such.

If an inventory of all that exists omits Ps (qua Ps), then either the inventory is incomplete or Ps lack ontological significance. My thesis is that if P is a type of artefact, then Ps have ontological significance.

On my view—I call it ‘constitutionalism’—a thing has ontological significance in virtue of its primary kind: Every concrete object is of some primary kind or other. A thing’s primary kind is the answer to the question: What most fundamentally is x? *Atom* is a primary kind; so is *person*, and I shall argue, so are *sewing machine*, *automobile* and other artefactual kinds. A thing has its primary-kind property essentially; its primary kind determines the thing’s persistence conditions. All concrete objects, except for

“simples” if there are any, are ultimately constituted by sums (or aggregates) of objects. Constitution is a relation of unity-without-identity. Unlike identity, constitution is a contingent and time-bound relation. If something is of primary kind *F* (*atom*, *person*, whatever), it has different causal powers from whatever constitutes it at any time. Consider a tree constituted by an aggregate of a trunk and two branches. The tree has the power to shade you, or to support a tree house, but the aggregate does not. The aggregate would continue to exist even if the tree were chopped down and the trunk and branches separated. But the tree would cease to exist.

All concrete things are ultimately constituted by aggregates of things. The identity conditions of aggregates are simple: Aggregate *x* is identical to aggregate *y* just in case exactly the same items are in aggregate *x* and aggregate *y*. An aggregate adds nothing to reality other than the items in it. The basic ontology contains hydrogen atoms and oxygen atoms and water molecules, but it does not separately contain an aggregate of hydrogen atoms and oxygen atoms. To call something an aggregate of *F*s and *G*s is just to refer to the *F*s and *G*s collectively. If *hydrogen atom* and *oxygen atom* are primary kinds, I'll say that an aggregate of hydrogen atoms and oxygen atoms has a hybrid primary kind, *hydrogen atoms/oxygen atoms*. This is just a matter of terminology: the aggregate is simply the parts referred to collectively. Aggregates add nothing to reality; the additions to reality are what aggregates *constitute*.

I call my view ‘constitutionalism’, because it takes constitution to be a basic relation in the universe. An aggregate of water molecules, in certain circumstances of juxtaposition and motion, constitute a river. The aggregate of water molecules are not identical to the river, for several reasons: The aggregate would exist if the molecules

were scattered throughout the universe, but the river would not. The aggregate when scattered is the same aggregate as the aggregate when it constitutes a river; but fish can survive in a river, but not in a scattered aggregate of water molecules. The river continues to exist when constituted by different aggregates—as some of the molecules go out to sea, and some evaporate, but the river goes on.

When one thing (e.g., an aggregate of water molecules) comes to constitute another (e.g., a river), a new entity (the river) comes into existence. If F is a primary kind, then to say that Fs (rivers, tigers, chairs, anything) have ontological significance is to say that when something comes to constitute an F, the addition of the F is not just a change in something that already exists, but the coming-into-being of a new thing. Every individual thing that exists has ontological significance in virtue of its primary kind.

Not all kinds are primary kinds. For example, *student* is not a primary kind; but *cat* is a primary kind: A cat is ontologically significant in virtue of being a cat, but a student is ontologically significant, not in virtue of being a student, but in virtue of being a person. The relevant difference between being a student and being a cat lies in the idea of persistence conditions.¹ A cat has its persistence conditions in virtue of being a cat; a student does not have her persistence conditions in virtue of being a student. A test for whether a kind is a primary kind (like cat) or not a primary kind (like student) is to ask: If this, say, cat were not a cat, would *it* still exist? The answer is no; *cat* is a primary kind. But if we asked if this student were not a student, would she still exist? The answer is yes; *student* is not a primary kind. The student still exists after she ceases to be a student, but a cat could not cease to be a cat and continue to exist. To put it in an old-

¹In “Why Constitution is Not Identity,” (*Journal of Philosophy* 94, 1997: 599-621) I argued that everything that can go out of existence altogether has persistence conditions.

fashioned way, a thing's primary kind is essential to it. On my view, ontological significance is related to primary kinds like this:

(OS) If x is of primary kind F, then x has ontological significance in virtue of being an F.

In accordance with my definition of 'ontological significance' above, 'Fs have ontological significance' is an abbreviation for 'xs have ontological significance in virtue of being an Fs'.² If Fs have ontological significance, then a new F adds to the stock of what there is.

Do Artefacts Have Ontological Significance?

Artefacts differ from natural objects in at least three ways: (1) Artefacts (and not natural objects) depend ontologically—not just causally—for their existence on human purposes. (2) Relatedly, artefacts are “intention-dependent” (ID) objects that could not exist in a world without minds. Natural objects, which can be deployed to serve human purposes, would exist regardless of human intentions or practices. (3) Artefacts (and not natural objects) essentially have intended proper functions, bestowed on them by beings with beliefs, desires, and intentions. With these differences from natural kinds, can artefacts be ontologically significant?

² Although I avoid the 'qua' locution, the way that I have elucidated 'Fs have ontological significance' suggests that an alternative to that expression might be 'Fs-qua-Fs have ontological significance.'

Many important philosophers—from Aristotle on—hold artefacts ontologically in low regard. Some philosophers have gone so far as to argue that “artefacts such as ships, houses, hammers, and so forth, do not really exist.”³ Artefacts are thought to be lacking in some ontological way: they are considered not to be genuine substances. Although the notion of substance is a vexed one in philosophy, what I mean by saying that things of some kind (e.g., hammers, dogs, persons)—Fs in general—are genuine substances is that any complete account of what there is will have to include reference to Fs. I shall argue that there is no reasonable basis for distinguishing between artefacts and natural objects in a way that renders natural objects as genuine substances and artefacts as ontologically deficient.

I shall consider five possible ways of distinguishing between natural objects and artefacts, all of which are mentioned or alluded to by David Wiggins.⁴ On none of these, I shall argue, do natural objects, but not artefacts, turn out to have ontological significance. Let the alphabetic letter ‘G’ be a placeholder for a name of a type of entity, without regard to whether ‘G’ designates a primary kind .

(1) Gs are ontologically significant only if Gs have an internal principle of activity.

³ Joshua Hoffman and Gary S. Rosenkrantz, *Substance: Its Nature and Existence* (London: Routledge, 1997): 173.

⁴ All the conditions either follow from, or are part of, the basic distinction that Wiggins draws between natural objects and artifacts. There is a complex condition that natural objects allegedly satisfy and artifacts do not: “...a particular constituent x belongs to a natural kind, or is a natural thing, if and only if x has a principle of activity founded in lawlike dispositions and propensities that form the basis for extension-involving sortal identification(s) which will answer truly the question ‘what is x?’” According to Wiggins, natural objects satisfy this condition and artifacts do not. David Wiggins, *Sameness and Substance Renewed* (Cambridge: Cambridge University Press, 2001): 89. I am not claiming that Wiggins denies that there exist artifacts, only that he distinguishes between natural and artifactual kinds in ways that may be taken to imply the ontological inferiority of artifacts.

(2) Gs are ontologically significant only if there are laws that apply to Gs as such, or there could be a science of Gs.

(3) Gs are ontologically significant only if whether something is an F is not determined merely by an entity's satisfying a description.

(4) Gs are ontologically significant only if Gs have an underlying intrinsic essence.

(5) Gs are ontologically significant only if the identity and persistence of Gs is independent of any intentional activity.

Let us consider (1) – (5) one at a time.

(1) The first condition—Gs are ontologically significant only if Gs have an internal principle of activity—has its source in Aristotle.⁵ Aristotle took this condition to distinguish objects that come from nature (e.g., animals and plants) from objects that come from other efficient causes (e.g., beds). But this condition does not rule in natural objects and rule out artefacts as genuine substances. A piece of gold is a natural object, but today, we would not consider a piece of gold (or any other chemical element) to have an internal principle of change; conversely, a heat-seeking missile is an artefact, but it does have an internal principle of activity. So, the first condition does not distinguish artefacts from natural objects.

(2) The second condition—Gs are ontologically significant only if there are laws that apply to Gs as such, or there could be a science of Gs—also allows artefacts to be

⁵ A substance has “within itself a principle of motion and stationariness (in respect of place, or of growth and decrease, or by way of alteration).” Aristotle, *Physics* 192b8-23.

genuine substances. Engineering fields blur the line between natural objects and artefacts. Engineering schools have courses in materials science (including advanced topics in concrete), traffic engineering, transportation science, computer science—all of which quantify over artefacts. Since something's being of an artefactual kind (e.g., *computer*) does not preclude a science of it, the second condition does not make artefacts less than genuine substances.

(3) The third condition is semantic: Gs are ontologically significant only if whether something is a G is not determined merely by an entity's satisfying a description. Demonstrative reference is supposed to be essential to natural-kind terms.⁶ The reference of natural-kind terms is said to be determined indexically; the reference of artefactual-kind terms is said to be determined by satisfying a description.⁷

Membership in a natural kind, it is thought, is not determined by satisfying a description, but rather by relevant similarity to stereotypes.⁸ The idea is this: First, Gs are picked out by their superficial properties (e.g., quantities of water are clear liquids, good to drink, etc) Then, anything that has the same essential properties that the stereotypes have is an G. So, natural kinds have “extension-involving sortal

⁶ This claim is similar to the notion that natural-kind terms, but not artificial-kind terms, are rigid designators. (A rigid designator has the same referent in every possible world.) However, what makes the difference between ‘whale’ and ‘bachelor’ is not that only the former is rigid. Rather, only the former term “has its reference determined by causal contact with paradigm samples of the relevant kind.” There is no reason that the terms cannot both be rigid. See Joseph LaPorte, “Rigidity and Kind,” *Philosophical Studies* 97 (2000): 304.

⁷ Although Wiggins is an Aristotelian, this is not Aristotle's view. For Aristotle, nominal definitions are reference fixers, used to identify objects for scientific study; they contain information that a scientist has before having an account of the essence of the objects. Real definitions are discovered by scientific inquiry and give knowledge of the essences of objects identified by nominal definitions. Nominal and real definitions are not accounts of different types of entities. Rather, they are different types of accounts of the same entities. Members of a particular natural kind have the same essence (underlying structure). See Robert Bolton, “Essentialism and Semantic Theory in Aristotle: *Posterior Analytics*, II, 7-10,” *The Philosophical Review* 85 (1976): 514-544.

⁸ E.g., Wiggins, *Sameness and Substance Renewed*, pp. 11-12.

identifications.”⁹ By contrast, artefactual terms (like those I used earlier—‘beds’, ‘knives and forks’, ‘cars’, ‘computers’, ‘pencils’, ‘nails’) are said to refer by satisfying descriptions: “A clock is any time-keeping device, a pen is any rigid ink-applying writing implement and so on.”¹⁰

I do not think that this distinction between how words refer captures the difference between natural objects and artefacts.¹¹ The distinction between referring indexically and referring by description, with respect to natural kind terms, is only a matter of the state of our knowledge and of our perceptual systems.¹² However gold was originally picked out (e.g., as ‘stuff like *this*’), now we can pick it out by [what are taken to be] its essential properties: For example, ‘gold is the element with atomic number 79.’ Not only might natural kinds satisfy descriptions, but also we may refer to artefacts in the absence of any identifying description. E.g., archeologists may believe that two entities are both artefacts of the same kind, without having any identifying description of the kind in question. (Were they used in battle or in religious rituals?)

Thus, the third condition—Gs are ontologically significant only if whether something is a G is not determined merely by an entity’s satisfying a description—does not distinguish natural kinds from artefactual kinds, nor does it rule out artefacts as genuine objects.¹³

⁹ Wiggins, *Sameness and Substance Renewed*, p. 89.

¹⁰ Wiggins, *Sameness and Substance Renewed*, p. 87.

¹¹ Aristotle would agree with me on this point, I believe. His reason for downgrading artifacts ontologically is that artifacts have no natures in themselves.

¹² Moreover, indexicality should not be confused with rigidity, which does not concern how a term gets connected to a referent. For criticism of Putnam’s confusion of the causal theory of reference and indexicality, see Tyler Burge, “Other Bodies” in *Thought and Object*, Andrew Woodfield, ed. (Oxford: Oxford University Press, 1982): 97-120.

¹³ Joseph LaPorte also holds that some kind expressions (both natural and artifactual) designate rigidly, and some designate nonrigidly. See his “Rigidity and Kind,” *Philosophical Studies* 97 (2000): 293-316.

(4) The fourth condition—Gs are ontologically significant only if Gs have an underlying intrinsic essence—also fails to distinguish natural from artefactual kinds. Although some familiar natural kinds—like water or gold—have underlying intrinsic essences, not all do. For example, wings (of birds and insects), mountains, and planets are all natural kinds, but none of them has an underlying intrinsic essence. Their membership in their kinds is not a matter of underlying intrinsic properties. Something is a wing, mountain or planet not in virtue of what it is made of, but in virtue of its relational properties. For that matter, something is a bird or an insect in virtue of its relational properties—its genealogical lineage. So, having an underlying intrinsic essence does not distinguish natural objects from artefacts.

(5) The fifth condition—Gs are ontologically significant only if the character of Gs is independent of any intentional activity—is the most interesting. According to some philosophers, the “character of [a] substance-kind cannot logically depend upon the beliefs or decisions of any psychological subject.”¹⁴ Unlike the first four conditions, the fifth does distinguish between artefactual and natural kinds. An artefact’s being the kind of thing that it is depends on human intentions. Conceding that the necessity of intention is a difference between an artefact and a natural object, I ask: Why should this difference render artefacts deficient?

If you endorse what Jaegwon Kim has called ‘Alexander’s Dictum’—To be real is to have effects—there is no doubt that artefacts are real. When automobiles were invented, a new kind of thing came into existence: and it changed the world. Considering

¹⁴ Joshua Hoffman and Gary S. Rosenkrantz, *Substance: Its Nature and Existence* (London: Routledge, 1997): 173.

the world-changing *effects* of the automobile (and countless other kinds of artefacts), artefacts have as strong a claim to ontological status as natural objects.

What generally underlies the fifth condition, I believe, is an assumption that Gs are ontologically significant only if conditions of membership in the substance-kind are set “by nature, and not by us.”¹⁵ But it is tendentious to claim that the existence of artefacts depends not on nature, but on us.¹⁶ Of course, the existence of artefacts depends on us: but we are part of nature. It would be true to say that the existence of artefacts depends not on nature-as-if-we-did-not-exist, but depends on nature-with-us-in-it. Since nature *has* us in it, this distinction (between nature-as-if-we-did-not-exist and nature-with-us-in-it) is no satisfactory basis for a verdict of ontological inferiority of artefacts.

A Theory of Artefacts as Ontologically Significant

My claim that artefacts have ontological significance is a generalization of the claim that *automobile* is a primary kind, *knife* is a primary kind, *sewing machine* is a primary kind, and so on for the other artefacts. I indirectly argued for this claim by arguing against its denial in the last section.

¹⁵ In “A Different Kind of Natural Kind,” *Australasian Journal of Philosophy* 73 (1995): 516-531, Crawford L. Elder discusses this point. For an alternative that I find congenial, see Amie Thomasson, “Realism and Human Kinds,” *Philosophical and Phenomenological Research* 68 (2003): 580-609.

¹⁶ In Chapter One of *The Metaphysics of Everyday Life* (Cambridge: Cambridge University Press, 2007), I argued that a distinction between what depends on nature and what depends on us is neither exclusive nor exhaustive.

Technical artefacts have proper functions that they are designed and produced to perform (whether they successfully perform their proper functions or not).¹⁷ Indeed, the general term for a kind of artefact—e.g., polisher, scraper, life preserver—often just names the proper function of the artefact. What distinguishes artefactual primary kinds from other types of primary kinds is that an artefactual primary kind entails a proper function, where a proper function is a purpose or use intended by a producer. Thus, an artefact has its proper function essentially: The nature of an artefact—its primary kind—lies in its proper function—what it was designed to do, the purpose for which it was produced.¹⁸

The proper function of a boat is to provide transportation on water. The proper function of an artefact is the intended function. An artefact may in fact never perform its proper function: Perhaps a boat is never actually put in water, or perhaps it malfunctions (sinks on launching). The aggregate of planks and nails that constitutes a boat at *t* inherits the proper function of a boat. But the aggregate of planks and nails only contingently has the function of providing aquatic transportation, in virtue of constituting a boat at *t*. The boat has its proper function essentially; the aggregate of the planks and nails that constitutes the boat at *t* has its proper function only contingently. After some of

¹⁷ There is a lot of literature on functions. For example, see Crawford L. Elder, “A Different Kind of Natural Kind,” *Australasian Journal of Philosophy* 73 (1995): 516-531. See also “Ascribing Functions to Technical Artefacts: A Challenge to Etiological Accounts of Functions,” by Pieter E. Vermaas and Wybo Houkes, forthcoming in the *British Journal for the Philosophy of Science*, is very useful. As Vermaas and Houkes point out, some philosophers take the notion of biological function to be basic and then try to apply or transform theories of biological function, which since Darwin are non-intentionalist, reproduction theories, to artifacts. I believe that Vermaas and Houkes are entirely correct to liberate the theory of artifacts from the notion of function in biology.

¹⁸ More precisely, a nonderivative artifact has its proper function essentially. The constituter of an artifact inherits the nonderivative artifact’s proper function and thus has it contingently (as long as it constitutes the nonderivative artifact).

the planks are replaced at t' , say, the aggregate that constituted the boat at t no longer constitutes it; and hence the aggregate that constituted the boat at t no longer has the proper function of providing aquatic transportation.

What proper function an artefact has determines what the artefact most fundamentally is—a boat, a jackhammer, a microscope, and so on. And what proper function an artefact has is determined by the intentions of its designer and/or producer. Here, then, are four conditions that I propose as necessary and sufficient for x 's being an artefact:¹⁹

(A1) x has one or more makers, producers, or authors. Designers and executors of design (perhaps the same people) are authors.

(A2) x 's primary kind (its essence, its proper function) is determined in part by the intentions of its authors.

(A3) x 's existence depends on the intentions of its authors and the execution of those intentions.

(A4) x is constituted by an aggregate that the authors have arranged or selected²⁰ to serve the proper function entailed by the artefact's primary kind.

(A1) – (A4) are, I hope, an adequate account of artefacts. Now I want to modify my general definition of 'constitution' given in *Persons and Bodies* to accommodate (A1)

¹⁹ In thinking about these matters, I found useful Risto Hilpinen, "Authors and Artifacts," *Proceedings of the Aristotelian Society* 93 (1993): 155-178, as well as Randall Dipert's *Artifacts, Artworks, and Agency* (Philadelphia: Temple University Press, 1993). For an insightful discussion of artifacts, see Amie Thomasson's *Fiction and Metaphysics* (Cambridge: Cambridge University Press, 1999)

²⁰ I do not want to rule out "degenerate" cases in which a natural object is appropriated without alteration. E.g., a piece of (unaltered) driftwood may be brushed off and used as a coffee table. Thanks to an anonymous referee of this journal for bringing this lacuna to my attention.

– (A4), and hence to accommodate artefacts. I’ll illustrate with a boat and an aggregate of planks and nails. The modification of the definition is to place a twofold condition on an aggregate that can constitute a boat:

(i) The aggregate must contain enough items of suitable structure to enable the proper function of the artefact to be performed—in the current example, the function of providing aquatic transportation—whether the proper function actually is ever performed or not); and

(ii) The items in the aggregate must be available for assembly in a way suitable for enabling the proper function of the artefact to be performed.

Call an aggregate that satisfies these two conditions ‘an appropriate aggregate.’

One further preliminary. According to my general definition of ‘constitution,’ if x constitutes y at t , and y ’s primary kind is G , then x is in what I called ‘ G -favorable circumstances’ at t . If a certain aggregate of planks and nails constitutes a boat at t , then the aggregate must be in boat-favorable circumstances at t . Consideration of artefacts suggests that we should distinguish two kinds of G -favorable circumstances for boats, say: (1) the circumstances in which a boat may come into existence; (2) the circumstances in which an existing boat continues to exist. The circumstances in which a boat comes into existence are more stringent than those for a boat’s remaining in existence. So, let me spell out some features of boat-favorable circumstances for a boat’s coming into existence:

The boat-favorable circumstances concern the relations between an appropriate aggregate for boats, designers and/or builders. For example: (a) the aggregate must be in the presence of one or more persons who know how to build a boat from the items in the aggregate, and who either intend to build a boat from the items in the aggregate or whose activity is directed by someone who intends to have a boat built from the items in the aggregate; (b) the items in the aggregate must be manipulated by such persons (either manually or by machine) in ways that execute their productive intentions or of those directing the persons; (c) the result of the manipulation must satisfy the productive intentions of the persons.

Now with the notions of an appropriate aggregate and boat-favorable circumstances, we can adapt the general definition of ‘x constitutes y at t’ to a boat. Call the particular aggregate of planks and nails ‘Agg’ and the boat ‘Boat’. Agg has a hybrid primary-kind, *plank/nail*.

Agg constitutes Boat at t if and only if: There are distinct primary-kinds, *boat* and *plank/nail*, and boat-favorable circumstances such that:

- (1) Agg is an appropriate aggregate of primary-kind *plank/nail* & Boat is of primary-kind *boat*; &
- (2) Agg and Boat are spatially coincident at t; and
- (3) Agg is in boat-favorable circumstances at t; and
- (4) It is necessary that: for all concrete objects z and for all times t, if z is of (hybrid) primary-kind *plank/nail* & z is in boat-favorable circumstances at

t, then there is some u such that u is of primary-kind *boat* & u is spatially coincident with z at t; and

- (5) It is possible that: there is a time t such that Agg exists at t & there is no w such that w is of primary-kind *boat* & w is coincident with Agg at t.²¹

When this biconditional holds, (A1) – (A4) are satisfied. (A1) – (A3) are satisfied when Agg is in boat-favorable circumstances, and (A4) is satisfied when Agg and Boat fit the definition. Boat is essentially an artefact: there is no possible world in which that boat exists and is not an artefact. Agg at t is contingently an artefact. Agg would not be an artefact if it hadn't constituted an artefact. Even though the planks and nails in Agg are themselves artefacts, the aggregate of artefacts is not an artefact. (No one produces an aggregate; it comes into existence automatically, and an aggregate has no proper function.) This completes a sketch of a theory of artefacts made up from aggregates of items.

Here are some advantages of this view: First, it allows for novel artefacts—objects with new proper functions. (Gutenberg's printing press had that proper function of mechanically reproducing text.) An artefact's having a proper function depends in part on the author's intentions, and not on any history of selection and reproduction as proper functions in biology are. So, prototypes of innovative artefacts have proper functions. Second, this account allows—as it should—that a single boat may survive

²¹ I am omitting as irrelevant here clause (6) in the original definition that guarantees that a material thing cannot constitute an immaterial thing. Also, the definition needs a clause to insure that, aside from G, x has no primary-kind property of higher-order than F. I define 'higher-order primary-kind property' in terms of higher-order causal powers. Derk Pereboom presented a counterexample in the Book Symposium on *Persons and Bodies in Philosophy and Phenomenological Research* 64 (2002): 623-635 that the added clause blocks. Tomas Kakol suggested adding a clause to the definition like this: '∀J[J is a higher-order primary kind property than F & J does not entail G → ~Jxt]'

various replacement of planks and nails. After replacement even of a nail, Agg would still exist (assuming that the replaced nail was not destroyed), but Agg would no longer constitute Boat; some other aggregate would. (So, again, we see that $\text{Agg} \neq \text{Boat}$: in no case is a constituter identical with what it constitutes at t.) Third, this account accords artefacts ontological status as artefacts. An artefact has as great a claim as a natural object to be ontologically significant. This is so because artefactual kinds are primary kinds, defined by their intended functions.

Ontological Implications of Artefacts

This constitutional theory of artefacts allows for human activity to contribute to ontological novelty. Inventions make the world ontologically richer. Gutenberg's printing press and Galileo's telescopes literally changed the face of reality.

What makes artefacts unique, in my opinion, is not just that they have functional essences, but that their intended functions are determined by the *intentions* of their producers and users. Unlike natural objects, artefacts have natures, essences, that depend on mental activity. Technical artefacts depend not only on individual mental activity, but also on social institutions and conventions. Without economic institutions, there would be no collective labor—no assembly plants, no drilling equipment, no container ships, no

jet planes, no neural implants, no MRI machines. So, social institutions and conventions are necessary conditions for the existence of many kinds of artefacts.

Moreover, in addition to the social institutions and conventions required for the existence of technical artefacts, these artefacts all have material bases. Consider a simple-minded example, a primitive plough, the function of which is to till the land. The plough is constituted by some pieces of wood and a metal blade. The pieces of wood and the metal blade are themselves constructed to certain specifications; but the pieces of wood have their ultimate source in a tree (a natural object), and the metal blade has its source in a quantity of iron ore (a natural object).

The fact that the material bases of technical artefacts ultimately come from natural objects, together with the fact that the existence of these artefacts requires social institution and conventions, implies that artefacts transcend the boundaries that seem to divide reality into nature and culture, into material and social, and into physical and mental. I think that the most important ontological implication of artefacts is that the bifurcation of reality into nature and culture, etc., is profoundly misguided. If, as I have argued, artefacts are not ontologically inferior to natural objects, and technical artefacts have both material bases and require various social and economic institutions and conventions for their existence, then the nature/culture bifurcation does not cut reality at its joints.

The Insignificance of the Mind-Independence/Mind-Dependence Distinction

I believe that underlying the misguided nature/culture bifurcation is a deeper distinction that is equally misguided. The deeper distinction—one that philosophers unconsciously take for granted—is a distinction between what is mind-independent and what is mind-dependent. Anything that depends on our conventions, practices or language is mind-dependent (and consequently downgraded by those who rest metaphysics on a mind-independence/mind-dependence distinction). All ID objects, including all artefacts, are by definition mind-dependent, inasmuch as they could not exist in a world without beings with beliefs, desires and intentions. Nothing would be a carburetor in a world without intentional activity.²² The mind-independent/mind-dependent distinction is theoretically misguided because it is used to draw an ontological line in an unilluminating place. It puts mind-independent insects and galaxies on one side, and mind-dependent afterimages and artefacts on the other.

A second reason that the mind-independent/mind-dependent distinction is unhelpful is that advances in technology have blurred the difference between natural objects and artefacts. For example, so-called “digital organisms” are computer programs that (like biological organisms) can mutate, reproduce and compete with one another.²³ Or consider “robo-rats”—rats with implanted electrodes that direct the rats’ movements.²⁴ Or for another example, consider what one researcher calls ‘a bacterial battery’:²⁵ These are biofuel cells that use microbes to convert organic matter into electricity. Bacterial batteries are the result of a recent discovery of a micro-organism that feeds on sugar and

²² See a lengthy discussion of artifacts (specifically, of carburetors) in my *Explaining Attitudes: A Practical Approach to the Mind* (Cambridge: Cambridge University Press, 1995): 195-96.

²³ *The Chronicle of Higher Education: Daily News*, May 8, 2003.

²⁴ *The New York Times*, May 5, 2002.

²⁵ *The New York Times*, September 18, 2003. The lead researcher, Derek Lovley, who coined the term ‘bacterial battery’, is a microbiologist at the University of Massachusetts at Amherst.

converts it to a stream of electricity. This leads to a stable source of low power that can be used to run sensors of household devices. Finally, scientists are genetically engineering viruses that selectively infect and kill cancer cells and leave healthy cells alone. *Scientific American* referred to these viruses as “search-and-destroy missiles.”²⁶ Are these objects—the digital organisms, robo-rats, bacterial batteries, genetically engineered viral search-and-destroy missiles—artefacts or natural objects? Does it matter? I suspect that the distinction between artefacts and natural objects will become increasingly fuzzy; and as it does, the worries about the mind-independent/mind-dependent distinction will fade away.

²⁶ Email update from *Scientific American*, September 23, 2003.