



Ontology

Ontology asks the question “what is there?”

Eliminative materialism claims that nothing exists but material particles, which makes many problems in ancient and modern philosophy difficult if not insoluble. To be sure, we are made of the same material as the ancients. With every breath we take, we inspire 10 to 20 of the same molecules of air that sustained ARISTOTLE. The total matter and energy of the universe is a fixed or “conserved” quantity

But information is not a fixed quantity. The stuff of thought and creativity, information has been increasing since the beginning of the universe. Information is an abstract entity. Digital information is just bits of data, yet it is capable of representing any physical object or process and arguably can also represent abstract concepts.

The ontological status of abstract concepts is a completely different question from the ontology of concrete physical objects, though these questions have often been confounded in the history of philosophy.

Information philosophy provides distinct answers to these two ontological questions. Physical objects are pure material or particles of energy that exist in the world of space and time. Abstract concepts (like redness) are pure information, neither matter nor energy, although they need matter for their embodiment and energy for their communication. For example, the abstract idea of “two” is embodied in any two objects. The idea of a circle is embodied in a round object. Redness is embodied in the red photons being emitted or reflected from an object. The arrangement of material objects, whether continuous matter like the wood in a table top, or the momentary position of billiard balls, is pure *information*.

The ancients sometimes said that these abstract concepts do not “exist,” but rather are said to “subsist.” Information philosophy



claims that the “form” of an object can not be separated from the matter and so deserves to be ontological, even metaphysical?

The contrast between physical objects and abstract concepts can be illustrated by the difference between invention and discovery.

We *discover* physical objects through our perceptions of them. To be sure, we *invent* our ideas about these objects, their descriptions, their names, theories of how they are structured and how they interact energetically - with one another and with us. But we cannot arbitrarily invent the natural world. We must test our theories with experiment. The experimental results select those theories that best fit the data, the information coming to us from the world. This makes our knowledge of an independent external world scientific knowledge.

By contrast, we humans invent many abstract concepts such as the names we give to objects. We know that these cultural constructs do not exist somewhere in nature as physical structures before we create them. Cultural knowledge is conventional, relative to and dependent on the society that creates it.

However, some of our invented abstract concepts seem to clearly have an existence that is independent of us, like the numbers and the force of gravity.

Consider the shape of a given object. The abstract representation of the shape in the mind, or in a computer model, is (quantitatively) much less information than the total information in the shape of the physical object.

But when the *representation* is accurate, it is isomorphic with a proper subset of the information in the object itself. We can assert that at least this similar information is in the world and should be included in our physical ontology.

The Metaphysicist's Approach

Rather than simply ask “Do abstract entities like numbers and properties exist,” a metaphysicist prefers to ask in what way they might exist that is different from the way in which “concrete” objects exist.



Concrete objects can be seen and touched by our senses. They are material, with causal relations that obey the physical laws of nature.

Abstract entities are *immaterial*, but some of them can still play a *causal* role, for example when agents use them to decide on their actions, or when chance events (particularly at the quantum level) go this way instead of that.

Just as the mind is like software in the brain hardware, the abstract information in a material object is the same kind of immaterial stuff as the information in an abstract entity, a concept or a “non-existent object.” Some philosophers say that such immaterial things “subsist,” rather than exist.

Broadly speaking, the distinction between concrete and abstract objects corresponds to the distinction between the material and the ideal. Ideas in minds are *immaterial*. They need the matter of the brain to be embodied and some kind of energy to be communicated to other minds. But they are not themselves matter or energy. Those “eliminativists” who believe the natural world contains only material things deny the “existence” of ideas and immaterial information.

Some ideas may be wholly fictitious and nonsensical, whether mere possibles or even impossibles, like the round square, but most ideas correspond to actual objects or processes going on in the world. In either case, we can usually specify the informational content of the idea. Some anti-metaphysicians like to say that names of non-existent objects are “meaningless.” But this is wrong. There is a wealth of meaningful information in our knowledge base about unicorns, for example.

Metaphysicists identify abstract entities with the information contained in them. They may be concepts that did not exist in the world until they were invented. Or the information may have existed in material structures and so we say they were discovered. For example, the idea of the moon includes the concepts of a distinct shape, color, and even the appearance of a face.

Many such ideas are mind-independent. Consider properties of the moon. Most observers agree the shape is round and the color is



white. (Actually, the moon is blacker than most any terrestrial black object. It only appears white compared to the blackness of space.) Some metaphysicians deny the existence of a universal property such as roundness or whiteness. But metaphysicists see the information needed to specify circularity and the wavelengths of radiation that correspond to whiteness. And that information is embodied in the moon, just as a software program is embodied in computer hardware, and a mental idea is embodied in a brain.

Many ideas or concepts are created by human minds by “picking out” some of the information in physical objects. Whether such concepts “carve nature at the joints” (Plato, *Phaedrus*, 265e) depends on their usefulness in understanding the world.

Plato’s Theory of the Forms held that an Idea like the circle pre-exists material beings, where Aristotle argued that the Ideas are abstractions from the most general properties, for example, in all the actual circles.

Information philosophy restores so-called “non-existent objects” to our ontology. They consist of the same kind of information that provides the structure and process information of a concrete object. What we call a “concept” about an object is some subset of the information in the object, accurate to the extent that the concept is isomorphic to that subset. By “picking out” different subsets, we can sort objects, e.g., into sets or “*natural kinds*.”

Information philosophy settles deep philosophical issues about absolute and *relative identity*. All material objects are self-identical, despite concerns about vague boundaries. All objects have relations with other objects that can be interpreted as relative identities. All objects are identical to other objects in some respects and different qua other respects.

Continuous or Discrete?

Is the fundamental nature of reality continuous fields or discrete particles? What about space and time? Are they perhaps also digital and discrete and only appear to be continuous? The Academic Skeptic argument about growth said that even the smallest material change destroys an entity and another entity appears. A change



in the instant of time also destroys every material object, followed instantaneously by the creation of an almost “identical” object.

The Skeptics argued that an individual cannot survive material change. When any material is subtracted or added, the entity ceases to exist and a new numerically distinct individual comes into existence. By contrast, the Stoics saw the identity of an individual as its *immaterial* bundle of properties or qualities that they called the “peculiarly qualified individual” or ἰδίος ποιὸν.

The Stoics were following Aristotle. Like him, they called the material substance or substrate ὑποκείμενον (or “the underlying”). They believed the material substrate is “transformed” when matter is lost or gained. The Stoics suggested these changes should be called “generation (γενέσεις) and destruction (φθοράς).” They said it is wrong to call material changes “growth (αὐξήσεις) and decay (φθίσεις).” These terms were already present in Aristotle, who said that the form, as essence, is not generated. He said that generation and destruction are material changes that do not persist. The Stoics argued that the peculiarly qualified individual does persist. Aristotle commented on his use of words about persistence:

It is therefore obvious that the form (or whatever we should call the shape in the sensible thing) is not generated—generation does not apply to it—nor is the essence generated; for this is that which is induced in something else either by art or by nature or by potency. But we do cause a bronze sphere to be, for we produce it from bronze and a sphere; we induce the form into this particular matter, and the result is a bronze sphere...

For if we consider the matter carefully, we should not even say without qualification that a statue is generated from wood, or a house from bricks; because that from which a thing is generated should not persist, but be changed. This, then, is why we speak in this way.¹

The basic definition of persistence is to show that an object is the same object at different times. Although this may seem trivially obvious for ordinary objects, information philosophy shows that there is strictly no such thing as identity over time. The “same” object at two different times contains different information (minimally, its time coordinate in four-dimensional space-time has changed). Metaphysicians say it is better considered as two objects that are not absolutely identical.

1 Aristotle, *Metaphysics*, Book VII, § vii & viii.



WILLARD VAN ORMAN QUINE's ontology proposed that we consider an object as existing in "stages." Quine's student, DAVID LEWIS argues that at every instant of time, every object disappears, ceases to exist, to be replaced by a very similar new entity.

As we saw in chapter 2, Lewis proposes *temporal parts* as a solution to the problem of persistence. He calls his solution "*perdurant*," which he distinguishes from "*endurance*," in which the whole entity exists at all times. Lewis says:

Our question of overlap of worlds parallels the this-worldly problem of identity through time; and our problem of accidental intrinsics parallels a problem of temporary intrinsics, which is the traditional problem of change. Let us say that something persists iff, somehow or other, it exists at various times; this is the neutral word... Something perdures iff it persists by having different temporal parts, or stages, at different times, though no one part of it is wholly present at more than one time; whereas it endures iff it persists by being wholly present at more than one time. Perdurant corresponds to the way a road persists through space; part of it is here and part of it is there, and no part is wholly present at two different places. Endurance corresponds to the way a universal, if there are such things, would be wholly present wherever and whenever it is instantiated. Endurance involves overlap: the content of two different times has the enduring thing as a common part. Perdurant does not.²

Lewis's perduring road parts do not exactly persist. They are intrinsically different parts. The enduring entity does persist *simpliciter*.

In their thinking about persistence, many science-minded metaphysicians have been inspired by Einstein's theory of special relativity. The idea of a four-dimensional manifold of space and time supports the idea that the "temporal parts" of an object are as distinct from one another as its spatial parts. This raises questions about its continued identity as it moves in space and time. But what if space and time are not themselves continuous?

As to the more common sense view of endurance, it is metaphysically necessary, both logically and in terms of an information analysis, the case that everything is identical to itself. Self-identity is a necessary truth. If you exist, you do not exist necessarily, but you are necessarily self-identical at each instant of time.

2 On the Plurality of Worlds, p. 202



And if you exist, you are very *nearly* identical to yourself a moment ago. But because your information content is a strong function of time, you at time $t + 1$ is not exactly equal to you at time t . This will make the perdurantists happy, but the change in information is such a tiny fraction of your total that endurance theorists are closer to the truth in the problem of persistence.

But will this continuity of the preponderance of the intrinsic information in an entity be continuous if there is a “gap” in the time itself? Can we fall back to the pre-Socratic insight of Parmenides, who said that if there is nothing between two objects, they must be in contact? This felt like nonsense in the case of space, is it the same with the time?

Meta-Ontology

The deepest of all ontological questions for information philosophy is the meta-ontological question, does information exist? Does it help if we change the question and look for another way information might exist, different from the way matter exists?

Some say form - information *subsists*. But this feels like a verbal quibble. We can say that whatever it *consists* of, it is not matter. But this only says what it is not. More wordplay, ways of talking.

Information *consists* of numbers, ideas, thoughts, composites of simples, arrangements of matter, its organization, order out of chaos, software in the hardware, above all, it is communications between entities. But is it “nothing but,” nothing *over and above* the matter itself?

Quantificationally, information is increasing in the universe while matter (with energy) is a conserved and constant quantity.

Quintessentially, information is the metaphysical and ontological locus of possibility and chance.

Quantum mechanically, the one irreducible mystery is how a purely abstract probability wave can acausally move information, if not matter, from one place to another at speeds faster than light.

