layout: default title: Absolute vs Relational Theories of Space

Introduction

We don't see space. We see objects that stand in spatial relations to one another. One object is 10 feet from me. Another is 20 feet from me. Being inaccessible to direct observation is unimportant. Neutrinos and force fields are not directly observable either, but many believe they still exist. Space is constituted by complex relational structure of material objects and their parts and the spatial relations in which all these stand to one another.

These relations symmetrical, transitive, and reflexive.

Examples of spatial relations.

Allow 'F' stand for 10 feet away:

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$$\alpha F y \beta \to \beta F \alpha$$

Allow L for to the left of and R for to the right of.

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$$\alpha L \beta \to \beta F \alpha$$

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$$\alpha L \beta \& \beta L \alpha \to \alpha L \gamma$$

Do space and time have independent existence from objects they 'contain'? Are do there just exist the spatial relations between one another?[1] Let me try a very loose analogy. Consider a marriage. Two spouses, S1 and S2. Let us grant there is the relationship 'being married to one another'. S1 and S2 stand in this relationship to one another. Let us call them the Johnsons, the couple. Is there some other entity, 'the couple' in addition to the two people that stand in the relationship to one another. Or a table. There are particles in arrangement. Is there something in addition to the particles and the arrangements.

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[1]There is a difference between reductive and non-reductive relationalists. The latter think that what exists just is these spatial relations. The latter thinks that space does exist, but space is dependent on its existence of these relations. Aristotle arguable is a relationalist of the second kind. He thinks that space does exist, but that this depends on the existence of before and after in motion. Interpreters of Einstein differ. His later work maybe reductive. HIs earlier work maybe non-reductive.

Some Terminology

Objects, universals, relations.

One-place or monadic properties. They are properties that objects exemplify individually or one by one.

Relations, properties that are exemplified by several individuals in relation to each other. Thus, being a mile apart is something that is exemplified by a pair of objects: one thing is a mile away from another; and it is a universal: many pairs of objects can be so related at any given time. Likewise, being next to is a spatial relation between objects: one object is next to another and, again, it is a universal: many pairs of objects can agree in entering into it.

We can identify features of relations:

1. A relation R is **symmetrical** if, given any pair of objects a and b,

$$aRb \leftrightarrow bRa$$

2. A relation R is **asymmetrical** if, given any pair of objects a and b,

$$aRb \& \neg bRa$$

3. A relation R is **transitive** if, given some objects a, b, and c,

$$(aRb \& bRc) \rightarrow aRc$$

4. A relation R is **non-transitive** if, give some objects a, b, and c,

$$\neg((aRb \& bRc) \rightarrow aRc)$$

5. A relation R is **reflexive** if for some object a,

$$aRa$$

6. A relation R is **non-reflexive** if some some object a,

$$\neg aRa$$

Many relations are such that pairs of objects enter into them only when taken in a certain order. Thus, being the father of is an asymmetrical relation: if one thing, a, is the father of another thing, b, then b is not the father of a. As logicians put it, it is the ordered pair, (a and b taken in just that order), that exhibits the relation. The three relations we have considered are all two-place or dyadic relations; but obviously there can be three-place, four-place, and, generally, n-place relations.

Aristotle

I'll have a section on Aristotle.

Motion

The second is about absolute motion. Think of being still. Are you? Well Earth is moving. So not really. We might say that you are still relative to the person beside you. But not still relative to the sun. Compare this to being on a train. One issue is whether there is absolute motion. What would the relationalist say?

Absolutism

Absolute space is also called substantivalism.

Allows for void and absolute motion.

Newton, Kant,

Space and time exist as independent substances, i.e. they are existing particulars in their own right, over and above the material content of the universe. Space and time are continuous and pervasive media that extend everywhere and everywhere.

Relationalism

Space and time do not exist as independent substances, there is only the material content of the universe. Space and time are merely defined through spatiotemporal relations among the material objects in the universe.

Incongruent Counterparts

"Concerning the Ultimate Foundation of the Differentiation of Regions of Space" (1768), Immanuel Kant

Claim: Absolute space is necessary to explain the existence of incongruent counterparts.

[An incongruent counterpart is]. . . an object which is completely like and similar to another, although it cannot be included exactly within the same limits.

There are two types of mirror objects. Let X be an object and let Y be its mirror image.

1. X is a **congruent counterpart** of Y if X can be made to coincide with Y by rigid motions.[2]

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[2]Moebius strip.

2. X is an **incongruent counterpart** of Y if X cannot be made to coincide with Y by rigid motions.

An object is said to possess handedness just when it and its mirror image are incongruent counterparts.

An object is said to lack handedness just when it and its mirror image are congruent counterparts.

Consider these congruent counterparts:

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$$E\exists$$

Examples of incongruent counterparts: shoes, gloves, hands, feet

Master Argument

The argument strategy: There are clearly differences between right and left hands. We want to know what makes them different. We'll identify the only viable options, exclude all but one. The only way we'll make sense of it, claims Kant, is by postulating space as something absolute.

1. A hand is left or right either (a) solely in virtue of the *internal* relations among the parts of the hand, or (b) at least partly in virtue of the *external* relations of the hand to something outside it, either (i) other material objects, or (ii) space itself.

2. A hand is not left or right solely in virtue of its internal relations, since the internal relation are the same for right and left, i.e. the proportion and the position of the parts to one another of each hand are the same.

3. A hand is neither right nor left even partly in virtue of its relations to other material objects, since a hand that was all alone in the universe would still be right or left.

4. Therefore, a hand is left or right at least party in virtue of its relation to absolute space.[3]

1–3 state the premises of the argument. 4 states the conclusion. The argument is valid. If it is sound, then 4 must be true. Here are the arguments for the premises.

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[3] 'Incongruent Counterparts and Higher Dimensions', by James Van Cleve

Internalism

Internalists accept 1 and 3, but they rejects 2. They accept that a hand that was all alone in the Universe would still be a right or left hand, but they think that it's being left or right can be explained without looking outside the hand itself. The features of the hand alone, they claim, will make it a right or left one. Hence, one needs no other material objects or space itself to explain these features.

Objection:

a. The internal relations of both the left and right hand are distances between points and angles between lines, e.g., the length of the index finger.

b. The internal relations of both the left and right hand are identical.

c. If the internal relations of a right hand make it a right hand, then they cannot be identical to the internal relations of a left hand.

d. The internal relations of a right hand do not make it a right hand (similarly for the left hand)

e. Internal relations cannot distinguish right from left handedness.

- Might there be other other internal relations that explain the difference between the left and right hand?

- Any candidates face a certain killer objection: if we can flip the hands in a fourth dimension to make them congruent, then right handedness and left handedness cannot be intrinsic properties of the hands.

Externalism

Externalists accept 1 and 2, but reject 3. They claim that being a left or right hand depends on a relationship to other material objects. Kant raises the following objection:

a. Suppose that there is a world in which only a hand, H, exists.

b. Suppose that a body possessing no hands pops into existence.

c. H can fit only the left or the right wrist of the right wrist.

d. If H fits the right wrist, it was a right hand before the body popped into existence.

e. If H fits the left wrist, H was a left hand before the body popped into existence.

f. H was a right or left hand before the body popped into existence.

g. H was a right or left hand when no other material object exists.

h. H's being a right or left hand is not explained by its relationship to any other material object.

Absolutism

Absolutists accept each premises, and since the argument is also valid, they think the conclusion is true. Space, they claim, is absolute.

If we only accept the existence of 3 spatial dimensions, must we then accept that absolute space exists? I think the issue is that 4th dimension undermines the absolutists. The Externalist can appeal to 4th to say that they are not congruent at all. But then there is an issue of being incongruent in the 4th dimension.