

The Second version of Relativity Theory

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According to David G. Watts in his paper on his 5 dimensional theory (let's not concern ourselves with his theory) – relativity theory before Einstein was Mach's theory. [1]

So there was relativity pre-Einstein. And Mach rejected Einstein's theory.

There was in effect two relativity theories in this scheme:

- (1) Mach
- (2) Einstein

Mainstream physics then decided to take the wrong route and go with Einstein.

Lets now deal with what Watts says.

Watts: "Mach's Principle represents the (positivist) view held by Mach (and others) that position and motion (*ie.*, space and time) should only be regarded in a 'relative' context; that is, any reference to 'absolute space' (or 'absolute time'), as Newton would have preferred, was meaningless since 'absolute space' (or time) could not be detected nor measured against. Instead, Mach insisted that the motion of any object be regarded only dative to the rest of the universe. Mach further stipulated that the laws of physics should be formulated in such a way as to make irrelevant whether it was the object that was moving with respect to the universe, or whether it was the universe moving about the object."

"A typical example of this difference in perspective is given by consideration of a rotating bucket of water. If a bucket of water is rotating about a vertical axis through its center, the water will assume a parabolic shape about that axis. While the experiment is simple, its interpretation is not. How does the water 'know' that it is in a rotational (i-e., noninertial) frame so that it might assume a parabolic shape?"

“According to the traditional Newtonian perspective, this is caused by the interaction of the water with *absolute space*; that is, 'absolute space provides the reference frame with respect to which the water can 'sense' that it is *not* in an inertial reference frame, and react to it (i. e., assume a parabolic shape).”

me: There are two versions of Newtonian physics let us call Newtonian physics I due to Newton, and the other Newtonian physics II which was extension due to Boscovich. Above it refers to Newtonian physics I.

(I have dealt a great deal about Boscovich in my other articles.)

Watts: “According to Mach's point-of-view, however, 'absolute space' is a meaningless mathematical concept since it can't be measured. Instead, Mach argued that the rotating water experiences an 'interaction' with respect to the rest of the matter distribution in the universe (so the water's noninertia *rotation*) is measured relative to the totality of all the matter in the universe). It is this interaction (with respect to the rest of the universe), therefore, that causes the water to assume a parabolic shape.”

“The greatest predicted difference from these two perspectives (Newtonian and Machian)..”

me: This is two perspectives—Newtonian physics I and Newtonian physics II.

Watts: “...on the rotating bucket of water then comes from considering what would happen if the bucket were *not* rotating, but the rest of the *universe* were rotating about it. According to the Newtonian view [me: that is Newtonian I], there would be no effect on the water.”

“Since the *water* is not rotating with respect to absolute space, then the water's surface will remain flat.”

“According to Mach's view [me: that's Newtonian physics II], however, all motion should be regarded as relative, and the situation of having the bucket remain 'at rest' while the universe is rotating about it is identical to the situation where the universe is 'at rest' and the bucket is rotating with respect to *it*. Therefore, Mach's Principle says that the universe rotating about a bucket of water 'at rest' should *cause* the surface of the water to assume a parabolic shape. It is interesting to note that, before Einstein, Mach and his followers considered *themselves* 'relativists'.”

me: Then of course Mach rejected Einstein's theory.

Watts: “Intimately connected with Mach's ideas on the relativity of motion, are his ideas on the relativity of *inertia* (that is, the *resistance* of an object to changes in motion; *mass*). In the same way that Mach believed that space (and time) should be regarded in a functional (positivist) sense, so he also believed that mass (inertia) should be regarded from a functional point-of-view. Mass, as the resistance of an object to (changes in) motion, can then be

understood, according to Mach, by comparing the relative motion/acceleration imparted to an object for a given impulse of momentum/force. If, for a given force, an object attains twice the acceleration than another object, then the first object would have half the mass (inertia) of the second.”

“Since motion/acceleration are, themselves, only to be understood from a relative point-of-view (from Mach's perspective), then inertia must, therefore, also be understood only in a relative fashion (relative to the rest of the universe). Particularly, since the standards of nonacceleration and nonrotation are defined by the totality of the matter in the universe, then the mass (inertia) of a given object must be related in some (unspecified) relative way to the distribution of matter in the universe.”

“For example, an object in an otherwise empty universe would possess no 'selfinertia.’”

“Since, by Mach's view, there is nothing for the object to move with respect to, it cannot possess motion, thus, inertia for it is meaningless. Only if there is an appreciable distribution of matter within this universe can the standards of nonacceleration and nonrotation shift appreciably such that the object can obtain inertia. Although Mach doesn't specify *how* this is to be accomplished, some (unknown?) interaction between matter must therefore give rise to inertia.”

me : That would have to be the idealisation of a mass point-particle, if the object had structure and distribution of mass in its volume (by mass point-particles) then the idealisation would not work.

Actually there is more than just Mach who was working on relativity in competition with Einstein which I shall deal with in my next paper.

Reference

[1] Inertial and Electromagnetic Aspects of Matter Induced from Five-Dimensional General Relativity, David G. Watts
<http://uwspace.uwaterloo.ca/bitstream/10012/417/1/NQ38281.pdf>

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