a table and any other object is in the sensible effects which it produces. ... Similarly the operationalist is accustomed to say that the physical properties of various objects are defined by the method of measuring them."

Insofar as it puts a stop to vague speculations and much loose thinking that was rampant in physics, the operational viewpoint can do much good. One has only to read parts of Bridgman's book: "The Logic of Modern Physics," to realize the need of a much more searching scrutiny of the bases of physics than has hitherto been made. The experimental basis and physical proof of much of atomic physics is of the flimsiest, especially many of the assertions of relativists, as we have already seen in our treatment of relativity. It would indeed be a blessing if some genius - for it certainly would need a genius - were to sift the chaff from the wheat in the experimental and theoretical physics of today. For this task, at least some of the principles of the operationalists would come in handy.

But unfortunately, as is usually the case with moderns, the operationalists go too far. It is one thing to demand the experimental basis for the electron, the neutron, the change of mass with velocity, - it is another to make the broad, sweeping exaggeration that everything not measurable is meaningless.

For instance, Eddington boldly states:

"There is no such thing as absolute length, we can only express the length of one thing in terms of the length of something else."

Jeans also says: "We can only know relations."

But we reply: If the rod had not a determinable sizeableness independent of the yardstick, or if the yardstick had no length independent of the rod, the relation would be completely indeterminate. In general, the metric quality is logically prior to measurement, the relating implies relata. Bridgman says: "The concept of time is determined by the operations by which it is measured." But as O'Rahilly well remarks, Bridgman refutes himself when he admits elsewhere that the "time concept has to be assumed as primitive and unanalyzable, for the operations essentially assume that the operator understands the meaning of later and earlier in time." Part of the confusion seems to the present writer to come from a confusion of the objective quality to be measured with the measure-number representing it in our physical or algebraic equations, a confusion of the symbol with its measure. We shall return to this particular aspect later.

The idea that nothing has meaning unless hic et nunc measurable leads Bridgman to deny existence to light unless we actually see its effects, say by interposing a screen in a light beam. As Jeffries rightly remarks, such an idea leads to worse difficulties; it actually would lead to all the evils of pure phenomenalism. As passages in Bridgman's book show, the operational attitude if applied to other realms than physics, say religion, would lead to scepticism and to the denial of the legitimacy of faith, for it is closely allied to the 'doubting Thomas' attitude: "Unless I put my hand, etc., I will not believe."

To sum up, 'operational reasoning' insofar as it puts a check