

INSTRUMENTALISM IN SCIENCE: COMMENTS AND CRITICISMS

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ABSTRACT

The affinity between our perception of ultimate reality and our judgement of what we find in the world with respect to the method of science cannot be contravened. That means, if science must be result-oriented, then there must be a definite method for achieving that aim. But it must be said here that the method of science may not be codified. Thus, we shall define scientific method as the decision rules that guide the scientist in making his decisions or a perceived system of procedural rules. Against this backdrop, this paper attempts to defend the thesis that instrumentalism can and should, in fact, be accepted as a method of scientific investigation.

KEYWORD: science, system, instrumentalism, method.

INTRODUCTION

According to Morris and Pai (143), the philosophical colossus of our age, by all measure, is the scientific philosophy of instrumentalism sometimes called experimentalism and/or erroneously labeled pragmatism. This is because instrumentalism is only one of the tenets of pragmatism. Morton White (13) classifies instrumentalism as one of the most popular philosophies in the world. As a philosophy, instrumentalism is relatively young, stretching back to less than a hundred years. It is, however, the systematic expression of a movement that began much earlier. But as an outgrowth of pragmatism, instrumentalism shares some ideas, terms, concepts and even exponents with pragmatism. That does not in any way suggest that the two terms are one and the same thing as some authors like Titus and Smith (462, 542) suggest.

As earlier observed, instrumentalism relates closely to pragmatism. And this methodological viewpoint often contrasts with scientific realism, which defines theories as specially being more or less true. However, instrumentalism is more of a pragmatic approach to science, information and theories than an ontological statement. Often times instrumentalists (people who hold that scientific theory is only an instrument for yielding correct predictions), just like pragmatists (people who emphasize results and solutions more than

theories), have been accused of being relativists (people who believe that things like truth and morality depend on the individuals or cultures) even though many instrumentalists such as Karl Popper are believers in sturdy objective realism.

BACKGROUND INFORMATION

Customarily, Galileo is considered the father of the scientific tradition. Although it is difficult to locate the origin of so nebulous a thing as an intellectual movement, but there seems to have been an epoch in time when human minds took a new turn. This epoch, the later part of the sixteenth and early seventeenth centuries, serves in retrospect somehow as a "Great Divide" or intellectual watershed in the historic course of human thought. On one side is the reliance on logical, self-evident and a priori truth; while on the other side is the reliance on experience and overt phenomena. Through the words of a brilliant commentator on the history of science, Herbert Dingle, one can assess the magnitude of this Shift in intellectual orientation. According to Dingle, the shift began with:

The natural assumption that the earth was the centre of the universe ... a fundamental characteristic of Greek thought, which is at variance with the scientific outlook (224).

Based on Dingle's view, it would be recalled that in the sixteenth century, Copernicus had

ventured to change the status quo by transferring the centre of the universe from the earth to the sun. By the time of Galileo, some three quarters of century later, it had become clear that there was no need for any spheres at all (Dingle, 255-230).

The above fact show that the Aristotelian epistemology was actually at work: starting with presupposed and “self-evident” principles and then attempting to make the observations of natural phenomena conform to them. In contrast to this procedure was the method of science tagged the Galilean-Newtonian philosophy, which emphasized the application of force for acceleration and velocity.

This attempt brought knowledge in apparently boundless measure. But this was logically outrageous from the standpoint of Aristotelian method. As observed above, the Aristotelian general principles were conceived a priori, independently of phenomena and phenomena were distorted at liberty so as to exemplify them. The problem at hand was how to “save the phenomena”. The basic principles themselves could not be threatened; rather it was the phenomena that stood in need of salvation (John, 2006: 157).

It should also be noted that instrumentalism, though an American philosophy, is an outgrowth of British empiricism. It arose as a reaction against the Hegelian philosophy prevailing in America in the late nineteenth and early twentieth centuries. Instrumentalists at that period felt that such philosophy was not result-oriented, and had deviated from solving man’s problems which should be the duty of philosophy. To rectify the problems, instrumentalists came up with a philosophy of action to meet the needs of man and that of the society.

It must be mentioned that beliefs found in today’s instrumentalism first occurred in the teachings of Heraclitus and the Sophists. And in the later time some of those beliefs were found in the teachings of Francis Bacon and Auguste Comte. These beliefs were modified and adopted by modern instrumentalists. Thus, instrumentalists try to provide the foundation of science (or knowledge in general) by making sure that whatever is believed or accepted is in agreement with practical consequences. This means, the value of any idea is determined by the consequences produced when the idea is translated into action for prediction.

The prediction thesis holds that in order to determine the meaning of an idea, it must be put into test: the consequences, simply put,

predictions, which follow constitute the meaning of the idea. In other words, what is known is that which works for the prediction of the future satisfactorily. Epistemologically, truth is known as what is useful to believe or what leads to a successful prediction. Based on the above, instrumentalism is a philosophy that has experience, consequence, verification, and workability as its crucial tenets.

SCIENTIFIC METHODOLOGY VIA INSTRUMENTALISM

Before we move on to proffering a way out of the problematic nature of scientific methodology via instrumentalism, a brief procedural note is necessary at this point. Works of science were not intended to be a theorizing or an analytic affair. This, probably, is the reason that emphasis in our own time has shifted from realism and other kindred philosophies, which maintain the possibility of defining, locating and applying values that science contain irrespective of the wishes or purpose of human beings, to instrumentalism. This explains why John (2000:118), holds that “The modern focus rests greatly on experimentalism which traces the justification of our perception of reality to consequences”. The conception of truth, in the realist view is somewhat dynamic but strongly final, perfect and ‘eternal’. In religious terminology, it may be identified with God’s thoughts, and with those thoughts, which, as rational begins we share with God.

But contrary to the scientific realism, instrumentalist reality is the moving, changing, and “process-influx” event spoken of as experience. In this sense, instrument or experience is the ultimate grounds for human existence. It is both the originator and the Supreme Court of whatever we do or say. Perhaps, it is with this understanding that Ndubuisi (82) classifies instrumentalism as “a more developed perspective when compared with realism and relativism”.

WHAT IS INSTRUMENTALISM?

A contemporary British philosopher, Bertrand Russell (564), defines instrumentalism as an attempt in the recent times to escape from subjectivism. Ozumba (6) agrees with W. F. Bynum in defining instrumentalism as:

The view that a scientific theory is nothing more than a device or instrument for yielding correct predictions about the course of nature, and that theories must

therefore be assessed not as true or false, but only as effective or ineffective in prediction(209).

attempt to explicate the meaning of instrumentalism, one cannot but agree with John Dewey when he asserts that instrumentalism is:

According to Alozie,

Instrumentalism is the philosophical tenet which states that scientific theories or theories of any type are not strictly speaking true or false, but are to be regarded as tools for making predictions (156).

an attempt to construct a precise logical theory of concepts, judgement and inference in their various functions by considering primarily how thought functions in the experimental determinations of future consequences (463).

In the philosophy of science, instrumentalism is the view that concepts and theories are merely useful instrument whose worth is measured not by whether the concepts and theories are true or false (or correctly depict reality), but by how effective they are in explaining and predicting phenomena. In ethics, instrumentalism resembles utilitarianism in defining moral rules only as tools for moral good. Thus, the moral code arising from a given population is simply collection of rules that are useful to the population. David Hume was perhaps the first person to suggest that there might not be any intrinsic or metaphysical value of rules, but that they are simply secular and natural rules that are human-made.

From the above definitions, it is clear that instrumentalism is a philosophy of action. Like pragmatism, it shares in the working definition of what that works or on the instrument that helps in predicting the future, rather than on empty theorizing exercise.

Instrumentalists believe that theories are necessary weapons in science. But they do not see it appropriate to evaluate theories with categories of truth or falsehood. The understanding here is that instrumentalism accepts theories as instrument for prediction, and this means that it is the ability of theories in serving their predictive function that makes a theory valuable. This shows, therefore, that it is the end, which is prediction that justifies the means, which is the theory itself (Ozumba, 66).

In politics, instrumentalism is associated with a view first suggested by John Dewey and later by the Chicago school of economics, which perceives politics simply as a means to an end. Milton Friedman is noted as the one who paraphrased the viewpoint by explaining that he had no ideological love for free-markets, but he might, as simply be a socialist if socialism fulfilled the ends most people seem to want.

Some instrumentalists such as Hesse would argue that theories possess the status of instruments, tools or calculating devices in issues relating to observation. The assumption inherent in this view is that theories are made use of to relate and systematize observational statements. Predictions could be made in the process; but the issue of truth does not arise. It is meaningless to talk about truth in this matter. Predictions, to the instrumentalists, exhaust the goal of science. To them, as Newton-Smith (33) remarks, theoretical sentences are incapable of being true or false. The reason for this, according to him, is that theories lack meaning and truth-value.

The fallibilistic epistemology of Karl Popper adds to this belief that one should empirically measure all politics and verify whether they fulfill their goals, and try to falsify our politics, critique them and come up with better ways to reach the ends. In philosophy of mind, instrumentalism is the brainchild of Daniel Denneth. It holds that propositional attitudes such as belief are not concepts on which one can base scientific investigations of the mind and brain, but that acting as if other beings do have beliefs is often successful strategy. For example, behaving as if the chess-playing computer has the belief that taking the queen will give it a major advantage is a successful strategy, despite the fact that few people would argue that simple electronic devices have beliefs as one normally thinks of them (John, 2006:169). Looking at the above

The thrust of the instrumentalists was influenced by a strong form of verificationism. They could not successfully verify the truth of theoretical sentences, which is evidence that these sentences can neither be true nor false. To them, scientific laws and theories are nothing but instrument to derive observational predictions from other observational statements (Gierdymin, 182).

According to the instrumentalists, the method of scientific investigation cannot yield anything more than tentative or revisable hypothesis at the long run. Hence, they insist that

experimental findings cannot also be said to contradict scientific laws, just as crucial experiment aimed at refuting theories is impossible. Again, Gierdymin (183) has shown how Poincare, one of the earliest instrumentalists, sees scientific theories only as terminological conventions, useful for systematizing observational data in the way a catalogue systematizes books in a library, but having no descriptive empirical content. This proves that as far as theories are concerned, the instrumentalists do not see them as articles of faith.

Furthermore, instrumentalists submit that scientific progress, even in astronomy, can only be achieved by tolerance. That is, there should be a kind of situation where everyone should feel free to propose an alternative to the existing theories through greater simplicity by avoiding friction in all its ramifications. Old theories should however be replaced by "better ones without any of the theories being either conclusively refuted or demonstrated" (Gierdymin, 188). This in actual fact, makes for progress in science.

The instrumentalists do not see physical laws as even true; they see the laws of physics as neither true nor false but as an approximation. Physical laws, they say, are always undermined on the strength of the evidence that we have. To this extent, it is only wise to say that they are indeterminate. They (physical laws) are increasingly undergoing modifications and improvements. Thus, those factors that were not adequately considered previously will from time to time, be receiving attention in addition to the new ones that are emerging.

Also, instrumentalists maintain that common sense laws are simple generalizations of everyday experience. It is therefore easy to determine if they are true or not. There is no difference between its language and our everyday experience. We can thus determine its truth or falsity. In contrast, physical laws are formulated in a highly idealized and precise language of mathematics. Predictions made from them assume the same idealized mathematical form. We cannot as a result append "true or false" status to such laws.

Another issue involved in physical laws is that there are always the measuring procedures, and as such the outcome is always impressive. For this reason, Duhem states, "physical theories are merely means of classifying and bringing together approximate laws" (Gierdymin, 199). The objects that theories in physics deal with are too complex and imprecise to be correctly

determined. Therefore, an instrumentalist, according to Feyerabend, may even see that :

The functions of words like "gravitation", "force" and "gravitational field" are exhausted by their giving an abbreviated description of the spatio-temporal behaviour of physical objects (1964:280).

According to John (2006:174), these and other terms like "magnetic field intensity", "true", "coordinate", "electric conductivity", etc cannot be checked to verify whether they correspond to physical facts. This in essence shows the indispensability of unobservable in our theory construction. It is even possible for an instrumentalist to deny the existence of these objects and simply see these objects or words merely as instruments meant for the ordering and predicting (of) sense data.

It must also be noted that instrumentalism denies that theories are truth-valuable, and that they should be treated like a black box into which one feeds observed data and through which one produces observable prediction. This requires distinction between theory and observation and within each type of further distinction between terms and statements is required. Let us take some examples: observable statements have their meaning fixed by observable truth conditions, such as, "the litmus paper is red", while observation terms, on the other hand, have their meaning fixed by their referring to observable things or properties, for instance, "red".

Furthermore, theoretical statements have their meaning fixed by their function within a theory and are not truth-valuable. An example is, "the solution is acidic". However, theoretical terms have their meaning fixed by their systematic function within a theory and do not refer to any observable thing or property, for example, "acidic". Though one may think that "acidic" refers to a real property in an object, but the truth is that the meaning of the term can only be explained by reference to a theory about acidity, in contrast to "red" which is a property you can observe. From the above explanation, it means those statements that mix both the theoretical terms and observation terms are observation statements, since their totality cannot be directly observed.

There is some argument against this distinction, however, as it confuses "non-

theoretical” with “observable”, and likewise “theoretical” with “observable”. For instance, the term “gene” is a theoretical term but it can also be an observable term. Thus, whether a term is a theoretical or not is a semantic issue, because it involves the different ways in which the term gets its meaning (from a theory or from an observation). And whether a term is observable or not is an epistemic matter, because it involves how we can come to know about it. In other words, instrumentalists are of the opinion that the distinctions are the same, that we can only come to know about something if we can understand its meaning according to truth-evaluable observations. So in the above example, “gene” is a theoretical term because, although it is observable, we cannot understand its meaning from observation alone.

THE CONTROVERSY

It will be observed that modern definitions of truth, such as those of pragmatism or instrumentalism, which are practical rather than contemplative, are inspired by industrialism as opposed to aristocracy. This makes instrumentalism, as a method of science, attractive to epistemic community. Perhaps, this is what Bertrand Russell has observed in instrumentalism when he describes it as:

A power philosophy, though not like Nietzsche's, a philosophy of individual power; it is the power of the community that is felt to be valuable. It is this element of social power that seems to me to make the philosophy of instrumentalism attractive to those who are more impressed by our new control over natural forces than by the limitations to which that control is still subject (827).

Reading through Popper's *Conjectures and Refutations* (1969), Kuhn's *The Structure of Scientific Revolution* (1970), Feyerabend's *Problems of Empiricism* (1981), Lakatos' and Musgrave's *Criticism and the Growth of Knowledge* (1970), etc one will discover that they all have different opinions on how science grows through the instrumentality of theories. For instance, Popper is of the view that there is no end in refining theories as new facts arise. In line with Popper's position, it means that scientific inventions and theories are conjectures.

To Kuhn, in his *Normal Science*, theories are accepted as working paradigm to solve puzzles and no attempt should be made by the scientist to falsify a theory. He further submits that the emergence of any anomalies and their accumulation can threaten the old theory and when persistent, they will lead to the collapse of the old theory and the advent of a new theory, which ushers in the era of what Kuhn terms as the revolutionary science. To him therefore, when this paradigm-shift occurs, a revolution has taken place. And that shows how scientific method should be cultivated and the growth of science maintained.

For Feyerabend, the method of science should be “anything goes”. That is, no one theory or method should be accepted in absolute finality. And, in fact, he is against any particular method of scientific investigation. His concern is that any method that works should be accepted as an instrument of scientific growth and enterprise. He accordingly accepts Popper's position that theories are constantly falsified and refined.

To Lakatos, every theory has a protective belt of hardcore elements that define it. In his scientific investigative programmes, Kuhn holds that theories are not to be abandoned like that because there are many research programmes going on simultaneously. In this case, science does not need protection (John, 2006:178). It can protect itself. But those stronger theories can supersede the weaker ones. And even the weaker ones can also pick up at any time and supersede the ones that were previously stronger. Unlike Kuhn, Lakatos holds that there are dormant scientific theories out there to be explored.

From Lakatos' point of view, this means scientific truth or knowledge is incremental. That is, it keeps on revealing. There is nothing like absolute scientific knowledge or truth and that no scientific theory should be rejected as every theory is a potential viable theory. Here it can be said that Lakatos and Feyerabend are scientific realists, that is, “anything goes”. In this case, Feyerabend, in particular, is against scientific method. This is why he is against the “tyranny of science”.

For Quine, theories or methods of science are just empirically underdetermined. That suggests that information that is reached by our senses is the foundation of any scientific method. But in a clever way, he holds that such information is inconclusive and will ever remain inconclusive. Two things should be noted from Quine's opinion: first, scientific knowledge is

necessarily inconclusive. Second, this inconclusivity has and will always transcend the observable entities. In this case both the observed and the unobserved complement each other for a complete method or view of science. This is the instrument for complete knowledge of science.

Furthermore, the controversy that surrounds a scientific methodology is a serious one among philosophers of science. For instance, in the "Postscripts", Thomas Kuhn (186) again argues against any possibility or rational consideration playing any (significant) role in an account of theory-formation. He rather subscribes to subjective, psychological and idiosyncratic feelings as paramount in the process of theory-formation. In other words, scientific enterprise is not guided by any objective, empirical fact or definable method, but rather it is a matter of mere arbitrary activities akin to that of religious show.

In line with Kuhn, Karl Popper (1983:6) denies the possibility of any scientific method. Rather Popper submits that the only thing that exists as "scientific method" is a continuous effort on the part of scientists to refute or falsify existing theories on the basis of some possible or conceivable observations. Hence, this, according to Popper, cannot be said to be a method of science in the real sense of the word. He concludes that they are simply a way of fixing truths and beliefs and provoking their acceptability in the scientific community. But the truth is that even when Popper is trying to deny the possibility of any scientific method, falsifiability criterion is in itself a method of science. No matter the position of different scientists in the methodology of science, the fact is that science has a method and this is not a hidden matter as it manifests in our day-to-day experiences, activities and conversations (Aigbodioh, 25). Also science is not an exercise that is done with imagination devoid of logical rigour, critical analysis and empirical fact, as Kuhn would want us to believe.

COMMENTS

The instrumentalist view on the issue of the cognitive status of scientific theories is a modest and pragmatic view. It clearly rejects that theoretical expressions have ontological underpinnings and satisfied with merely ascertaining what the function of a theory is in the scientific enterprise. (Aigbodioh, 107). Nagel (118) succinctly declares the thesis of instrumentalism thus: "Theories are primarily

logical instrument for organizing our experience and for ordering experimental laws".

Thus, according to the instrumentalist position, scientific theories are not generalized statements about any real observable state of affairs in the world, not about actual relations. Rather, they are concerned with computation rules similar to logical rules of inference, with which we can order and organize human experience. They are therefore said to serve as instrument and technical rules for inferring particular observational statements from others. Again, Aigbodioh has, on the merit and demerit of instrumentalism, observed that

This view of theories has probably attracted more fellowship than any other, although it is beset with a number of apparently insurmountable problems... theoretical expressions do not possess material, informative or descriptive content, but are like dispositional expressions, e.g. "breakable" (as against 'broken') which need not be regarded as meaningless since they can yet be analyzed into truth-functional statements (107, 108).

There are a number of issues that instrumentalism has tackled and which make it very interesting. One of such things is the basic understanding of the pervasiveness of reality. That is to say reality is cumbersome when compared with what lies below phenomena. By this tacit "copoutism", instrumentalism has saved itself from the elusiveness of the real picture of reality. The deficit of this understanding on the logical positivism constitutes a serious mistake. Again, prediction and precision are other important factors that instrumentalism has added to scientific research. With prediction, a researcher is able to put in a hypothetical form to the result he anticipates from the problem he is confronted with. In other words, there is a degree of expectation or result from a certain test carried out by a researcher. This result may be the proposition of the researcher, and if so it follows that the research is a successful one.

From the above, it can be seen that prediction is an asset in scientific investigation. It makes for easy communication of research result. This is to say that prediction helps the researcher not to go into the laborious task of

writing volumes on the outcome of the experiments he has embarked upon. And when the result is coined in a very similar or exact form, it makes for easy reference when the need for the application of the idea arises. Besides, any scientist who wants to make reference to it for further use will do that without much constraint. It is for these and similar reasons that measurement remains paramount in experimental enterprise.

Moreover, it can be deduced that instrumentalism is a mature scientific method because it is only a mature science that exhibits the grounds of its prediction, namely: laws, data and these can be corrected or entirely abandoned if they lead to false projection. However, the general ambition of science tends towards achieving accurate prediction (Ndubuisi, 41, 42). But as earlier observed, there is always a basis, a datum through which a scientific prediction is made.

It must also be mentioned that the thrust of the logical positivism is process or theory standardization (such as observation and confirmation) in order to establish a true picture of reality. But in the case of instrumentalism, the basic thrust of its philosophy is the possibility of a successful prediction of the course of nature. Now, if reality is that which man cannot objectively describe it therefore means that a theory about it cannot be inter-subjectively verified, formulated and confirmed. These attitudes have further complicated the complexities of reality of the logical positivists to successfully formulate and confirm any theory. Thus, instrumentalism has carefully avoided the accuracy of details in the formulation of theories, which constituted a setback to the previous ones. In its place, instrumentalism would bother rather about the basic scientific methodology, namely: predictive efficacy of theories (Ozumba, 68). This predictive ability, to my mind, makes instrumentalism, a better option to preceding and kinship methodologies.

Instrumentalism is ethnomethodological in concept. It does not perceive reality as something far removed from man. Instrumentalism rather adopts the Protagoras' "man is the measure of all things" as its guiding principle. Thus, it cannot be seen as a philosophical non-involvement, because it uses humanistic means to advance science.

Furthermore, instrumentalist's non-involvement in the over-exaltation of theory is a good case to be examined. This is true because theories as we all know only make sense when

they are effectively harnessed for the prediction of the course of nature. It has avoided the tenacity of the logical positivism, which accepted anti-metaphysical theories as a variable key to a systematic interpretation of scientific methodology. This is true because it is free from dogmatism, which stifles scientific progress.

Science, as a rational enterprise, should rely on the instrumentalism in the sense of prediction. This is true because the said prediction will offer useful practical orientation and inter-subjective verifiability. Prediction, in this way will settle puzzles, control nature and any other conundrum of life. This is where instrumentalism is relevant to scientific methodology.

CRITICISMS

Aigbodioh (108, 109) has offered three objections to the instrumentalist view. The first criticism leveled against instrumentalism is that the analogy between a theory and an instrument seems to be misplaced from the standpoint of the scientific programme of inductive experimentalism. Secondly, instrumentalists are being accused of negating the fact that common concepts or theories do not correlate to anything in real life. To the critics, this position by instrumentalists runs contrary to the implicit assumption that scientific theories express relations between properties of existing objects by reference to ostensibly discernible objects. Thirdly, the characteristic of theory as computational rules or rules of inference is considered as a problem. According to the critics, these rules should rather be seen as (explanatory) premises from which conclusions are drawn.

Another problem with instrumentalism is the laborious avoidance of the rigorous attitude before a theory is formulated. This makes instrumentalism both a scientific "dropoutism" and "copoutism". Dropoutism in that it tends to become disengaged with the whole scientific procedures, and copoutism because it has refused the whole scientific investigation, which is by its very nature, committed to the normal scientific means.

Lastly, there is a serious problem with projection. For instance, Horner and Westacott (102) have observed that there is no valid or rational basis for supposing that correlation we have observed in the past will continue in the future. This problem of projection and its assumption had earlier caused David Hume to regard the so-called necessary connection

between two things or events as mere fiction that we foist on nature. Well, this uncertainty problem commonly associated with instrumentalism is not a unique problem of science, but rather an issue constantly relating to the whole human enterprise. Human minds are always too predictive of the future, when, in fact, it is not the case. This is what social scientists would call a psychological necessity, which is not good enough for science. For example: that every President of the United States has been a white male has no necessary correlation between the office and the qualities to suggest any logical prediction for future Presidents of the States. The Obama phenomenon (of 2008) has rendered such prediction meaninglessly useless.

Having seen the objections against instrumentalism and without necessarily going into detailed counter arguments, it is proper to say that the charges against instrumentalism as expressed by a representative spokesman, Aigbodioh, are not altogether groundless. They are caused basically by three factors, namely: lack of a proper understanding of the dynamics of instrumentalism, farcical approach to instrumentalism, and the reflection of contemporary anxieties rather than a deeper examination of instrumentalism.

Having said that, I want to quickly add in summary that the criticisms are not strong enough to weaken instrumentalism; in fact, I see these criticisms as mere academic exercise. They are not substantial enough to effectively affect instrumentalism as a method of science. After all, instrumentalism has openness, one distinguishing mark of a sound scientific method, as its watchword. It is open and receptive to new ideas especially in the face of contemporary, overwhelming and compelling experiences.

Above all, instrumentalism subjects its beliefs to self-criticism and equally, takes in good faith criticisms from others. This is because instrumentalism, as a method of science, appreciates and concretizes the simple fact that philosophical truths are never held in absolute finality, they are very hardly accepted in methodic dogmatism. This, too, shows that the ableness of instrumentalism is not in doubt. It does not also assume that its beliefs are immutable and unchanging. Since scientists are constantly faced with new challenges, instrumentalism, which is meant to serve scientific enterprise better, has equally made its method open to keep pace with new challenges.

Recent global experiences have taught the scientific community the lesson of greater

openness. Instrumentalism as opposed to the largely dogmatic and "authoritarian" posture of many of the methods of science in implementing the present scientific principles is more advantageous. In this circumstance, one cannot pretend that the ideas of scientific methodologies peddled before the advent of instrumentalism are anything to write home about, today. They were formulated in error. Instrumentalists, on their part, have no right to make any scientific methodology sacrosanct by their refusal to reject error. The conceptual and fundamental errors heretofore accepted must be replaced by the instrumentalist view. This is where instrumentalism shares its ideal with realists' thesis.

CONCLUSION

In conclusion, one may say that the entire knowing process is an open-ended, ongoing, and restless activity of human beings. By this time, one may begin to appreciate why such an endeavour is exasperating to many people. It has no "anchor to wind-ward", no absolute to tie to, no quiet harbour of truth where testing can be permanently halted. There is no resting-place where a person can say once and for all, "I know this for sure". The element of contingency and relativity so pervasive in this doctrine is emotionally unacceptable to great many individuals. They cannot stand the strain of open-endedness in the sphere of thought and belief to avoid premature closure of the method of science. And their rejection of this philosophy is in a sense understandable. For instrumentalism is a "tough-minded" outlook. One has to have a thick intellectual and moral skin to manage it. But instrumentalism, like any other philosophic point of view, is interested not necessarily in what is comfortable. The point is that it is interested in the actual situation in which people live: To retreat to "more secure" doctrines is, as William James always put it, "a failure of nerve" (92).

The great advantage of instrumentalism is that it is a method of knowing that is public, available to all. Instrumentalists do not deny private experience; all they say is that it does not produce knowledge. This sort of experience that is common to everyone, testable and warranted is the only kind of experience that is capable of yielding what we call method.

For this reason "community" plays an important role in instrumentalist methodology. Indeed, many instrumentalists speak of the "uncoerced community of persuasion" as the central criterion of truth. Science, one will note, is of this general character; it is open, it has this

public knowing procedure to which many people, in communication with one another, contribute. And there must exist some common persuasion among them before anything can be labeled as a method of science.

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