UNIT 2 HISTORICISM

Contents

2.0 OBJECTIVES

This lesson aims to discuss some of the salient features of Historicism (Social Constructivism) School of Philosophy of Science of the 20th century. The Introduction includes a very brief description of the trends of Historicism in general and how it differs from Logical Positivism in its approaches of doing Philosophy of Science. The following sections seek to familiarize the students with the salient contributions of Kuhn, Feyerabend and Hanson, some of the prominent philosophers of this school. [*Note*: Philosophy of Science in the 20th century can also be divided into Positivist and Postpositivist Schools. However, for our purpose, we divide the latter further into two groups: *Historicism* and *Historical Realism*, Unit 2 and 3, respectively].

2.1 INTRODUCTION

After the World War II most of the intellectuals became disillusioned with humanity's scientific growth. The historical outlook affected many spheres of humanities and new disciplines, like Historical Materialism, Anthropological Historicism, Eschatological Historicism and so on emerged. Historicism, a popular school of thought in Germany by the 19th century, looks at everything in terms of historical developments. Reacting against the normative view of knowledge and cognition of the Enlightenment period, it argues that *life and reality are nothing but history*. Taking the cue from J. G. Herder's *Outlines of a Philosophy of the History of Man* (1784) and G. W. H. Hegel's *The Philosophy of History* (1837), Historicism gives importance to the historical situatedness of each individual consciousness, which is shaped by *socio-cultural contextuality, contingency and perspectival nature of our existence.* Radical contingency is the distinguishing feature of human life. David Roberts maintains that "Our world . . . cannot be stable, centered, self-identical in the way that the metaphysical tradition led us to expect" (1995, 199) and even if we manage to reach the levels of metaphysics or science, we are still within the framework of history and contingency. The popular names associated with this school of thought are Leopold von Ranke, Wilhelm Dilthey, J. G. Droysen, Freidrich Meineckes,

Benedetto Croce and R. G. Collingwood. The powerful critics of historicism are Friedrich Nietzsche, Walter Benjamin, Karl Popper etc. However Martin Heidegger, Edmund Husserl and Hans-Georg Gadamer engage themselves in a constructive approach to the whole ideas of historicism.

The impact of historical outlook towards knowledge enterprise affected philosophy of science also. In the beginning of the 20th century, Logical Positivists (members of the Vienna Circle) and Logical Empiricists (likeminded group from Berlin), insisted that Philosophy of Science should be precise and rigorous giving importance only to the logical and linguistic analyses of the scientific concepts and theories. Positivists like Carnap, Hempel, Reichenbach, Schlick, Popper etc. held scientists as 'little philosophers', incorruptible investigators who are maximally rational and worried about epistemological and ontological issues" (Klee, 1999, 199). But historicists, like Hanson, Feyerabend, Kuhn, Lakatos etc., tried to demythologise the logical positivists' view of science and to arrive at a picture that is more faithful to the actual historical developments and sociological factors of science. In short, one can say: "Hume thought science was inductive and irrational, Popper thought it was non-inductive and rational, and Carnap thought it was inductive and rational", and in contrast to them, "Kuhn seems to argue that science is both non-inductive and non-rational" (Ladyman, 2002, 94).

2.2 HISTORICISTS' CHALLENGES TO LOGICAL POSITIVISM (LP)

a) *Rationality of Science* – LP claims that science is rational, because it strictly follows scientific method (verification or Popper's falsification). But Historicism argues that science is non-rational and there can be many methods in science; *b) Cumulative growth* – Science progresses cumulatively, where the latter theories are the betterment of the previous ones, with more empirical content; such progress is not available in any other enterprise, where knowledge grows only in a rough sense. But for Historicism growth is transformative and latter theories are not necessarily better than the previous ones; *c) Objectivity in Science* - Science is objective, while Historicism shows that science has got both subjective and objective elements; *d) Monopoly of Truth* - Science is the storehouse of truths. Historicism challenged this and showed that other resources are also reliable. *e) Reductionism of science* – All sciences can be reduced to physics, as there is a single set of fundamental methods for all of them. Historicism does not agree with this as there can be different methods for science and reductionism becomes more controversial with more growth in various domains of sciences; *f) Superiority of Scientific theories* - Scientific theories are superior to any other belief system as science is immutable. But Historicism argues that scientific theories do change and there is nothing special about scientific enterprise; *g) Dichotomy between the context of discovery and the context of justification* – This distinction is very important because a hypothesis may arise out of any sort of personal or social consideration, but it has to be justified on the basis of observational evidence; the context out of which it emerges is not relevant to philosophy of science as only its justification matters. But Historicism denies any such dichotomy; *g) Clear Distinction between observational terms and theoretical terms:* LP insists on the distinction of observational terms and theoretical terms (and thereby observational and theoretical statements also). The observational terms can be traced to some sort of observational experiences,

while there is no such observational basis for theoretical terms. However Historicism denies this distinction because there is no 'pure' observation and all observations are theory-laden; *h) Weltanschauung (World view) of the scientists:* According to LP, the value-system, the passion, prejudices and the whole world-view of scientists have no role in science, as the scientists remain above all these elements. Historicism clearly shows that the *Weltanschauung* of the scientists has a crucial role to play in their science, by colouring and controlling the process of science. (*Weltanschauung* can be understood as the totality of background, upbringing, personal preferences, prejudices, and expectations etc. of the scientists); *i) Role of History in Philosophy of Science:* For LP, history of science is not necessary to do philosophy of science, while for Historicism history of science is important to do philosophy of science, because historical factors do play an important role in having an adequate picture of science.

Check Your Progress I

Note: Use the space provided for your answers.

1) What is the importance of historicist approaches in the intellectual enterprises in general and in philosophy of science in particular?

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2) Explain some of the areas where historicist philosophers of science challenge Logical Positivism.

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2.3 THOMAS SAMUEL KUHN (1922-96): SCIENCE– A SOCIAL ENTERPRISE

Kuhn is given the credit of bringing Historicism into the Philosophy of Science. He received his Ph.D. theoretical physics from Harvard University in 1949. Soon he became interested in the history of science. His world-shattering work, *The Structure of Scientific Revolutions* (SSR), in 1962, evoked controversial discussions in extremely diverse fields. It has been translated into twenty languages. In 1956 he joined the University of California at Berkeley; he moved on to Princeton University and later to MIT. He suffered from blood cancer and he died rather young in 1996. Some of his papers both on the history and the philosophy of science are given in *The Essential Tension*, 1977. His ideas can be seen in two broad categories: *Early Kuhn* and *Later Kuhn*, focusing on the

important Kuhnian concepts like *Paradigm, Incommensurability and Theory Choice.*

Early Kuhn (Till late 1970s)

Science - a Cycle of Normal Science and Revolutionary Science**:** Science is basically a long period of *normal science*, occasionally interrupted by crises, which lead to short periods of *revolutionary science*. In the Normal Science period the main preoccupation is puzzle-solving activity. All scientists work as collaborators, not as innovators, applying the known solutions to the problems at hand. When the existing theories get into conflict with the fresh observational data, anomalies arise and mostly anomalies are overlooked. A normal scientist must learn to ignore them, or else she can't carry on with her research: "The scientist who pauses to examine every anomaly he notes will seldom get significant work done" (Kuhn, 1962, 82). But when anomalies grow too many and too strong to tolerate, a crisis sets in, leading to a revolution, where a new paradigm is chosen. Once that is accepted again another period of normal science starts, until anomalies appear, which would ultimately lead to a revolution.

Paradigm - A Primary Concept

Paradigm is almost synonymous with a scientific community, ensuring both the logical and physical closeness. It is a sort of world-view of the community. [E.g. Aristotelian physics, Copernican astronomy, Newtonian physics, Ptolemaic astronomy, the phlogiston and the Oxygen theories of combustion, the caloric theory of heat, particle physics, quantum physics]. *Paradigms are constitutive of science*: Each paradigm has its own problems, its solutions and methodology. It binds the scientists so deeply that the scientists belonging to different paradigms "disagree about what is a problem and what is a solution; they will inevitably talk through each other when debating the relative merits of their respective paradigms" (Kuhn, 1970, 109). *Paradigms are constitutive of meaning*: Paradigms determine the meanings of the terms used in scientific theories. Finally, *paradigms are constitutive of subject matter of discourse*. Within a paradigm there is a strong consensus-thinking. Kuhn demands a very strict adherence to the paradigm on the part of the scientists. They would do anything to be faithful to it, "even in the face of contradictory evidence" (Ladyman, 2002, 119). [Note: With critiques of the notion of paradigm, Kuhn preferred, with his 2nd edition of *SSR* (1970), a *'disciplinary matrix'* to 'paradigm'. The disciplinary matrix includes these important elements: i) symbolic generalizations, ii) models, both ontological and heuristic, iii) values, and iv) exemplars – which are essential for the scientific community to obtain or validate genuine knowledge].

Incommensurability

During revolutionary period scientists suffer from incommensurability (i.e. *communication breakdown*). It arises due to the rejection of an old theory, the changes in the problem-field, the standards of solution and even some of basic scientific concepts. The scientists from both Aristotelian paradigm and the Copernican paradigm may speak of the center of the universe but they mean different realities; for, the former mean the earth, while the latter the sun, which are apart by 150 million KMs. Kuhn says that there is no way in which the communication breakdown can be bridged because the interpreter will have to live in two worlds and he will end up in mental asylum.

The Essential Tension

There is a tension as a scientist essentially needs flexibility and open-mindedness to progress; but at the same time 'convergent thinking' and the rootedness in the given tradition is also needed: "Only investigations firmly rooted in the contemporary scientific tradition are likely to break that tradition and give rise to a new one" (Kuhn 1977, p.227). As the convergent thinking is instilled in the fresh minds through the students' text books, it is very difficult to be innovative as that would go against paradigms. Edwin Hung's analogy of railway tracks: "The rails in one sense constrain the movements of the train, but in doing so guide it smoothly in a definite direction" (Hung, 1997, 358). Being an enthusiastic innovator and a faithful traditionalist at the same time is precisely, as Kuhn puts it, the *essential tension*.

Later Kuhn (Early 1980s Onwards)

In the latter part of Kuhn's career there is a shift to the language considerations of science. From the essays in *The Road since Structure*, a collection of his essays produced between 1970 and 1993, published posthumously in 2000, we learn the four fundamental themes emerging out (Kuhn, 2000, 1-9): i) Science is undoubtedly a cognitive empirical investigation of nature, endowed with a special sort of 'progress'. But this progress is not towards the fullness of truth, but progress in ever-improving technical puzzle-solving ability; ii) Science is basically 'a social enterprise', where the scientists work within the community and only occasionally they move out of it to find solutions for certain anomalies; iii) Modifying the earlier notion of scientific development as a series of long period of normal science, occasionally punctuated by short periods of revolution, now Kuhn maintains that *science is period of development within a coherent tradition divided occasionally by periods of 'speciation'* (like the biological evolution of species of Darwin's theory), into two distinct traditions with somewhat different areas of research; and finally; iv) He distinguishes between *commensurable languages* (where translation is possible, between two languages, and therefore, what is said in one language can be said in another) and *incommensurable languages* (where only paraphrasing is possible between the languages), giving *a linguistic twist to the understanding of incommensurability.*

Theory Choice in Science

When scientists decide from various theories, Kuhn argues that they don't go by rational and epistemic considerations. There is no neutral algorithm or systematic procedure for theory choice, which takes place not only by the shared (or objective) criteria but also by "idiosyncratic factors dependent on individual biography and personality" (Kuhn 2002, 429). The non-epistemic factors are also of philosophical importance. Kuhn identifies five, among many other, important characteristics of a good scientific theory: *accuracy, consistency, scope, simplicity and fruitfulness of the theory.* He thinks that they are individually important and collectively sufficiently varied to make a good choice. Each creative discipline is characterized, among other things, by different sets of shared values. Kuhn prefers to call the shared criteria as *values, rather than rules*. Along with these values there are many personal or subjective criteria shaping theory choice: one's previous experience as a scientist, the duration of her research, extra-scientific persuasions (like philosophical or religious convictions), one's personal preferences, for instance, one may prefer originality to coherence (and therefore

readiness for risks), while another may prefer vice versa and end up not taking risks. Thus an adoption of the new theory cannot be regarded as conscious choice on the part of that person. So declares Kuhn, "*No process quite like choice has occurred,* but they are practicing the new theory nonetheless" (2002, 436; emphasis mine).

Popper and Kuhn

Kuhn, in his paper, "Logic of Discovery or Psychology of Research" (1977), compares and contrasts his views with those of Popper. Some of the commonalities between them: i) both focus on the dynamic nature of science, rather than the strict logical structure of science; ii) both give equal importance to facts and the spirit of actual scientific life and thereby turning to the actual history of science and resulting in similar conclusions; iii) both emphasize the revolutionary process of scientific growth; iv) both reject the cumulative growth of science; v) both of them seriously doubt the possibility of any neutral observation language; vi) both agree that the aim of scientists is to arrive at explanatory theories; and finally vii) both of them give due importance to the concept of tradition in the enterprise of scientific knowledge. However, there are also *dissimilarities between them*: i) Popper makes falsification a regular and frequent occurrence, while Kuhn sees the need for this only at revolutionary periods, which occasionally take place; ii) Kuhn' idea of normal science, where most part of the actual science lies, is missing in Popper's framework; a beginner in science is primarily trained to work in normal science not to throw away the existing theories outright! iii) Kuhn does not agree with Popper's sharp distinction between context of discovery and context of justification; iv) For Popper the method of science is the method of falsification, and Kuhn sees no such single method; and v) For Popper science is non-inductive and rational, while for Kuhn science is non-inductive and non-rational.

Remarks

i) Logically and philosophically Kuhn's ideas may not be very attractive yet they are very persuasive; ii) In Kuhn's scheme paradigm a very important concept, but unfortunately, there is no clear understanding of it. Kuhn is vague and inconsistent with regard to the use of paradigm. Masterman enlists twenty-one various uses of the word in Kuhn's 1962 edition of *SSR*. Also it is not clear about the nature of the influence of the paradigms, whether psychological or logical, upon its members; iii) Kuhn's idea of theory-choice abolishes the idea that science is guided by a scientific method. Given this idea Lakatos labels Kuhn's science as "a matter of mob psychology" (Lakatos, 1970); and iv) Kuhn has been strongly criticized for his Incommensurability, as it is likely to land science in irrationality and relativism. Kuhn at the second phase prefers to look at incommensurability *metaphorically* and in terms of *linguistics*. With the change of theories not all the terms change in their meaning. While most of the meanings remain the same only some of the terms change in their meaning. "The terms that preserve their meanings across a theory change", says Kuhn, "provide a sufficient basis for the discussion of differences and for comparisons relevant to theory choice" (Kuhn 2000, 36), and therefore, "Incommensurability thus equals untranslatability" (Kuhn, 1990, 299). Since there can be no perfect translation, among scientists there is no side-by-side or point-to-point comparison; a scientist has to learn from scratch as a learner of a new language does.

Check Your Progress II

Note: Use the space provided for your answers.

1) Write a short note of Kuhn's notions of: a) Paradigm, b) Normal Science c) Revolutionary Science

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2) Kuhn speaks about *Essential Tension*. What is the tension he refers to? Explain what is essential about it?

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3) "Kuhn's view on theory choice leads to mob psychology in science" – Do you agree with this accusation? Substantiate your position.

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2.4 PAUL K. FEYERABEND (1924 - 94): LIBERATOR OF HUMANITY FROM SCIENCE

Feyerabend was born in Austria, in 1924. His studies (Physics) were interrupted by the World War II, in which he served an infantry officer in the German army. A bullet injury in his spine caused severe damages which troubled him till his death. After the war he switched over to philosophy of science. He spent a year in working with Karl Popper and for the rest of his life he lived in the USA. Strongly criticizing the positivists' view of science, he argued that there science was neither unique nor rational. He propagated this conviction, mainly in his celebrated works: *Against Method* (1975) and *Science in a Free Society* (1978). In this section, his significant ideas regarding the non-rational aspects of science and his sincere invitation to free human society from the clutches of science are presented.

Method(s) in Science Denied

Science is claimed to be rational because of its one (allegedly) special method. But history shows that there is no *the* method, suitable for all the domains of science. Feyerabend shows how Galileo systematically went against each of the rules of the methodological monists and this is a strong sign for the need for *methodological radicalism* and *theoretical pluralism*. Scientists violated the rules and even chose the opposite rules; they ignored the demands of rationality. Often these violations were *factual*, *deliberate* and even *absolutely necessary* for further growth in science. When a new theory is proposed it need not have all the empirical support as theories often obtain clarity only after a prolonged usage. To become empirically successful they need non-rational and non-sensical acceptance in the first place. Theoretical pluralism and methodological pluralism are preferable as they don't impose rigid rules on the scientific community and it is necessary for the growth of science, because, "Variety of opinion is necessary for objective knowledge" (1975, 46).

Epistemological Anarchism – Need not Lead to Chaos!

Anarchism, Feyerabend argues, is a requirement for any intellectual enterprise and he calls himself 'anarchist'. Anarchism may be objectionable in politics but certainly not in epistemology and this epistemological anarchism is needed to give the society the right picture of science. This is the aim with which he wrote *Against Method* (1999, 228). The absence of fixed rules in an anarchistic science will not land science in chaos. We need to trust in the well-ordered nervous system that the humans have developed over the millennia and this will save us from chaos (1999, 230). He does not encourage a chaos-like situation, in both theoretical pluralism and methodological pluralism.

Demands of Empiricism Rejected

Radical empiricism insists upon two conditions – *Consistency Condition* and *Meaning Invariance*. Feyerabend explains them as follows: "i) Only such theories are then admissible in a given domain which either contain the theories already used in the domain, or which are at least consistent with them inside the domain and ii) Meanings will have to be invariant with respect to scientific progress; that is, all future theories will have to be phrased in such a manner that their use in explanations does not affect what is said by the theories, or factual reports to be explained" (1999, p.926-7). He finds serious fault with both these criteria. Episodes from the history of science show that both these conditions have been violated, especially at those crucial points where great scientific revolutions took place; for instance, the relativity theory is shown to be violating both the conditions of consistency and meaning invariance. The first criterion, the *consistency condition,* increases the tendency to retain the older theory even in the face of contradictory observational evidence. A new theory is rejected if it goes against the prevalent theories; thus the age and familiarity become the basis for the theory elimination and "Had the younger theory been there first, then the consistency condition would have worked in its favour" (1975, 36). Against the condition of 'meaning invariance', he maintains that 'contextual theory of meaning', by which, meaning of a term in a theory is determined by the context in which it occurs. For example, gravity was understood as physical force in the Newtonian theory of gravitation, while theory of relativity treats it as geometrical force. This meaning variance aspect leads to incommensurability.

A Strong Version of Incommensurability

Two competing theories are incommensurable. No common standards to evaluate their merits. Positivists argued that with the use of 'statements of purely observational language, uncontaminated by theoretical preconceptions', one can compare two theories. But since there is no pure observation and the meaning of the observation-terms of a theory is embedded in the theory, two theories can never be compared. This fact of incommensurability leads to a strict subjectivity in the realm of theory choice. Since there is no logical way of comparing various theories, we are left only with the "aesthetic judgments, judgments of taste, metaphysical prejudices, religious desires, in short, what remains are *our subjective wishes*" (1975, 285). Thus the notion of incommensurability shakes the claims of rationality in science.

Feyerabend – A Great Humanist

Feyerabend cautions humanity not to be carried away by scientism, the tendency to absolutize science. To ignore science is irrational, similarly to absolutize science is equally irrational. Being taken up by one-sided growth of science lot of harm is done to humanity and environment and therefore humanity is to be liberated from the clutches of science. Throughout his life his he voiced out his deep concerns for humanity and its liberty, in politics, science and in all intellectual pursuits. That is why he wanted the world to remember him basically as a simple and ordinary human being, who valued love the most. He wrote in his autobiography, on 11 February, 1994, just a couple of weeks before his demise: "My concern is that after my departure something remains of me, *not* papers, *not* final philosophical declarations, but love… That is what I would like to happen, not intellectual survival but the survival of love" (1995, 181).

Remarks

i) There are mixed reactions about Feyerabend's contributions. On the one hand, people like Gonzalo Munevar (1991) declares Feyerabend to be most important thinker of the 20th century, while on the other, there are people to call him 'a playful and childish thinker' who allows 'anything' to go (Schnädelbach, 1991);

ii) Feyerabend is against only the traditional understanding of rationality, which ignores subjective or rhetorical elements like judgement, emotions, intuitions, reasonableness etc. But he makes it clear that all these are essential components of scientific progress;

iii) It is encouraging to see that he does not reject metaphysics as meaningless. Not only the theoretical terms, but even the observational terms need theoretical background to understand. As Newton-smith has it, "… it is not that our observational judgments may have an ideological component, our observational judgments have no components that are not ideological" (1996, 139). That is why, Feyerabend is also convinced that "*a good empiricist must be a critical metaphysician*" (1998, 944).

iv) True, big scientists have produced very important theories by violating the well-cherished rules of their times and all scientists are not always rational in all the matters. But only a few that too the trend-setters of modern science fit Feyerabend's description; as Laudan says, "It is not scientific charlatans

he is describing; rather… the figures he is writing about have always been considered as the folk heroes of our scientific culture" (Laudan 1989, 302), like Kepler, Copernicus, Galileo and Einstein, who come across as persistent 'cheaters' in the game of science, as they always seem to go counter-inductively, just not bothering about even the glaring falsifying evidence. Violation of rule is only an exception and but to make this exception a rule, that science always progresses, or has to progress this way, is a far-fetched claim. [Laudan's analogy: Just because a few cases of cancer spontaneously got cured without any medication, can one say, cancer does not need any treatment at all? Further, "To move from the alleged failure of two or three methodological rules to the presumption that all methodologies are hopeless is *to engage in just that sort of naïve inductivism about which he is otherwise so abusive*" (Laudan, 1989, 305-306)].

v) Feyerabend's idea of strong incommensurability is also problematic. If two theories don't have any point of comparison at all, we will not even know that they are completely different. Shapere proposes 'the chain-of-reasoning connections' between successive theories and the usages of the terms in them, which help us to compare them. At successive stages some properties or the other of the terms are dropped or added for specific reasons (Shapere, 2001, 199). For instance, from the times of Faraday and Thomson till today's quantum theory the idea of electron has changed greatly, but still we know that all these have been referring to something called 'electron'. The continuity and comparability of the usage is not due to some common descriptions or common reference, rather, "the rationale for saying that we have referred to the same thing all along is given by the linkage of reasons which gives continuity to the history" (Shapere, 1989a, 429) and thus incommensurability can be softened.

Check Your Progress III

Note: Use the space provided for your answers.

1) Write a short note on 'Epistemological Anarchism".

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2) What are the two major conditions of the Classical Empiricism that are challenged by Feyerabend? Explain.

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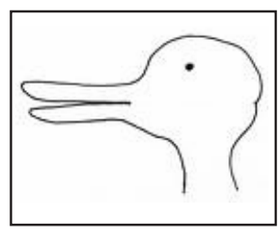
2.5 NORWOOD RUSSELL HANSON (1924-67): CHAMPION OF THEORY-LADENNESS OF OBSERVATION.

N. R. Hanson, an American philosopher, a versatile personality – a baseball player, a heavyweight boxer and trumpet player, a daring fighter plane pilot and a creative writer in philosophy and history of science - served as a marine fighter during the World War II. He had his studies in Chicago, Oxford and Cambridge. He became the first university lecturer in philosophy of science. He has made significant contributions to the fields of philosophy of science, history of science, epistemology and aerodynamics. His well-known work, *Patterns of Discovery* (1958), clearly argued for the theory-ladenness of observational account. His eventful life was tragically cut short by a plane crash on a mountain near Cortland, New York, with ten of his books in progress.

The Relevance of 'The Context of Observation'

Hanson challenges the views of Logical Positivism (LP) in his very important book, *The Patterns of Discovery*. LP, focusing only on the finished products of science, seems to pay no attention to the *context of discovery*, as they think only the *context of justification* is important for philosophy of science. But Hanson argues that since all observations are theory-laden, this distinction between the contexts cannot be very sharp. He explains it with an example: Kepler and Tycho Brahe watch the sunrise; as Kepler believes in heliocentric universe and Brahe believes in the geocentric universe, do they see the same sun or different things? Traditional people would say, following the sensory core theory, that both see the same thing but interpret it differently but Hanson argues that both see two different things. For, interpretation is part and parcel of observation and 'seeing' already involves conceptions and theoretical frameworks (1967, 4-5).

Hanson explains this better with the examples employed by Wittgenstein in the *Investigations*; for instance, the picture of duck/rabbit or faces/vase. Seeing a picture as rabbit and seeing the same picture as a duck amounts to seeing two things. In seeing as such there is no interpretation involved. The change from rabbit to duck takes place fast and spontaneously. What changes is the organization of what one sees. 'The organization is neither an element in the visual field nor anything that registers on the retina; rather it is the way in which elements in the visual field are appreciated'. Such an appreciation involves theories. Thus what we see is influenced by the theories we hold. Hanson argues, therefore, that *seeing is always seeing that* and 'that' is something depends on the background one has. It is not the eyes or the camera that see things, but the people see and they always see with background theories and "there is more to seeing than meets the eyeball" (Hanson, 1998, 341).



Causality is Theory-laden

Hanson denies the traditional, metaphysical type of cause-effect relationship. Following Hume, Hanson sees causal relationship as psychological, with no necessary connection between them. Causality is human way of understanding the functions of nature, rather than a feature of nature itself. We find causality a

convenient tool to explain natural phenomena, to simplify and facilitate inferences. The causal connections are limited to rare and accidental happenings. Causes are found with effects, not because of some cosmic bonds that keep them together, but because our theories connect them.

Logic of Discovery

After careful analyses of case-studies in history of science, Hanson comes out with a pattern of discovery: To solve a problem at hand, first a workable hypothesis is proposed. This must fulfil some expectations, like it must have initial plausibility for solving the problem, be coherent with the existing background assumptions, logical and empirical methods of testing. So for him the logic of discovery is 'inferring novel hypotheses' from problematic situations. He agrees that discovery of hypothesis involves ingenuity, creativity, insight and imagination but along with these psychological factors, there are also some logical aspects involved in the process of proposing a particular hypothesis. There are some reasons to propose hypothesis, *A*, rather than *B*. Testing a hypothesis is different from 'plausibility considerations' which help us to decide whether to propose a hypothesis or not. So the plausibility is also determined based on some evidence. For instance, to explain the velocity of Mars, Kepler considered a non-circular orbit, rather than taking into account the colour of Mars or the presence of other planets etc. He rejected many such factors, and decided upon the orbit of Mars as a plausible hypothesis. To choose this one as a plausible one, he had some reasons, not just psychological factors.

At the time of proposal, one cannot demand 'true' hypothesis, but one can look for 'plausible conjectures'. There is a distinction between 'reasons for accepting a hypothesis' and 'reasons for proposing the hypothesis in the first place'. To show that the context of discovery is not purely ruled by psychological factors and there are reasons to show why a particular hypothesis is considered worthy of testing, following C. S. Peirce, Hanson proposed *logic of abduction*, which investigates the norms used in checking whether a hypothesis is worth considering. [*Abduction* refers to the process of arriving at an explanatory hypothesis for a case at hand; we deduce *P* (e.g. it has rained) from *Q* (e.g. the ground is wet), because *P* is sufficient (or almost sufficient), but not necessary for *Q*. Peirce describes this kind of logical inference as 'guessing', that comes prior to induction and deduction].

Remarks

i) Hanson stirred a lot of controversy and debates in the philosophical and scientific circles, though he could not gain disciples. He seems to be more interested in critiquing others rather than developing his own system of well-thought out logical systems. ii) If Hanson treats causality as mere conjunctions as Hume does, he has to answer all the objections raised against Hume; for instance, how to differentiate accidental conjunctions and more regular law-like relationships between cause and effect? iii) Regarding the logic of discovery, he seems to have mistakenly conflated plausibility arguments (which help us to choose one from many available hypotheses) with discovery as such. Further, though it is meaningful to distinguish the 'plausibility considerations' in proposing a hypothesis from the procedure of confirming it; but it is not clear whether they are merely subjective prejudices and psychological beliefs of the scientists and whether or not they have any legitimate role in science. So, though he gave us the patterns of scientific discoveries, he could not work out logic of discovery.

Check Your Progress IV

Note: Use the space provided for your answers.

1) "Observation cannot be separated from interpretation". Discuss this claim with reference to Hanson's ideas on observation.

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2) What is the 'logic of discovery' of Hanson. Do you agree with it? Explain.

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2.6 LET US SUM UP

Historicist philosophers of science have challenged the rational and objective picture of science, proposed by the logical positivists. Kuhn, Feyerabend and Hanson and others argue that no methodology or criteria for rationality is to be thrust upon science; rather they emerge from the actual practices of the scientific community. They insist on the need for socio-cultural, historical and moral factors to understand science and to do philosophy of science. However, with this approach, one may make science totally relative and irrational if one is not cautious. This is perhaps taken care of by the historical realists (See: Unit 3), who treat science as social enterprise while upholding its rational character as well.

2.7 KEY WORDS

Incommensurability : It simply means 'communication breakdown'. Since historicists stress the 'contextual theory of meaning' of the terms in a scientific theory, they argue that the followers of different scientific paradigms suffer from the problem of incommensurability in understanding each other.

Theory-ladenness of observation : There is no 'pure' observation; no observation is theory-free. Human observation is not like the recoding by an instrument. It is not that we see something and then interpret, but our seeing itself involves interpretation, as our seeing is coloured by our background theories. It is not that 'eyes' see, but 'we' see.

2.8 FURTHER READINGS AND REFERENCES

Anderson, G. *Criticism and the History of Science: Kuhn's, Lakatos' and Feyerabend's Criticisms of Critical Rationalism.* Leiden and New York: Brill, 1994.

Brown, H. *Rationality*. London: Routledge, 1988.

Feyerabend, P. *Against Method.* London: New Left Books, 1975.

———————— *Philosophical Papers*. Vols. 1 and 2. Cambridge: Cambridge University Press, 1981.

———————— "How to Be a Good Empiricist – A Plea for Tolerance in Matters Epistemological." in *Philosophy of Science – The Central Issues.* Ed. Martin Curd and J.A. Cover. New York & London: W. W. Norton & Company, 1998.

Friedman, M. "Kuhn, and the Rationality of Science." in *Philosophy of Science.* Vol. 69 (2002). 171-190.

Gutting, G. Ed. *Paradigms and Revolutions. Applications and Appraisals of Thomas Kuhn's Philosophy of Science.* Nortre Dame, IN: University of Nortre Dame Press, 1980.

Hanson, N. R. "Notes Toward a Logic of Discovery." in *Perspectives on Peirce: Critical Essays on Charles Sanders Peirce*. Ed. Bernstein. New Haven: Yale University Press, 1965. 43–65.

———————— *Patterns of Discovery.* Cambridge: Cambridge University press, 1958. Also New York: Cambridge University Press, 1967.

———————— *What I Do Not Believe, and Other Essays*. Ed. Toulmin and Woolf, (Dordrecht: Reidel, 1972).

———————— "Observation." in *Introductory Readings in the Philosophy of Science.* Ed. E.D. Klemeke. Et al. New York: Prometheus Books, 1998.

Horwich, P. Ed. *World Changes - Thomas Khun and the Nature of Science*. Cambridge, MA: MIT Press, 1993.

Hoyningen-Huene, P. *Reconstructing Scientific Revolutions: Thomas S. Kuhn's Philosophy of Science*. Chicago: University of Chicago Press, 1993.

Klee, Robert. Ed. *Scientific Inquiry – Readings in the Philosophy of Science.* New York: Oxford University Press, 1999.

Kuhn, T. S. *The Structures of Scientific Revolutions.* Chicago, IL: University of Chicago Press, 1970.

———————— *The Essential Tension - Scientific Tradition and Change.* Chicago, IL: University of Chicago Press, 1977.

———————— "Remarks on Incommensurability and Translation." in *Incommensurability and Translation: Kuhnian Perspectives on Scientific*

Communication and Theory Change. Ed. Rema Rossini Favretti. Et. al. Cheltenham, UK: Edward Elgar, 1999. 33-37.

————— *The Road Since Structure: Philosophical Essays.* Ed. James Conant and John Haugeland. Eds. Chicago and London: University of Chicago Press, 2000.

————— "Objectivity, Value Judgment and Theory Choice." in *Philosophy of Science – Contemporary Readings.* Ed. Yuri Balashov and Alex Rosenberg. London & New York: Routledge, 2002.

Ladyman, James. *Understanding Philosophy of Science.* London & New York: Routledge, 2002.

Lakatos, I. "Falsification and the Methodology of Scientific Research Programmes." in *Criticism and the Growth of Knowledge.* Ed. by Lakatos and I. Musgrave. Cambridge: Cambridge University Press, 1970.

Lakatos, I. "Popper on Demarcation and Induction." in *The Philosophy of Karl Popper.* Ed. Paul Arthur Schilpp. La Salle, Illinois: Open Court, 1974.

————— and E.G. Zahar. "Why Did Copernicus's Programme Supersede Ptolemy's?" in *The Copernican Achievement*. Ed. R. Westman. Los Angeles: University of California Press, 1976.

Laudan, L. *Progress and its Problems.* Berkeley: University of California Press, 1977.

Schnädelbach, Herbert. "Against Feyerabend," in *Beyond Reason.* Ed. Gonzalo Munevar. Netherlands: Kluwer Academic Publishers, 1991. 433-448.

Roberts, D. David. *Nothing But History: Reconstruction and Extremity after Metaphysics*. Berkeley: University of California Press, 1995.

Salmon, Wesley. "Rational Prediction." in Martin Curd and J.A. Cover. Eds. 1998. 433-444.

Shapere, Dudley. "Evolution and Continuity in Scientific Change." *Philosophy of Science.* 56 (1989a). 419-437.

————— "Reasons, Radical Change and Incommensurability." in *Incommensurability and Related Matters*. Ed. Paul Hoynjingen-Huene and Sankey. Netehrlands: Kluwer Academics Publishers, 2001. 181-206.

Stove, D. *Popper and After: Four Modern Irrationalists.* Oxford, Pergamon Press, 1982.