

## ON THE THEORY DEPENDENCE OF OBSERVATION

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Some philosophers suggest that the influence of the observer's theories or beliefs on observations is critical; the theories interact fundamentally either with the objects of perception or with statements concerning those objects. The suggestion develops to the conclusion that the naive empiricist really is a little naive in aspiring to test his theories about the world by making observations of it. Champions of this view are plentiful, and their arguments and philosophical origins diverse — even so the standpoint is untenable. The interesting arguments have been refuted conceptually and empirically by Kordig and Shimony (see Kordig (1971), Shimony (1977), and see also Sheffler (1967), Dretske (1969), and Suppe (1974)). Yet despite these criticisms the view still has widespread acceptance — it is, for instance, argued by Brown and by Chalmers in their very popular introductions to the philosophy of science (Brown (1979) and Chalmers (1976)).

This paper is intended to be another refutation, this time by stressing the public aspect of observation.

The account of perception favoured here is the Critical Realism popularized by the American Pragmatists: there are enduring objects in the world, and it is these that are perceived although not always as they are and not always directly. In terms of the traditional dichotomy, which critical realists do not approve of, it is the material objects which are perceived and the sensations or sense data are the means by which this is done. With this view most statements about the observable and the true objects of perception are fallible. Not only does the individual perceive public objects, but also he can use observation to make judgements on public states of affairs. The English language has a convenient set of constructions that allow a boundary to be drawn. Let us introduce the notion of a set of

personal observation statements for an individual : it is the set of factual statements  $p$ , describing public states of affairs, such that the individual can truly assert 'I observe that  $p$ '. In many cases the constructions 'I perceive that  $p$ ', 'I see that  $p$ ', or 'I hear that  $p$ ' would serve equally well to pick out some of the  $p$ 's. A threefold claim is being made on behalf of a personal observation statement : that  $p$  is true, that the individual has made some observation, and that, given the knowledge of the individual, the observation made warrants the assertion of  $p$ . The statements are public in content and fallible — the truth of  $p$  is open to all, and that a statement is a personal observation statement is at best a conjecture. Each of the personal observation statements is true and so they are consistent one with another. But while the sets of personal observation statements are consistent, they will not in general be coextensive because no two observers will possess the same knowledge. To amplify. Say A and B are people and  $p$  a statement : conjunctions of the form *A sees that  $p$  and B does not see that  $p$*  will be common and often true, whereas conjunctions of the form *A sees that  $p$  and B sees that  $\text{not-}p$*  can never be true. The latter conjunctions are ruled out by a conceptual desideratum arising from the usual philosophical distinctions between knowledge, belief and truth and the properties ascribed to them (in particular that a proposition can be known only if it is true and no proposition can be both true and false).

It is assumed then that the objects in the world produce the sensations that we have. In contrast, our thoughts are not produced by the objects or sensations, at least not in a regular way. Yet the thoughts do bear some familiar controlling relations over the perception of objects. These relations usually concern selection among the manifold of objectives. A perceiver sometimes notices what he expects, sometimes fails to notice what he expects, sometimes notices what he does not expect and sometimes does not notice what he does not expect. There is no hint in these commonplace occurrences that the expectations in any way affect the objects or their properties.

Many modern philosophers of science — Hanson, Brown, Kuhn, Chalmers, and Feyerabend, for instance — have been tempted to supplement this empiricism. What they wish to add is the view that what a person believes affects either what is in the world or the truth value of statements concerning the world. There is a vagueness here that Suppe has drawn attention to (see his (1974) p. 192). Two views should be distinguished : one, that the objects one

observes, and their properties, are constituted in part by what one believes, and two, that the objects one observes, and their properties, are independent of the observer's beliefs, yet what kind of objects they are observed to be, and the properties they are observed to have, are determined in part by what one believes. View one is false — it asserts a near causal interaction between thought and perceptual object so that apparently mere belief should be able to change the world. There is truth in view two, but, as will emerge from the present paper, the truth in it would be expressed better by stating that what the objects are observed to be and what properties these objects are observed to have depends on part on what the observer *knows* (not on what the observer believes).

Hanson writes :

Let us consider Johannes Kepler : imagine him on a hill watching the dawn. With him is Tycho Brahe. Kepler regarded the sun as fixed : it was the earth that moved. But Tycho followed Ptolemy and Aristotle in this much at least : the earth was fixed and all other celestial bodies moved around it. *Do Kepler and Tycho see the same thing in the east at dawn ?* (Hanson (1969), p. 5)

And he answers, in a slightly different context :

It is only right that I announce straight away that my inclination is to say "No, the two astronomers do not see the same thing." (Hanson (1969b), p. 63)

He argues that there is a sense in which they do see the same thing and one in which they do not, and that the important sense for science is the one in which they do not. Put crudely the reason is that the two astronomers have different beliefs or knowledge about the sun and this leads them to see a different thing.

The suspicion is that if they see a different thing there will be at least one proposition which is genuinely true for one of them while false for the other : they will live in different worlds. Presumably the two observers think they see different things. Then logic alone demands that at least one of their beliefs is false or both are true. One observer's belief being mistaken poses no problem — we all on occasions think we see something which is reality is not there. Should both beliefs be true there are two possibilities. Maybe

one observer fails to see some of the things which are there — again a common happening; or the world is populated by different things for the different observers — there are alternate realities. Hanson's thesis is either the trivial one that sometimes we make mistakes about what is there or do not notice all of it, or the highly non-trivial one that there are alternate realities. And alternate realities have the immediate consequences that truth is relative and that 'rival' theories are incommensurable.

What should be said is that the two observers see the same public object but are able to produce non-coextensive sets of personal observation statements concerning it. They both see the sun; yet there will be facts or negative facts that one notices and the other does not. Hanson has sympathy with this view on occasions, but at heart he disagrees with it. He makes *seeing* very private, and relates *seeing that* to belief not knowledge: he simply does not give enough weight to the public and objective aspects of *seeing* and *seeing that*.

Hanson must be countered by emphasizing the public elements. The observer is not the sole authority on what is seen because he may not be able to identify what he sees or he may misidentify it. Say a typewriter is placed on an empty desk and an observer unacquainted with typewriters passes it in response to the request to pass the object which he sees on the desk — the observer sees a typewriter although he does not know what it is that he sees. Saying what is seen is in part saying what the seen object is; and we all can play a role in determining what something is — indeed to identify an object we may use extensive knowledge and use senses other than sight.

Hanson would disagree. In his books *Perception and Discovery* and *Patterns of Discovery* he presents cases in which it seems that the observer has a privileged status and further in which it seems that the observer has some influence through his beliefs on what is seen. His argument appeals to Gestalt and child-puzzle diagrams, and centres on the variation of views as to what these diagrams depict. For example, he discusses the viewing of a standard mathematical illustration of a cube and asserts that some see a wire-edged frame where others see a perspex cube, and Hanson further states that there is no preferred identification of what is seen. There is a subtle suggestion here which later develops into a misleading analogy. No one sees a perspex cube or a wire-edged frame, at best they see only a drawing of a wire frame or a drawing of a perspex cube — Hanson consistently confuses objects with drawings of objects.

Wire-edged frames cannot be perspex cubes, and if we were in real doubt as to which an object before us was we could easily settle the matter by trying to touch one of the faces; but drawings are a different case. Saying what a drawing depicts is demanding and there may even be a subjective sense of depiction in which this depends on the beliefs of the viewer and his cultural setting. It is here that the false analogy is manifested. There is the implicit suggestion that the relation between a picture and what that picture represents is similar to that between a visual experience and what that visual experience is of. So that, to use again uncomfortable terminology, the sense data, which are the immediate objects of perception, are melded by the beliefs or culture of the viewer into the material objects, which are the mediated objects of perception. The analogy should be resisted — seeing a depicted wire-edged frame in a diagram is not much like seeing a typewriter on a desk. These mistakes of Hanson are illustrated in his conclusion on the seeing of objects :

besides considering slightly bizarre examples ... like reversible figures and shifting-aspect figures, we may that in certain important respects the seeing of ... X-ray tubes, bicycles — indeed, the seeing of most of our familiar material objects — consist in part of this element ... [of recognizing]. (Hanson (1969b) p. 111)

He simply nowhere discusses the seeing of material objects, he considers only drawings of X-ray tubes, bicycles, and material objects. He then leans toward the private by writing of recognizing :

So too we can ask what sorts of things must have taken place for a man *to be* described as seeing a bicycle, or seeing an X-ray tube, or a spirochete; unless a person had had at least one visual sensation and knew what a spirochete was, *he* would not say that he had seen a spirochete. (Hanson (1969b) p. 112, Italics added)

The muddle is obvious. The first part of the sentence concerns what has to happen for a man to be described as seeing a spirochete; and the second, the argument, concerns what has to happen for him to be able to say that he had seen a spirochete — but if the man cannot recognize spirochetes he will not be able to say what we can.

There is a complication that perhaps should be mentioned.

Psychologists introduce "higher-order variables" such as patterns and with these the observer must recognize them in order to see them (though he may not be able to articulate suitable labels of identification). Fortunately much of the discussion of the seeing of public objects can proceed without detailed consideration of the seeing of patterns, the seeing of facts, and the like.

Hanson has an independent line of argument which also leads to the conclusion that the observer has some influence through his beliefs on what is seen. He quotes Duhem :

Enter a laboratory; approach the table crowded with an assortment of apparatus, an electric cell, silk-covered copper wire, small cups of mercury, spools, a mirror mounted on an iron bar; the experimenter is inserting into small openings the metal ends of ebony-headed pins; the iron oscillates, and the mirror attached to it throws a luminous band upon a celluloid scale; the forward-backward motion of this spot enables the physicist to observe the minute oscillations of the iron bar. But ask him what he is doing. Will he answer 'I am studying the oscillations of an iron bar which carries a mirror'? No, he will say that he is measuring the electric resistance of the spools. If you are astonished, if you ask him what his words mean, what relation they have either to the phenomena he has been observing and which you have noted at the same time as he, he will answer that your question requires a long explanation and that you should take a course in electricity. (Hanson (1969) p. 16)

And Hanson continues :

The visitor must learn some physics before he can see what the physicist sees. Only then will the context throw into relief those features of the objects before him which the physicist sees as indicating resistance.

This obtains in all seeing ....

The infant and the layman can see: they are not blind. But they cannot see what the physicist sees; they are blind to what he sees. (Hanson (1969) p. 17)

Thus far the argument is not sinister. It is a slightly metaphorical

description of a point that is simple and true of all observers in perceptual situations. The physicist and the layman see exactly the same material things : they see an experimenter, a workbench, voltmeters, coils of wire, and so on. The physicist identifies these and also sees that the experimenter is measuring resistance; the layman does not. They both see him measuring resistance, but only the physicist sees that he is. This metaphorical passage can be stated in a less acceptable form, as Brown does :

there is thus an important respect in which the layman and the physicist see different things when they observe the same experiment (Brown (1979) p. 83)

The reasoning here is similar to the quantification into propositional attitudes. If a person knows that  $p$ , we may infer that there is something that he knows; but if a person sees that  $p$ , should we existentially quantify over the  $p$  and infer that there is something that he sees? Maybe it is clearer to regard facts as not being among the things which are seen. In the quote from Brown the word 'things' operates as a transmogrifier. There is a sense in which the physicist and the layman see different things — namely, that in which they see that non-coexistentive sets of statements are true. But the dominant sense is that in which they see the same things — namely, that in which they see the same objective producers of sensations.

Should we choose to employ Hanson's and Brown's idea of facts being among the things which are seen there would be no special problem but for their further insistence that *seeing that* is related to belief not knowledge. In effect this means that strictly it is not objective facts that are among the things which are seen, but rather the subjective externally projected beliefs. Their view seems to be that if you see an object you also see that the object has all the properties that you believe it to have. This idea has nothing to recommend it : it deviates from our notion of personal observation statements in obliterating the belief, knowledge, truth distinctions and apparently means that a person's beliefs could never be confounded by what he saw. It is better to stay with the standard conceptual distinctions under which, for example, if a motorist sees a red traffic light and believes that it indicates his right to proceed, he does not see that he has the right to proceed he merely thinks he sees that he has the right.

Brown's strategy when arguing in his book *Perception, Theory*

*and Commitment* is to consider a disjunction : either there are theory-free perceptible facts or there are partially theory-determined observations, and to criticize the first option and argue for the second. He writes :

Rather than observations providing the independent data against which we test our theories, fundamental theories play, a crucial role in determining what is observed, and the significance of observational data is changed when a scientific revolution takes place (Brown (1979) p. 10)

An open question is whether the theories are supposed to affect the constitution of the sets of observable statements or whether the theories are thought to change the truth value of particular statements members of those sets. When a scientist makes observations in connection with a theory that he holds does the truth of the observation statements depend on that theory or is their truth independent of it ? The latter covers two cases : being independent of the theory but dependent on other theories, *theory-neutral*, and being independent of all theories, *theory-free*. The theory-neutral view is common, and the theory-free view rare. With good reason. Observation statements are uncertain : they are open to revision in the light of further observation : they forbid some future observational possibilities : they have a 'theoretical' aspect. (Attention is usually drawn to this feature by the phrase 'observations are theory-laden'; a clearer expression would be 'observations are fallible'.) What this all amounts to is that Brown's criticisms of the theory-free view should not be taken as evidence in favour of *his* theory-dependent position. Only Brown's positive arguments need be considered.

Brown's thesis is :

that the knowledge, beliefs, and theories we already hold play a fundamental role in determining what we perceive. (Brown (1979) p. 81)

And his argument starts with the everyday example of the seeing of a typewriter. But it has been pointed out already that knowledge, beliefs, or theories of the specific token objects of perception are not a prerequisite for perceiving those objects — seeing typewriters is independent of typewriter theories. Brown would probably admit

this. He uses the example to discuss what is required :

in order to see that this object is a typewriter. (Brown (1979) p. 81)

The interest is in *seeing that*, not merely *seeing*, and indeed you must be able to identify typewriters in order to see that an object is one. Brown writes :

what we learn by observing [the scientist] is not determined solely by what he is doing but also depends on what the observer already knows. An observer who lacks the relevant knowledge will not gain the same information by watching the experiment as will a trained physicist. (Brown (1979), p. 83).

Exactly so, what an observer learns depends in part on what he *knows*. Yet further reading reveals that Brown really thinks that what an observer learns depends in part on what he *believes*. Brown writes :

In terms of the information they had available ... when Kepler saw the sun, he saw the stationary centre of the universe around which the earth revolved. Brahe, on the other hand, saw a celestial body which moved around the stationary earth. (Brown (1979), p. 94)

Kepler may have believed *p* while Tycho believed its contradictory; but Kepler and Tycho never knew contradictory propositions. As an independent point consider the skills required by Kepler and Tycho to produce a visual identification of the sun. Kepler's theory that the sun is the stationary centre of the universe will not be part of these identificational skills; this conjectured property cannot be seen and so visual identification will bypass it completely. So too for Tycho's theory — every personal observation statement strictly tied to vision will be theory-neutral between the theories of Kepler and Tycho. Brown occasionally forgets that his main line of argument concerns statements and facts, and then makes bold assertions about things. He offers an example which originates with Hanson :

Consider two microbiologists. They look at a prepared slide; when asked what they see, they may give different answers.

One sees in the cell before him a cluster of foreign matter : it is an artefact, a coagulum resulting from inadequate staining techniques ... The other biologist identifies the clot as a cell organ, a 'Golgi body'. As for technique, he argues : 'The standard way of detecting a cell organ is by fixing and staining. Why single out this one technique as producing artefacts, while others disclose genuine organs ? (Brown (1979) p. 83)

Brown asks :

What do the scientists disagree about ? Do they disagree about what they see or only about the proper description of something which they both see ? (Brown (1979) p. 83)

He chooses the former and reasons :

If we accept the latter alternative, it follows that the undescribed thing which both scientists see plays no role in scientific knowledge nor in the resolution of scientific debates. It is the described or theory-laden percept that the two biologists are arguing about; even if we were to concede that there is some theory-free datum that both perceive, no further observation of this datum would be relevant to the resolution of the disagreement. (Brown (1979) p. 83)

But say two physicists are looking at the spectrum of an element and one thinks that it is of element A and the other of element B. Does it follow that the two physicists see different things ? No, they both see the same spectrum and their disagreement is over how to identify it. Does it follow that the undescribed thing which both scientists see plays no role in scientific knowledge nor in the resolution of scientific debates ? No, the so-called undescribed thing has been identified, perhaps as a spectrum; this identification is theory-neutral between the theory that it is of element A and the rival that it is of element B; and this theory-neutral thing will have properties and these, if seen, may well resolve the dispute. Does it follow that no further observation of the theory-neutral datum would be relevant to the resolution of the disagreement ? No, the disagreement may well be resolved by further observation; the physicists may decide that the only difference between a spectrum of A and one of B was a faint line of a particular wavelength, and then they would return

to the theory neutral datum and look at it more carefully. Our biologists may well settle their disagreement by further inspection of the image.

Some of the suggestions concerning the theory dependence of observation have their origin in Kuhn's *The Structure of Scientific Revolutions*. There Kuhn writes :

the historian of science may be tempted to exclaim that when paradigms change, the world itself changes with them. (Kuhn (1982) p. 110)

And :

In so far as their only recourse to that world is through what they see and do, we may want to say that after a revolution scientists are responding to a different world. (Kuhn (1962) p. 110)

As an example, in 1769 Lexell proposed that some astronomical observations were of the planet Uranus and not of stars or a comet as had been previously thought; Kuhn writes :

When that suggestion was accepted, there were several fewer stars and one more planet in the world of the professional astronomer. A celestial body that had been observed off and on for almost a century was seen differently... (Kuhn (1962) p. 114).

Again :

as a result of discovering oxygen... Lavoisier saw nature differently ... Lavoisier worked in a different world. (Kuhn (1962) p. 117).

And :

Until that scholastic pendulum was invented, there were no pendulums, but only swinging stones for the scientist to see. Pendulums were brought into existence by something very like a paradigm-induced gestalt switch. (Kuhn (1962) p. 119).

Kuhn's idea is to place the scientist in the world of the scientist's beliefs. When the professional astronomer believes in a planet Uranus, he is in a world in which there is a planet Uranus, presumably it is also true for him that there is a planet Uranus; and when seeing Uranus he sees what is in his world a planet. This flies in the face of orthodox philosophy. Philosophers know full well that people may believe whatsoever they wish; that is why philosophers introduce the higher standard of truth. Bare beliefs may be produced by will; but will alone cannot produce true beliefs; they need the appropriate state of the world in addition to the state of the agent. Ordinary philosophy is richer than Kuhn's proposal and it has the advantage of not allowing the creation of empirical truth by wishing. Further Kuhn is confused about the difference between what the world is like and what we think, say, or believe it to be like. Take the suggestion that pendulums were brought into existence with the proposal of the paradigm or theory which covered them. This is absurd. Scientists use their theories not only to predict, but also to retrodict. Consider the geological and dating arguments that invoke the earth's rotation — would Kuhn really wish to assert that all such methods are invalid since the earth's rotation was "brought into existence" in the sixteenth century by Copernicus's theory that the earth rotates and that "there were no" earth rotations before then?

Chalmers, another philosopher influenced by Hanson, makes a new and subtle use of the material in his book *What is this Thing Called Science?* His aim is to refute the view that there is an infallible observational base and specifically that, in the case of vision, the visual experience is determined solely by the light rays impinging on the retina. While Chalmers's general intent is to be lauded, some of the details need comment.

Chalmers appreciates that the Gestalt diagrams are diagrams, and he uses them to show that the visual experience does not depend solely on the incoming light rays — the light rays are the same for the different observers and yet one viewer can have a visual experience of, say, a rabbit picture while another has a visual experience of a duck picture. What is being argued about here is new. Chalmers is discussing the product sensations rather than the producing objects. The distinction should be emphasized. Chalmers writes:

What an observer sees, that is, the visual experience that an

observer has when viewing an object, depends in part on his past experience, his knowledge and his expectations. (Chalmers (1976) p. 23)

The phrase 'What an observer sees' has different denotations for the contrasting philosophical styles. Chalmers thinks that 'What an observer sees' is a visual experience, the view adopted in this paper is that we do not see visual experiences, rather we have visual experiences and see some of things, events, happenings, qualities ... One of Chalmers's examples may serve to clarify the topic :

In a well-known experiment, subjects were shown playing-cards for a small duration of time and asked to identify them. When a normal pack of cards was employed, subjects were able to accomplish this task very successfully. But when anomalous cards were introduced such as a red Ace of Spades, then, at first, nearly all subjects initially identified such cards incorrectly as some normal card. They saw a red Ace of Spades as a normal Ace of Diamonds or as a normal Ace of Spades. The subjective impressions experienced by the observers were influenced by their expectations. When, after a period of confusion, subjects began to realise, or were told, that there were anomalous cards among the pack; they then had no trouble identifying all the cards shown to them, anomalous or otherwise. *The change in their knowledge and expectations was accompanied by a change in what they saw, although they were still viewing the same physical objects.* (Chalmers (1976) p. 23, italics added)

The playing cards do not change, it is only the subjective experience that is supposed to change.

The interpretation of this and similar experiments bears investigation. A distinction among the subjective experiences is needed. One can calculate what is available to be perceived simply by applying the laws of optics to the objects present. These may be called, following Hirst (1959), the theoretically apparent properties; so that in the above experiment a red Ace of Spades would be theoretically apparent (were it held up for long enough). Then there is how the object actually appears to the perceiver, the actually perceived properties. Chalmers's suggestion is that expectation causes the observer to alter the theoretically apparent red Ace of Spades

into an actually perceived red Ace of Diamonds. That may be. But misidentification when given brief exposure to ambiguous cues is not in itself good evidence for this hypothesis. Surely misidentification does not always amount to actual perception of a wrong object. And time plays a curious role in this experiment. On the face of it Chalmers may have the same difficulties as Locke — if the observer really is having an actual perception of a red Ace of Diamonds what in his visual experience causes this perception to be lost and revert to a red Ace of Spades as the exposure is prolonged? (For a more detailed treatment, see Shimony (1977)).

If Chalmers's point is that the theoretically apparent properties and actually perceived properties do not match, then lengthy argument is not needed. A concussed rugby player with double vision is unexciting proof (and also unexciting proof that visual experience depends in part on the observer's past experience).

The prospect of basing common sense knowledge, let alone science, on actually perceived properties is bleak. (It is one of philosophy's failed programmes.) But Chalmers thinks that the variability of actually perceived properties is of great significance for science; he quotes Polanyi :

Think of a medical student attending a course in the X-ray diagnosis of pulmonary diseases. He watches, in a darkened room, shadowy traces on a fluorescent screen placed against a patient's chest, and hears the radiologist commenting to his assistants, in technical language, on the significant features of these shadows. At first, the student is completely puzzled. For he can see in the X-ray picture of a chest only the shadows of the heart and ribs, with a few spidery blotches between them. The experts seem to be romancing about figments of their imaginations; he can see nothing that they are talking about. Then, as he goes on listening for a few weeks, looking carefully at ever-new pictures of different cases, a tentative understanding will dawn on him; he will gradually forget about the ribs and begin to see the lungs. And eventually, if he perseveres intelligently, a rich panorama of significant details will be revealed to him : of physiological variations and pathological changes, of scars, of chronic infections and signs of acute disease. He has entered a new world. He still sees only a fraction of what the experts can see, but the pictures are definitely making sense now and so do most of the comments made on

them. (Chalmers (1976) p. 24 quoting Polanyi (1958) p. 101)

And Chalmers takes this to be a description of "the changes in a medical student's perceptual experience when he is taught to make a diagnosis by inspecting an X-ray picture" (Chalmers (1976) p. 24). Chalmers and Polanyi may be right for in their terms the medical student is in the world of his own perceptual experiences and so as he learns to actually perceive more his world changes. But it may well be that in terms of the public world of science the student does not enter a new world — all that happens is that he learns to notice more in *unchanging* photographs and he learns the significance of what he does notice.

Feyerabend has had two views on the philosophy of observation and it is only the first that is related to the points under discussion. His earlier work defends a Hanson-type position (derived ultimately from Wittgenstein) in which change of belief means change of perceptual object, but later this idea is explicitly repudiated (Feyerabend (1965b) p. 247) and instead a greater role is assigned to the exploitation of the fallibility of perceptual judgements expressed in language (Feyerabend (1975)).

In 'Problems of Empiricism' Feyerabend writes concerning the partial dependence of perception on belief :

What we receive from the outer world (and from the so-called "inner world") are certain clues, which most of the time are pretty vague and indefinite. Perception is the result of the reaction of the total organism to these clues. In this reaction, the knowledge acquired, the beliefs held, the emotional condition of the receiver, his fears and his expectations, play a most important role. It is these that are (partly) responsible for the formation of well-defined wholes out of indefinite patterns of stimuli.

Just consider the appearance of a lake on a bright summer day. There are small areas of brightness where the sunlight is reflected from the wave crests, and these areas are separated by a darker background. At some places, a well-defined shadow seems to fall upon this ever-changing pattern of extreme brightness and darkness. These are the clues. Yet what we see is something very different. We see a continuous, uninterrupted surface and a boat travelling along on this surface. The objects

seen, the lake and the boat, are fairly independent of the details of the arriving pattern, which means that the tendency to perceive a well-defined objective situation may make the observer see things that are not really there. (Feyerabend (1965) p. 220)

and he continues :

Initially unrelated impressions are combined into wholes, and the belief bringing about the combination will lead to the perception of objects even in cases where many of the constituent impressions are missing. This is how a belief may give a well-defined outline to what is perceived only vaguely, indistinctly, by a person lacking it. (Feyerabend (1965) p. 220).

The suggestion seems to be that we perceive *private* objects. The sentence :

The objects seen, the lake and the boat, are fairly independent of the details of the arriving pattern ....

is revealing. Such an assertion would be true and uninteresting if the 'objects seen' denoted the public objects, the lake and the boat; the 'objects seen' have to be the private objects, the visual experience of the lake and the visual experience of the boat. Feyerabend's theory is that there are no real actually perceived private objects, but only actually perceived atoms which are formed by belief into actually perceived objects. To paraphrase it. What we really perceive immediately and directly are unrelated impressions or appearances and these are formed into actually perceived wholes with the aid of our beliefs; the indirect or inferred private objects of perception are unrelated impressions glued together by belief. In terms of the earlier distinctions there is the theoretically apparent moving boat on the lake, but in truth no one actually perceives it, they actually perceive only changing patterns of colours and belief does the rest.

This theory is common in psychology and in philosophy a version was popularized by Hume. And the objections to it are well known. One, the sheer regularity of our experience makes it implausible to assume that the constructed wholes are free creations from the atomic impressions; a better assumption is that the atoms must be associated in certain ways (maybe thanks to God, maybe

thanks to external objects producing them, ...); belief alone cannot be the glue. Two, much of visual experience seems to proceed from the whole to the parts -- you have a visual experience of a moving boat on a lake then, if you really concentrate on detail, you may have a visual experience of wave crests or shadows ... Finally, the everyday occurrences under point two receive scientific expression in the results of the Gestalt school.

Feyerabend believes that he has evidence in favour of his account of the psychological workings of subjective visual experiences :

The theory of the dependence of perception upon belief is by no means as fanciful as it may appear to a radical empiricist. That primitive people, whose life is governed by a powerful myth, live in an observational world very different from our own is shown by their art. It has been assumed for some time, no doubt under the influence of empiricism, that the "primitive" character of these productions is due to a lack of skill : these people live in the same perceptual world as we do, but they are unable to produce adequate copies of it. This assumption has been refuted. One element of the refutation consists in showing that the primitive artist may on occasion exhibit a quite considerable skill, but that he refuses to use this skill for the creation of what we are inclined to call a "realistic" picture. (Feyerabend (1965) p. 220)

The proposed connection between art and the dependence of perception on belief is none too clear. It seems to be : we draw our visual experiences well (using our artistic conventions ?), primitives draw their visual experiences well (using their artistic conventions ?), our drawings are different from their drawings, therefore our visual experiences are different from their visual experiences; further their life is governed by a powerful myth, therefore the difference in the visual experiences results from this belief system, therefore visual experiences depend on belief. Much could be said here, but to be brief : -- if a modern and a primitive draw the one rhinoceros, the public object (the rhinoceros) will be the same for both, the theoretically apparent properties will be the same, the actually perceived properties (the visual experiences) will be very similar maybe with slight differences, the drawings will be different mainly because the artistic conventions differ. A similar case with

components of seeing, believing, and drawing is that of the students in a biology examination who are required to identify a prepared organ and draw it — those who recognize the organ tend to produce a drawing similar to the illustration in the text book whereas the drawings of those that do not tend to be like the given organs. The true objects of perception are the organs and each of these changes not at all as a result of being recognized. Identification may change the visual experiences, but not a lot: recognition may provoke intense scrutiny and this may reveal fine detail which is believed to be there, broken lines may be enriched into continuous ones if that is what they should be, irrelevant aspects of the visual experience will be given less attention maybe even causing them no longer to be experienced, and so on. It is the drawing that will introduce major changes. The students are trying to draw the organ (*not* the visual experience) and the ones that have effected recognition are in a better position to do this by selecting and ‘fudging’. The students that have failed to recognize the organ are much more in the position of an artist — they must either try to draw their visual experiences or the unidentified object of their visual experience. No matter what, the drawings that the examiner surveys will not be a good guide to each student’s visual experiences. Feyerabend does not establish his thesis: “that primitive people live in an observational world very different from our own is shown by their art”.

To sum up. There are related subjectivist, idealist, and phenomenalist themes appearing here and there in the works of philosophers who espouse the theory-dependence of observation. The theses concern epistemology and ontology, and they are subjective and bind together origin and justification.

*The epistemology of observation :*

1. The subject experiences sensations from one organ, and there is a belief-enhanced disposition to aggregate this input stream in certain ways.

2. The disposition is displayed when the subject makes an observation statement, and so cognitively the observation-statements are about belief-coalesced sensations originating from one sense-organ.

3. The sole authority on the truth of an observation statement is the subject who asserts it; since it concerns his beliefs and sensations and he has privileged access to these.

4. The sole evidence for the truth of an observation statement is ultimately the single sensation or sensation set.

5. The possibility of a genuine disagreement is slim since the observation statements are subject relative; disagreements are usually apparent for the subjects generally turn out to be talking about different things.

*The ontology of observation* ' .

6. There are subjects, sensations, and beliefs; and no public objects independent of these.

All these theses are false. A mistake frequently made in epistemology is taking the objects of thought or knowledge to be ideas or sensations of the world. This leads to solipsism. We do not think only of our ideas and perceive only our sensations : we think about and perceive the world. Subjects perceive public objects by individually experiencing sensations often by means of many of the sense organs. These objects are fairly independent of the perceiver : they would be there even if there were no perceivers, they are not changed by being thought about, they are not changed by being talked about, they are not altered by having theories expressed about them, they are not affected much by being perceived,s... So much for metaphysics. This critical realism conflicts with the views of some philosophers of science. There are the belief philosophers : Kuhn, Brown, Hanson, and Wittgenstein. For them the world is the world as you believe it to be, and if you see an object you see that the object has all the properties that you believe it to have; there is not one world, there are as many worlds as there are believers with different beliefs. They are just mistaken. To quote Santayana :

Looking at the moon, one man may call it simply a light in the sky, another, prone to dreaming awake, may call it a virgin goddess; a more observant person, remembering that this huminary is given to waking and warning, may call it the crescent; and a fourth, a full-fledged astronomer, may say (taking the aesthetic essence before him merely for a sign) that it is an extinct and opaque spheroidal satellite of the earth, reflecting the light of the sun from a part of its surface. But all these descriptions envisage the same object — otherwise no relevance, conflict, or progress could obtain among them.

What that object is in its intrinsic and complete constitution will never be known by man : but that this object exists in a known space and time and has traceable physical relations with all other physical objects is given from the beginning : it is given in the fact that we can point to it. If it did not so exist and (as sometimes happens) we were suffering from a hallucination, in thinking we were pointing at it we should be discoverably pointing at vacancy; exploration would satisfy us of that fact, and any bystander would vouch for it. But if in pointing at it we were pointing to it, its identity would be fixed without more ado; disputes and discoveries concerning it would be pertinent and soluble, no matter what diversity there might be in the ideal essences — light, crescent, goddess, or satellite — which we used as rival descriptions of it while we pointed. (Santayana (1920), p. 172)

Then there are the modern traditionalists like Chalmers and Feyerabend who hold, in the spirit of Locke, Berkeley, and Hume, that we perceive sensations; they couple this with the premise that beliefs can affect sensation to reach the conclusion that our theories affect what we perceive. They are right that belief can affect sensation, but wrong that we perceive sensations; and there is no evidence whatsoever that beliefs can change objects. To move on to statements. There is no special preliminary to the entertaining of an observation statement, it is riteless; and the statement concerns public objects and their properties. There is no sole authority on the truth of an observation statement, just as there is no sole ultimate evidence for its truth. The statement is a conjecture which may be subjected to many and varied tests; success at these may constitute evidence in its favour. Finally, and most importantly, genuine disagreement is possible.

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