Preliminary Exploration of Hanson's Idea of "Theory-laden Observation"

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Abstract: According to the traditional view, observation is neutral, unrestricted by theory, and theory depends on observation. However, Hanson's theory-laden observation, his Thematic Framework model, points out that observation depends on theory, that theory infiltrates observation, that theory determines the purpose and object of observation, and that observation must be guided by correct theory. Observation, as Hanson sees it, is a process of brain activity: it is not only the reception of information, but also the action of understanding and categorizing that information. Therefore, observation is naturally related to the observer's background, life experience and psychological set. Different observers may draw different conclusions about the same process by nature of the differences in their life experience.
***Keywords*:** observation, infiltration, theory, thematic, framework

Introduction

Our elders have always taught us to observe carefully, think seriously and practice diligently. Such doctrine indicates that the processes of observation, thinking and practice are totally separate.

But don't you think when you observe? Is observation truly detached from thinking? If thinking can be obviously separated from action, can action really be separated from thinking? It was not until I came across Hanson's concept of Theory-laden Observation that my mind was opened and I came to really find the answers to such questions.

1. The origin of "Theory-laden Observation"

In 1959, Norwood Russel Hanson published *Patterns of Discovery*. In this book, Hanson puts forward his ideas about Theory-laden Observation, which has later come to be known as the Thematic Framework model. In this book, he posits that the existing theoretical background affects perception, and that there is no pure observation unaffected by theory. Therefore, "perception" is, as he says ,"theory-laden". This model points out that any observation is not totally objective, and observers with different background will perceive the same object differently; That is to say, the "language of the neutral observation" which is completely independent of theory does not exist, and thus that any observational statement is riddled with theoretical factors in varying degrees no matter how much the observer may try to avoid them. According to the view, observation depends on theory; observation infiltrates theory; theory determines the purpose and object of observation; and observation must be guided by correct theory. [1]

The traditional view had held that theory depends on observation, while observation is uninfluenced by theory. This view is rational in its own way: through observation and experimentation people can verify a hypothesis; by comparing the experimental results and the hypothetical inference, the original hypothesis is supported or nullified. However, this long held view failed to explain many circumstances in this day. Thus, in response to this inconsistence, Hanson proposed his concept of "Theory-laden Observation", suggesting that neutral observation does not exist, and that any observation is permeated with theoretical factors in varying degrees.

So, when we observe something, what type of theories will permeate our perceptions? Hanson tells us that we "see" with our eyes which are formed by past experience and knowledge and are influenced by logical forms of any language and symbols. Thus any statement regarding an observation is constructed based on some kind of theoretical model, which, in turn, provides the language for observation.

To better understand Hanson's model, we can consider the following three cases. In the first case, some observational statements use theoretical terms. It is impossible to understand these observations without scientific background. In the second case, there are many concepts in daily life, which are, in fact, theoretical terms created by scientists in the process of exploration. They have been widely used in daily life for so long that they have become common sense and that people have forgotten their origin. In the third case, although there may be no theoretical term in an observational statement, the meaning of the statement is still based on some theory that has been formed by common sense over the course of a lifetime, and is thus connected with the observer's background. In the third case, under the guidance of different theories and beliefs, different

descriptions and statements could be made. [2] Therefore, the concept of "Theory-laden Observation" could be generalized in all things prescient to observation, including the individual's background knowledge, beliefs, preferences and predilections.

2. How theory works on observation

So, how do theories affect observation? Logical positivism holds that people first see something objectively, and then form a certain conceptual framework or model through information processing in mind. Hanson, however, points out that this is not the case. When people observe a something, they do not perceive passively, but rather consciously apply it to a conceptual model in their minds, so as to adapt the new information into something familiar. This process, therefore, causes different individuals to have different reactions to the same object. Hanson finds it necessary to recognize the differences between physical process and mental activity. "Seeing" (that is, observing) is not only a physical process; it also includes a visual-experience element (that is, a kind of psychological process). The influence of the individual's background "theory" on observation is not additive after "seeing," but rather simultaneous with the physical response to a visual stimulus.

Hanson points out that perception is not just the process of receiving information, but also a process of processing information by the brain. Therefore, perception must be related to the observer's background knowledge, life experience and psychological state. Different observers, therefore, may draw different conclusions about the same process due to the fundamentally different nature of their lifetime's experience. "Observation," therefore, is a subjective process, which requires the observer's brain to make use of the observer's previous frameworks, theories and ideas. One of the characteristics of scientific observation is that it is built upon various ideas, frameworks and theories. Therefore, scientific observation cannot be regarded as completely objective and neutral. An observation is neutral only when it is purposeless, excluding all the subjective elements. Since scientific observations always have a purpose, they are naturally permeated by some subjective ideas. Scientific research generally follows a structure of "Conjecture – Experimental verification"; even the "Observation – Conclusion" structure also includes conjecture, the hypotheses. Hypotheses cannot be arbitrarily created as they are based on some previous theory or observation in order to ensure the rationality of the hypotheses itself, which guides the implementation of experiments. It is obviously improper to just make random assumptions and perform purposeless and ill-designed experiments.

In his work, Hanson gives an example in the field Physics: if the two famous astronomers Kepler and Tycho watched the sunrise at the same time, how would they feel? Kepler held a heliocentric theory while Tycho insisted on geocentrism. They came to the conclusion diametrically opposed to one another. When they saw the sunrise in the East, they saw a completely different scene: Tycho saw the sun rising from the East, and the ground was motionless; Kepler, on the other hand, saw that the sun did not move. For him, earth rotated around the sun so that we see different appearance of sun at different time. From this example, we can see that different theories applied to the same object of observation would lead to different conclusions.

As human beings we tend to use familiar language to observe and understand things around us. A classic example in Psychology is the "Duck-Rabbit Illusion" created by Jastrow and put in his book *Facts and Fiction in Psychology*. The image is an ambiguous picture which could be interpreted as either the head of a duck facing one way, or the head of a rabbit facing the other. Experiments have shown that if you put this figure in front of a group of children, they might say, "this is a duck's head!" But, after a while in a different situation they might say, "this is the head of a rabbit!" This observation of children holds, not just for the Duck-Rabbit Illusion, but for all images. At one time, a figure may be to them one specific thing, but in different times and in different situations that same object will appear to them to be something else. "The Duck-Rabbit Illusion" is a typical example of Gestalt psychology. It shows that the whole determines the nature of the part, and the part is meaningful only when it depends on the whole. As for philosophers, they used this figure to illustrate the relationship between perception and cognition. For example, according to Wittgenstein, if the same object can be regarded as two different things, it shows that perception is not pure sensory feeling. Observational statements are loaded with concepts, which are the combination of experience and thought. [3] Here perception can be understood as observation and concept as theory.

The modern neuroscientific research has shown that specific or general perception has plasticity, and that the formation of perception is affected by the interaction between the perceiver's brain and their environment. [4] A person's life, thus, basically determines the scope and manner of a person's perception of a visual stimulus. When human beings observe a thing, they always regard it as what they expect to see. The expectation here is exactly what the past experience has given them. So in this instance, when someone who has never seen a duck is shown the "Duck-Rabbit Illusion," he will certainly not see a duck head in the image.

Kurosawa's famous movie *Rashômon*, from 1950, also demonstrates this understanding to a certain extent. In the film, a samurai warrior and his bride have a fateful encounter with a bandit, while passing over a barren mountain, leaving the

warrior dead and his wife molested. When the case is investigated, several characters: the bandit, a wood-cutter, the samurai's wife and the samurai's ghost had broadly differing recollections of the events. When they give their stories they each try to cover their crimes and make themselves less guilty while casting aspersions on the others. Naturally the audience knows the truth because this is a movie, and the audience has seen what happened. But in real life, there are many things we cannot see, just as the characters in the film could not see them, and thus we can perceive an example of "Theory-laden Observation" in practice.

3. What can the concept of "Theory-laden Observation" teach us?

Let us first consider the advantages of observation which is based upon theory. Firstly, when observing, if the observers are guided by theories which express the objective essence of things, then their observations are much more likely to be objective to a larger extent. Secondly, observation based upon theory can help us remember and judge things correctly according to their types. Thirdly, the knowledge and experience we, as observers, have accumulated can save us time and effort, giving us access to mental heuristics (*i.e*. when we already know about something and how it works, we don't need to spend more time to explore, develop hypotheses, undertake observations, and perform experiments in the practice of science and engineering for instance, because we already understand the principles which govern this kind of thing when we meet a new one). Thus, when we learn we must grasp the basic principles of the various disciplines and make flexible use of them.

There are a range of disadvantages to relying on inherent theories in our observations as well, and these may lead to poor judgement on the part of observers. Consider the facts. In this age, everything is changing and, with the interconnectedness of the world, more information is becoming available at an ever-increasing rate. Relying too heavily on this kind of previous knowledge, or on (what may have become with the passage of time) outdated views may restrain people's thought, and it may sometimes cause them to make mistakes. Worse still, these views or theories may even become prejudices, and hinder societal and scientific innovation and progress. For instance, many teachers tend to instill students with certain templates and shortcuts to help them succeed in examinations. There is no denying that these shortcuts are helpful in achieving high scores in exams. However, as Goethe said, "Grau, teurer Freund, ist alle Theorie, Und grün des Lebens goldner Baum." Restraining themselves in such templates, students will lose the ability to innovate and solve problems by themselves. Such education is becoming meaningless in a modern society which is increasingly dependent on innovation and creativity.

Finally, religious belief has a strong influence on people's observations. Religion is a universal feature of human kind that is found across all societies and thus all observations have their own unique features based on the tenets of the observers faith (or lack thereof). As Schleiermacher said, "The essence of religion is neither thought nor action, but intuition and emotion. It wants to see the universe directly and listen attentively to the appearance and activities of the universe itself." [5] As a unique way for human beings to grasp the world and life, religion fully embodies the subjective initiative of humanity and the reaction of the spiritual to material. Its influence on life is mainly manifested through the study of doctrines and repeated rituals. Through this form of study, people gradually allow the concepts and spirit of religious belief to infiltrate their human values and behavioral frameworks. Thus, over time, it becomes a new force shaping the psychology and personality of believers. The power of this religious faith often infuses people with "sacred goals" and provides them with a foundation for their lives. It can help them to understand things such as emotion, intentions, aspirations and actions in a way which will guide them to constantly reflect and shape themselves. This constant reflection thus then allows believers to improve, realize and eventually surpass themselves. So, it is important to consider whether we have allowed religious belief to infiltrate our observations? Or if not religious beliefs, then other unscientific ideologies? In view of the strength of religious belief, it is necessary to examine whether religious belief has underpinned an observation and its interpretation.

In conclusion, Hanson's Theory has provided us with a more advanced way of thinking about the world than the traditional, straight-forward views of logical positivism, and it provides us with the tools and a vision with which to examine an increasingly complex world. It helps us to understand that perception cannot be determined by the objective thing itself, but rather it is related to the environment and the culture in which it is seen and the nature of the observer themselves. Therefore, with the understanding of the concept of Theory-laden Observation, we should try our best to grasp the theoretical knowledge of the natural, social, and cultural sciences, to guide our study, work and life in a way which is least effected by our own biases.

References

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