

Theories and their implications to understanding Scientific and Behavioral Concepts

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ABSTRACT: *This paper portrayed the importance of scientific theories in understanding the concepts of psychological phenomenon. The researchers reviewed relevant information as regard to the advantages that can be derived from theories. It becomes a clear problem in academic environment that students find it very difficult to review theories effectively to explain issues. More so, they restrict theories to chapter two of their report not knowing that theories can be use to elaborate almost every part of scientific report. This paper ironed out these issues and further proffers possible solutions as regard the problems raised.*

Keywords: *psychology, theory, model, observation, testability.*

1. INTRODUCTION

Every psychological phenomenon demands theoretical baseline for effective understanding. Researchers overtime gave different opinion as to what theory is all about. Some define theory as empirical evidence of information that has been tested repeatedly. While some viewed it as a body of rules, ideas, principles, and techniques that applies to a subject, especially when seen as distinct from actual practice¹. Theory is also define as an assumption or system of assumptions, accepted principles, and rules of procedure based on limited information or knowledge, devised to analyze, predict, or otherwise explain the nature or behavior of a specified set of phenomena and abstract reasoning.

Every theory shares the element of science. During scientific investigations, scientists put together and compare new discoveries and existing knowledge. In most cases, new discoveries extend to what is currently accepted, providing further evidence that existing ideas are correct. For example, in 1676 the English physicist Robert Hooke discovered that elastic objects, such as metal springs, stretch in proportion to the force that acts on them. Despite all the advances that have been made in physics since 1676, this simple law still holds true. Scientists utilize existing knowledge in new scientific investigations to predict how things will behave. For example, a scientist who knows the exact dimensions of a lens can predict how the lens will focus a beam of light. In the same way, by knowing the exact makeup and properties of two chemicals, a researcher can predict what will happen when they combine.

Sometimes scientific predictions go much further by describing objects or events that are not yet known. An outstanding instance occurred in 1869, when the Russian chemist Dmitry Mendeleev drew up a periodic table of the elements arranged to illustrate patterns of recurring chemical and physical properties. Mendeleev used this table to predict the existence and describe the properties of several elements unknown in his day, and when the elements were discovered several years later, his predictions proved to be correct. In science, important advances can also be made when current ideas are shown to be wrong. A classic case of this occurred early in the 20th century, when the German geologist Alfred Wegener suggested that the continents were at one time connected, a theory known as "continental drift".

At the time, most geologists discounted Wegener's ideas, because the Earth's crust seemed to be fixed. However, following the discovery of plate tectonics in the 1960s, in which scientists found that the Earth's crust is actually made of moving plates; continental drift became an important part of geology. Through advances like these, scientific knowledge is constantly added to and refined. As a result, scientific theories give us an ever more detailed insight into the way the world around us works².

1. THEORY AS A CONCEPT AND ITS LITERAL MEANING.

As used in science, "theory" does not mean the same thing as it does in everyday life. A theory is not a guess, hunch, hypothesis, or speculation. It is full-blown³. A theory is built upon one or more hypotheses, and upon evidence. The word "built" is essential, for a theory contains reasoning and

logical connections based on the hypotheses and evidence. Thus we have Newton's theory of gravity and the motion of planets, Einstein's theory of relativity, the germ theory of disease, the cell theory of organisms, plate tectonics (theory of the motion of land masses), the valence theory of chemical compounds, and theories of evolution in biology, geology, and astronomy. Also in social sciences with courses like psychology, there are theories that help to explain phenomenon like personality, perception, attitude, therapy, behaviour etc. These theories are self-consistent and consistent with one another.

Construction of good theories is a major goal of science. Scientific theory can be wrong, as shown by experiment or observation, since one of its hypotheses might be wrong, the reasoning might be flawed, or new data might come along that disagree with it. Alternatively, its validity might be limited (as are some of those listed above). Therefore, in science, a wrong theory is modified, discarded, or replaced. This has happened, for example, in physics with the caloric theory of heat and the theory of the aluminiferous ether, and in chemistry with the phlogiston theory of combustion.

Theories are at the heart of practice, planning, and research. Theories powerfully influence how evidence is collected, analyzed, understood, and used; it is practical and scientific to examine them. Hypotheses are explicit, but when theories are implicit their power to clarify or to confuse, and to reveal or obscure new insights, can work unnoticed. Theory presents a systematic way of understanding events, behaviors and/or situations. A theory is a set of interrelated concepts, definitions, and propositions that explains or predicts events or situations by specifying relations among variables. The notion of generality, or broad application, is important. Thus, theories are by their nature abstract and not content- or topic-specific. Even though various theoretical models of health behavior may reflect the same general ideas, each theory employs a unique vocabulary to articulate the specific factors considered important. Theories vary in the extent to which they have been conceptually developed and empirically tested; however, "testability" is an important feature of a theory. As Stephen Turner has noted in his chapter on "Theory Development," social science theories are better understood as models that work in a limited range of settings, rather than laws of science, which hold and apply universally.

Statement of Problem

Over the years, the researchers observed that students find it very difficult to use theories effectively in their reports and all this bounce back to lack of knowledge of the importance of theories. It was also observed that students restrict theories to chapter two of their reports not knowing that theories can be used in almost every part of their reports. Students tend to be more interested in practical, real-world relevant topics and show little passion for the underlying theoretical concepts. Additionally, many students have

difficulties in understanding scientific theories and theoretical questions. The problems become apparent in two areas: perception and interpretation. Problems of the first kind include students' difficulties in identifying and stating the essence of a theory, resulting from an inability to distinguish between major and minor points, even when the key points were identified. Problems of the second kind can arise in the form of a lack of competence with a scientific point of view. That is to say, many students who are enthusiastic about the content of a special theory are not able to control their enthusiasm and evaluate the content according to scientific criteria. Quoting Kurt Lewin's (1935) famous maxim "There is nothing as practical as a good theory" letting students experience the need for good theories, which are an essential part of science may be better⁴. This paper is out to correct these limited impression students have on theories.

Qualities of a Good Theory

Psychology as a science involves the application of scientific procedures and approaches in an attempt to understand human behaviour. Science is as much an attitude as a collection of methods. As an attitude, it insists on precision, consistency, and replicability. The methods resulting from this attitude consists of rules intended to eliminate subjectivity, bias, and the influence of random factors so that we can have confidence in the conclusions of scientific research. One way of conducting scientific research is the experiment but there are several other scientific methods. Science is a collection of methods and attitudes that relate directly to how we discover and accumulate 'facts' (i.e. providing knowledge). However, in psychology it is perhaps too strong a word to use since the word fact implies a degree of certainty and accuracy that is not always possible in psychology where 'facts' are simply observations of events, behaviors or relationships.

Science insists that these observations be made under controlled conditions so that the same observations can be made by anyone, i.e. they can be replicated. Facts (or observations) would be of limited value to psychologists if they were not organized, summarized, and simplified. That is where theory comes in. A theory is a collection of related statements whose principal function is to summarize and explain observations. Formal theories, must be tested, i.e. it is not enough to believe that a psychological theory is true for all important observations and relationships. It must be demonstrated that it is actually true. Some theories are more useful than others because they reflect the facts observed. Some theories do not reflect the facts very well.

According to Bell (1978) a theory is good if it accurately reflects observations, is expressed clearly, is useful for predicting as well as explaining, lends itself to practical applications, is consistent rather than self-contradictory, is not based on numerous assumptions (unproven beliefs) and is thought provoking and provide satisfying explanations⁵. The most useful theories are those that not only serve to

explain observations but also to predict events. A theory that fits the facts better would lead to predictions that are more accurate. The reviewers deduced that a good theory should possess the following qualities: A good theory makes its inapplicability promptly and unambiguously known, a good theory approximates objects, not their relationships, a good theory tells you what it cannot tell you and a good theory rapidly makes new predictions from old predictions.

Differences between Theory and Model

Before we go into the importance of theories and their implications to understanding concepts, it will be necessary for us to expatiate between model and theory. According to Halvorson (2012) a model needs to possess three mapping features thus model is based on an original and reduction feature, a model only reacts to a (relevant) selection of the original's properties⁶. Pragmatic feature and a model need to be usable in place of the original with respect to some purpose. The rest two features are covered simultaneously if one speaks of a model as a projection" as this implies both something that is projected (the original) and that some information is lost during the projection. Of course, exactly what information is dropped by an activity called abstraction and what is retained depends on the ultimate purpose the model is going to be used for. The third feature can be further elaborated by detailing what the pragmatic use of the model is.

According to Gray (1993) a model is information on something (content, meaning) created by someone (sender) for somebody (receiver) for some purpose (usage context)⁷. A model is like a pattern or a blueprint, it is a representation of how things are or how they can be or should be. We could also say that a model is an organized set of beliefs about something important. Models can be very specific and concrete, and they are often included in, or derived from, theories (e.g. models of atomic structures or memory systems). Models can also be very general, e.g. A model that represent all our beliefs and assumptions about human nature. In this sense, each of us has implicit models that govern our view of the world and guide our beliefs and our behaviour. Psychological models are essentially metaphors, i.e. they are more likely to suggest what humans *could* be like (e.g. "humans behave as though they were like this or that") and not what they *are* like (e.g. "humans are this or that").

Accordingly, models, like theories, should not be judged in terms of their accuracy but rather in terms of their usefulness. A theory - or a model- is neither right nor wrong, it is simply more or less useful⁸.

Importance of Psychological Theories

There are numerous psychological theories that are used to explain and predict a wide variety of behaviors. What exactly is the purpose of having so many psychological theories? These theories serve a number of important purposes.

Theories provide a framework for understanding human behavior, thought, and development. By having a broad base of understanding about the how's and why's of human behavior, we can better understand others and ourselves⁹. Theories create a basis for future research. Researchers use theories to form hypotheses that can be tested. Theories are dynamic and always changing. As new discoveries are made, theories are modified and adapted to account for new information.

Theory goes hand in hand with practice. While it is quite easy to get results from uncontrolled practical experiments. Theory will be able to determine what contexts are necessary for predictable results. A scientific theory summarizes a hypothesis or group of hypotheses that have been supported with repeated testing. If enough evidence accumulates to support a hypothesis¹⁰, it moves to the next step known as a theory in the scientific method and becomes accepted as a valid explanation of a phenomenon. When used in non-scientific context, the word "theory" implies that something is unproven or speculative. As used in science, however, a theory is an explanation or model based on observation, experimentation, and reasoning, especially one that has been tested and confirmed as a general principle helping to explain and predict natural phenomena¹¹.

Any scientific theory must be based on a careful and rational examination of the facts. In the scientific method, there is a clear distinction between facts, which can be observed and/or measured, and theories, which are scientists' explanations and interpretations of the facts¹². Scientists can have various interpretations of the outcomes of experiments and observations, but the facts, which are the cornerstone of the scientific method, do not change. A theory must include statements that have observational consequences. A good theory, like Newton's theory of gravity, has unity, which means it consists of a limited number of problem-solving strategies that can be applied to a wide range of scientific circumstances. Another feature of a good theory is that it formed from a number of hypotheses that can be tested independently.

A scientific theory is not the end result of the scientific method; theories can be proven or rejected, just like hypotheses. Theories can be improved or modified as more information is gathered so that the accuracy of the prediction becomes greater over time. Theories are foundations for furthering scientific knowledge and for putting the information gathered to practical use. Scientists use theories to develop inventions or find a cure for a disease¹³. A few theories do become laws, but theories and laws have separate and distinct roles in the scientific method. A theory is an explanation of an observed phenomenon, while a law is a description of an observed phenomenon¹⁴.

2. CONCLUSION

To alleviate these problems raised, instructors should: (1) stress the usefulness of psychological and scientific theories, (2) emphasize the relevance of psychological theories to everyday life, (3) give support in understanding and in evaluating psychological theories, including their strengths and weaknesses, and (4) show the benefits of proper application of theories. In this column, some suggestions are offered that might help achieve these teaching goals. The following guidelines were developed and tested in introductory courses in theories of social psychology. However, they are easily applied to other types of psychological theories, for instance to theories of learning or personality.

REFERENCE

- [1] Redmond, W. D. 2008 *Theory* Encarta: 1993-2008 Microsoft Corporation.
- [2] Thomas, G. 2007 *Education and Theory: Strangers in Paradigms*. Open University Press.
- [3] Hawking, S. 1996 *"The Illustrated a Brief History of Time"* New York: Bantam Books, p. 15.
- [4] Kurt, L. 1935 *A Dynamic Theory of Personality*.
- [5] Bell, P. 1978 "Psychology is good": True/false? *Australian Psychologist*, Vol. 13, pp. 211-218.
- [6] Halvorson, Hans 2012 "What Scientific Theories Could Not Be". *Philosophy of Science* 79 (2): 183-206. The University of Chicago Press.
- [7] Gray, P. 1993 Engaging students intellects: The immersion approach to critical thinking in psychology instruction. *Teaching of Psychology*, Vol. 20, pp. 68-74.
- [8] Goodson, F.E., & Morgan, G.A. 1976 Evaluation of theory. In M.H. Marx & F.E. Goodson (Eds.), *Theories in contemporary psychology* (2nd ed) pp. 286-299. New York: Macmillan.
- [9] Eysenck, H.J. 1985 The place of theory in a world of facts. In K.B. Madsen & L.P. Mos (Eds.), *Annals of theoretical psychology* (Vol. 3). pp. 17-72). New York: Plenum Press.
- [10] Jochen, L. 2003 Models in software engineering: an introduction. *Journal on Software and Systems Modeling*, 2(1)
- [11] Marx, M.H., & Helix, W.A. 1987 *Systems and theories in psychology* (4th ed.). New York: McGraw-Hill.
- [12] Lefrançois, G.R. 1999 *Psychology for Teaching (10th ed)*. Stamford: Thomson Learning.
- [13] National Academy of Sciences 2008 *Science, Evolution, and Creationism*.
- [14] Colin, A & Thomas K. 2001 *The essence of multilevel Meta modeling*. In Martin Gogolla and Cris Kobryn, editors, *Proceedings of the 4th International Conference on the UML 2000*, Toronto, Canada, LNCS 2185, pages 19-33.