

My “It’s So Simplified It’s Scary” Description of Three Ways of Looking at Science

I have purposefully used extreme versions of positivism and constructivism. I have purposefully treated a large group of epistemologies that lie “somewhere between” extreme positivism and constructivism as a single group (realism). I have certainly simplified very complex ideas into a few brief statements. I have made statements in a form and content to create the greatest possible distinction between epistemological stances. I did this to try to make clear some major ideas about ontology, epistemology and methodology. This is a simplistic treatment of a very complex set of ideas. These views and relationships are not nearly this simple. There are many, many shades of grey. Please take this as a guide to help you understand the broad, most compelling differences in rather exaggerated form – not a sophisticated explanation. Thank you.

Originally termed Realism: If you can’t touch, smell, hear, see or feel it, it does not exist. Now usually called “positivism.” General School: Positivism Specific Version: Logical Empiricism	Originally termed “moderate” realism: There is a reality outside our brains, but our ideas and experiences influence what we think about it. General School: Realism Specific Version: Critical Realism	Originally termed Anti-Realism: nothing exists except ideas in human brains. Now usually called constructivism. General School: Constructivism Version: Relativism
What is reality?		
Reality exists independently of what anyone knows, thinks, or believes about it – it “is”. Ultimately, we will be able to explain and predict all phenomena accurately and precisely. In this sense, reality is “immutable.”	Reality exists independently of what anyone thinks, but human values, beliefs, knowledge and creativity are an integral part of reality. The ability of humans to translate their knowledge, values and creativity into actions shapes and forms reality. In this sense, reality evolves over time.	While there are “things” that are external to us, there is no way to establish any general agreement about them because human experiences and ideas make it impossible for us to achieve any kind of general agreement.
What can we know about reality?		
Science deals with discovering universal laws (no exceptions) that describe the causal relationships among phenomena. Theories are statements of these universal laws and require repeated confirmation and no instance of disconfirmation.	Science deals with understanding and explaining the relationships between phenomena, including the effects (expressions) of human knowledge, creative works, and beliefs or values. Theories are logically consistent, proposed explanations of these relationships for which there exists empirical evidence. Universal laws (if there are any), highly repetitive patterns and the effects of actions by individuals and groups are all involved in explanation.	Science, if it exists, deals with becoming aware of how individuals experience and perceive reality. Ultimately, what is “knowable” is what is in your own mind. What is “known” cannot be determined without reference to who knows it. Put another way, every reality in every living individual’s mind is a separate reality and we cannot formulate any general explanations.
What are the objectives of scientific research?		
The researcher’s objective is to discover the underlying laws that are universally applicable to explain the outcome or phenomena under study. Individual responses are of little interest and responses that vary greatly from the norm (outliers) are treated as part of the variance (deviation from the central tendency) of the overall pattern of response.	The researcher’s objective is to understand patterns and relationships and to generalize these understandings over time to build a more complete theoretical framework that is logically consistent and leads to anticipated outcomes when put into practice. Ultimately, “good” explanations or theories must account for the full range of responses observed.	The objective is to share, understand and describe faithfully the reality experienced by different individuals or groups of people. There is a deep commitment to exploring how reality differs among people and to taking these multiple realities “seriously,” rather than treating them as competing or exclusive versions of a single reality.

What constitutes a theory?		
A theory is an explicit statement of the precise, invariable causal relationships between two or more phenomena based on underlying laws that are universally applicable. When there are two or more theories, one will eventually be shown to be true, valid or correct.	A theory is a set of relatively concrete and specific concepts or constructs and the proposed interactions among them. Theories can describe, explain, or predict the relationships between phenomena. Different theories may contribute to understanding the same phenomena because they often focus on different aspects of the phenomena of interest.	A theory explains how one person or group of people perceive or experience any given phenomena. Theories are specific to the standpoint or experience of individuals and groups and there is no way to provide a general theoretical explanation that is free of positional bias.
What do we accept as evidence?		
Scientific evidence consists of directly observable events or phenomena based on hypothesized outcomes that flow deductively from laws or “law-like” statements about cause and effect. Directly observable events and phenomena include those that require an MRI machine, massive telescope, or psychological test to observe.	Scientific evidence consists of directly and indirectly observable events and phenomena, including things that people tell us about their thoughts, feelings, beliefs, behaviors and perceptions. Deduction, induction and practice all yield hypotheses or propositions, both of which are statements about the relationships between phenomena that we expect exist.	Evidence exists in the mind of the individual human being. There is little or no interest in developing hypotheses. Perhaps more fairly put, all conclusions about the relationships between phenomena are regarded as existing only from the perspective of a particular standpoint defined by the individual and his/her place in society.
How do we get evidence?		
There is a strong reliance on the traditional hypothetico-deductive model of the scientific method in which theories generate formal hypotheses that are tested by collecting empirical data. The true experiment is regarded as the best, and perhaps the only, research design that yields valid evidence.	Testing hypotheses, building theory through observation and analysis, and evaluating theory-based interventions through practice all provide equally valid information. The multiple designs covered in this course yield different kinds of evidence, with no design holding a preferred or superior position.	Traditional considerations in research design like internal and external validity are not important. The degree to which the researcher can express an individual or a group’s true experience of reality is a critical component in assessing the value of the information gained.
What do we mean by a “valid conclusion?”		
The concept of “disconfirmation” or falsifiability is very important to reaching valid conclusions. Only those hypotheses that can be “falsified,” or shown not to be correct, are valid. Confidence that a given explanation is “true” or “valid” is based on accumulating a large mass of confirming data from numerous studies, preferably experiments. Replication is critical both within each experiment and by multiple researchers. Ultimately, one explanation (theory) should prove to be the best explanation of existing reality.	Competing explanations are critical to reaching valid conclusions and research means testing competing explanations both within a single study and in different studies. Multiple forms of evidence accumulated through hypothesis testing, theory building through observation & analysis, and evaluation of theory through practice are required to create confidence that an explanation is “true” or valid. Multiple explanations or theories are encouraged in order to create a more comprehensive explanation, with the view that they may ultimately come together into a more elaborated theoretical framework.	All experience and therefore all conclusions are subjective and are not amenable to confirmation or disconfirmation. Perhaps more important, the validity of any conclusion must be understood within the specific experiential domain of a person or group. Validity, itself, is a contested term that has meaning only within a social context.

Should the researcher strive for objectivity?		
The researcher should be isolated from the phenomena that s/he studies and ideally has no (or minimal) effect on what is measured. Double blind experiments, for example, are one way to separate the researcher from the research process. The person who creates the research question & design does not know the people who implement the research (collect the data) and those people do not know what treatments they are implementing.	The researcher cannot be isolated from what s/he studies. People, including researchers, affect what is “objectively real.” However, there is a difference between a random “researcher effect” and bias. Bias refers to research procedures that we can identify <i>a priori</i> as having a potential effect on the data we collect. The researcher’s must avoid introducing bias in research and clearly distinguish between findings and his/her interpretation of the findings	The researcher cannot help but intervene in the processes or phenomena s/he studies because s/he becomes a part of the reality of the research participant. Research findings are socially constructed and the researcher’s interpretation of what s/he observes is a valid research finding in and of itself.
How does research inform practice?		
Eventually, through replication of deductively derived hypotheses, one “best” solution to any problem will be determined. In the extreme version, there can only be one correct way to proceed.	Different theories will lead to different conclusions about how to improve practice. These conclusions will “compete” in the world of practice. The practice-based evidence that results is as critical as any other for improving theory and understanding.	Practice must be rooted in the experience of the people affected by practice. Research can reveal the different standpoints of these groups and help practitioners ensure that the different realities, particularly of the oppressed, guide practice.
What research methods are preferred?		
There is a strong reliance on scales, indices and other instruments that produce interval data. Strong preference for quantitative analytic techniques.	There is a strong tendency to use a mixed methods approach in which a variety of instruments that produce different kinds of data are used; no particular preference for quantitative or qualitative analytic techniques.	There is a strong reliance on interviews, particularly stressing the individual’s personal experience, life history, and perspective. Strong preference for qualitative analytic techniques.