[FC-02-002] Epistemology

Abstract

Epistemology is the lens through which we view reality. Different epistemologies interpret the earth and patterns on its surface differently. In effect, epistemology is a belief system about the nature of reality that, in turn, structures our interpretation of the world. Common epistemologies in GIScience include (but are not limited by) positivism and realism. However, many researchers are in effect pragmatists in that they choose the filter that best supports their work and a priori hypotheses. Different epistemologies – or ways of knowing and studying geography – result in different ontologies or classification systems. By understanding the role of epistemology, we can better understand different ways of representing the same phenomena.

Keywords: classification, ontology, Philosophical foundations

Author & citation

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Explanation

Epistemology is the way that we view reality. The easiest way to think of epistemology is to imagine a series of filters laid over the earth. What we perceive depends on our filter. Different scientific traditions, different cultures and different humans use different filters. The trouble with descriptions – whether they be in GIS or in text on through photographs – is that they often claim to be the truth about the world. But they are ontological entities that result from specific epistemologies.

So now we have two philosophical terms to deconstruct: epistemology and ontology. Epistemology is the lens or perspective that a person uses to interpret and report entities and phenomena. The ontology is what really exists or at least the computational categories that we use to describe what exists. Before we go any further it is worth explaining the difference between the use of ontology in a stricter philosophical sense and how it is used in computing sciences (including GIScience). In philosophy and the humanities, ontology refers to the essence of a thing, its ultimate manifestation and clearest instantiation. For example, the ideal of a chair or a mountain, an instance of the entity that fulfills all the known criteria. In computing sciences, however, an ontology is a range of discourse permitted in a specific computing environment. This understanding of ontology was introduced by Gruber in the 1970s as it became evident that a programming environment provides a limited ‘universe of discourse’ or categories and objects. Of course, different epistemologies result in different ways of seeing the world and therefore different ontologies or categories.

Ontologies exist separately of the methods and perspectives that humans use to study them, but they are interpreted through epistemology – or perspective. In effect, epistemology has a large effect on the resulting ontology. How one studies and

understands the world contributes to the ontologies that are evident to the observer and ultimately reported in science.

One popular and ubiquitous epistemology used in science is positivism. Its central precept is that observations (empirical and through sensors) are the basis for theory. Because positivists believe very strongly that observations are reliable and always genuine, they lay claim to truth in their subsequent theories.

In positivism, all observations must be repeatable thus reinforcing the premise that theories can constructed on the basis of observations. Positivists do not believe that any filters or impediments prevent them from correctly observing events and phenomena. One version of positivism, logical positivism, stresses that statements about the world must be verifiable. Problems with logical positivism arise however as different people in different cultures and environments can see the same buildings, topography, situations and report on them quite differently. Over the past several hundred years the epistemology of positivism has been linked very closely to scientific rigor. It is, however, just one of many competing epistemologies.

Ironically, despite the fact that GIScience has often been accused of positivism, GIS researchers are more often realists – though GIScience scholars can subscribe, consciously or not, to any epistemology. Realism, like positivism, is somewhat nebulous and hard to define precisely. Philosophers generally understand realism as the way that we interpret and report on the world with the understanding that we can never really know the world as it is, but can discern certain truths about it through investigatory techniques. Realists believe that the world and events that take place in it are shaped by hidden or implicit structures that follow clear patterns. A forest fire, for instance, is an event that is linked to environmental relationships and relations between political players (structures) that give rise to fires. Realism presumes that there are things we can know to be true that are independent of the mind (that is, true or false in an absolute sense), and they can be identified through careful study and observation. In essence, realism allows us to use evidence to make conclusions about how the world works. Realism puts more emphasis on specific conditions that give rise to events than does positivism. Realism also acknowledges that - while there is an ultimate reality - the way that we discern it will always be mediated through filters as there is no way to absolutely know the world directly. From a GIScience perspective, realism accounts for the spatial-temporal location of entities by connecting them to specific situations.

However realism, like positivism, at its foundation subscribes to a deep belief that there is an underlying reality. While we may all approach this reality using different lenses, both epistemologies are confident that there is a concrete, material justification for their resulting ontologies. By contrast, competing epistemologies like post-structuralism are based on the precept that there may be no material, unalterable reality. Rather through culture and even our perceptual senses, we manufacture the parameters of reality. Post-structuralists are keen to break down the binary between structure and agency and look instead to transformation as a result of cultural contingency.

Pragmatism is another approach to knowledge or epistemology that allows proponents to change their world view and actions as more evidence is received. In GIScience, this translates into incorporating changes as necessary to accommodate new evidence, or, more commonly in the case of GIS, technical difficulties. An attractive feature of

pragmatism is that it is not dogmatic but is rather anti-foundationalist. As such, it views knowledge builders as participants rather than observers. Knowledge, in pragmatism, is only as a tool for organizing the world (whether in digital or analogue environs).

Pragmatism, as an epistemology, treats knowledge as something that results from experience or scientific testing. It is skeptical about big metaphysical truths. GIS users, for instance, often fit the technology to the problem, and the two are developed in tandem. GIS data is collected based on the data available and specific analytical capacities of the software. Pragmatist researchers generally do not rely on hypotheses to frame their investigations. Rather proof results from demonstration. These are all characteristics of a pragmatic epistemology. In addition, GIScientists usually focus on specific rather than generalized patterns. Questions like “where should we locate the landfill site” are not positivist, nor realist, but pragmatic.

At the end of the day, it may be difficult to discuss GIS (both its computational technologies and science precepts) in epistemological terms at all. It does not matter whether your goal is to locate a landfill or to create a more environmentally friendly community, ultimately it has be something that we can do with data and computers. In this context, Michael Goodchild has raised the question of whether it is even realistic to talk about epistemologies in technical detail (Goodchild 1995) There may be a basic incongruency between the epistemological discussion and the tools of computation. There may be a lack of equivalency or comparability between the discourses. It may be that epistemology is too abstract a notion to “map” onto GIS. Instead, perhaps we can only talk about applications and implementation of GIS or about error and omittance in data. The latter approach is, in effect, pragmatism. If this is the case, then ontologies – or the categories created by different epistemologies – should be the focus of our attention.

References

Goodchild, M. F. (1995). Geographic Systems Information and Research. In Ground Truth, ed. J. Pickles, 31-50. New York: Guildford Press.