Commentary

The logical status of applied geographical reasoning

DRAGOS SIMANDAN

Geography Department, Brock University, 500 Glenridge Avenue, St Catharines, Ontario, Canada L2S 3A1

E-mail: simandan@brocku.ca

This paper was accepted for publication in June 2011

This commentary is an invitation addressed to policy-oriented human and physical geographers to consider, from a strictly logical point of view, the way that reasoning works in applied geographical thought. The promise hidden in this somewhat unfashionable return to logic is twofold. First, by traversing the distance between our discipline and formal logic we may harvest the reward of a more rigorous understanding of the daily work that we do as policy-oriented geographers than that provided by the earlier scholarship on geography as practice (Dewsbury and Naylor 2002; Lorimer 2003). Second, the arid land of logic offers a novel entry point into answering the formidable difficult question of whether there is any common ground left between applied human geography and applied physical geography (Gatrell and Jensen 2009; Massey 1999; Richards 2003; Bracken and Oughton 2006; Couper 2007; Matthews and Herbert 2004).

To be sure, previous scholarship has questioned the operation of logic and reason in geography from a variety of standpoints. These include physical geography (Inkpen 2004; Gregory KJ et al. 2002), positivistic human geography (Bunge 1966; Harvey 1969; Gould 1999), humanistic geography (Buttimer 1993; Adams et al. 2001), non-representational theory (Thrift 2008; Anderson and Harrison 2010; Pile 2010), postmodern and poststructuralist geographies (Soja 1989; Doel 1999; Ley 2003), feminist geographies (Rose 1993; Whatmore 2002; Pratt 2004), as well as a neglected work that stands in a class of its own (Olsson 1975). Part of the value of applied geography is assumed to consist in its unique way of thinking about reality, or, in other words, in the existence of a geographical way of reasoning (Johnston and Sidaway 2004; Gregory et al. 2002; Aitken and Valentine 2006; Gatrell and Jensen 2009). Taking this assumption as given, there remains the further task of specifying and characterising the properties of this type of reasoning. Some may start by invoking the set of concepts that guide applied geographers' inquiring of knowledge about the world (e.g. distance, space, place, territory, landscape, scale, environment, locale, site). According to this view (Holloway et al. 2008) what makes policy-oriented geographical reasoning geographic is the active use of key geographical concepts. The advantage of this position resides in the fact that it brings out in a sufficiently vivid manner what separates applied geography from other related practical disciplines. The disadvantage comes from the fact that, by focusing on substantive semantic issues, this position foregoes the opportunity of characterising applied geographical reasoning in formal terms, qua reasoning (Harman 2008). That is, it sidesteps the epistemically useful exercise of trying to clarify the logical status of policy-oriented geographical reasoning.

Logic is the formal study of reasoning. Many scholars equate it with deduction, but deduction is only one of the subfields of logic (Kosko 1993; Shapiro 2007). The study of deduction, however, is useful for understanding what applied geographical reasoning is not (Rips 2008). The shortest path to this goal involves, first, the specification of one of the key properties of deductive logic and, second, the explanation of why applied geographical reasoning fails to have this property. A system of reasoning is said to have the property of monotonicity if the addition of new information to the premises of a valid argument cannot modify the conclusions already drawn in that argument. Monotonicity is the hallmark of deduction and explains both its success and its failure (Rips 2008). Its success and appeal come from the certainty guaranteed by a deductive argument: we live in a changing, uncertain world, and being able to point to a system of reasoning that seems to shelter us from this frightening uncertainty seems reassuring. Beliefs set in stone by
deductive inference act as anchors on which one can rely forever. Or so it seems. The failure of deduction comes precisely from this false sense of certainty (Harman 2008). Reasoning must be reasoning about something, and that something is usually some aspect of the material world. Since the material world – by opposition to the abstract world of mathematics (Shapiro 2007) – is a non-stationary, ever-changing environment, it follows that any system of reasoning that would help us navigate reality must at the minimum be able to cope with this perpetual change (Rescher 1996; Abbott 2001). Change in the world should imply change in our beliefs about the world and deduction is not up to this fundamentally adaptive task of belief revision (Rott 2008). It is for this reason that logic has moved beyond deduction to elaborate systems of reasoning that are non-monotonic, that is, that are sensitive to the addition of new information. Nicholas Rescher (2009, 148) offers a banal example of non-monotonic reasoning from everyday life that will help the readers grasp just what non-monotonicity is all about. Suppose that, in trying to answer the question ‘What will John do during the trip?’ the following four data points become successively available:

1. He loves doing crosswords.
2. He loves reading mysteries even more.
3. He didn’t take any books along.
4. One of his fellow passengers lends him a book.

Commenting on the ‘to and fro’ change in our conclusions imposed by this sequence, Rescher notes:

Such situations are called nonmonotonic because additional knowledge always has the potential of constraining a change of mind – rather than merely providing additional substantiation for a fixed result. We have no assurance that further information produces a closer approximation to the truth.

Rescher (2009, 149)

The central distinction in logic has become that between monotonic (i.e. deduction) and non-monotonic logics (Pollock 2008). The single most important statement that can be made with regard to the logical status of applied (human and physical) geographical reasoning is that it belongs to the class of non-monotonic reasoning¹. In other words, policy-oriented geographical reasoning is defeasible (i.e. earlier drawn conclusions can be defeated by the addition of new facts, some of which are generated by the very application of our ideas outside academe) and non-demonstrative (i.e. our beliefs about reality cannot be demonstrated once and for ever; we must do with building provisional arguments based on the current weight of the evidence, which itself changes with the times; Pollock 2008). Indeed, unlike mathematics, which is a closed world of formalisms that relies heavily on deduction, demonstration, and proof (Shapiro 2007), applied geography studies and attempts to improve the real, messy world out there. Because that wild, unruly world is always in a process of becoming (Rescher 1996), the conclusions drawn yesterday may have to be abandoned today, and so on, without end in sight. The core virtue of policy-oriented geographical reasoning is not certainty, but adaptability. As the world changes, so do applied geography’s entertained beliefs about how to improve it.

The point we are trying to make is that an alternative window into the nature of applied geographical reasoning, besides the one provided by the discipline’s key concepts, offers an opening toward the more subtle problematic of the mechanisms by which the updating of geographical beliefs² operate. We change our minds in applied geography precisely because we do not think deductively. But to say that is not to say much, because negation is always epistemically cheaper than assertion (Lipton 2004). Once understood that applied geographical reasoning is non-monotonic, two types of conceptual work need to be undertaken in order to give substance to this elementary statement. The first is descriptive: astute observation with large enough samples can lead, in time, to a better diagnosis of the patterns of reasoning by which applied geographers reach and abandon their conclusions and their practical advice. The second is normative and prescriptive. Non-monotonic reasoning, just like its monotonic counterpart, can be rigorous or sloppy (Pollock 2008). The rules for valid syllogistic inference have their counterpart in the rules for well formed non-monotonic inference. If the central problematic of deduction is what follows from what, the central problematic of non-monotonic reasoning is what counts as evidence for what. There are several competing ways to answer this problem, ranging from explanationism (Lipton 2004; White 2005), to Bayesianism (Oakford and Chater 2009), and to error statistics (Mayo 1996; Mayo and Spanos 2006). Each of these approaches is a constellation of epistemic gains and epistemic losses, but this only underscores the necessity of a substantive engagement of policy-oriented geographers in these debates (e.g. Simandan 2011). The aim is not to settle the debate over the best system of non-monotonic reasoning, but to learn from our immersion in the debate how to update our beliefs and strategies for producing applied work in the most epistemically profitable way. Since all the research clusters within applied geography share a concern with the material world and its betterment, they should also share an interest in learning how to improve their non-monotonic reasoning, regardless of whether it is focused on rivers, mountains and wildlife, or on populations, economies, and urban life. Non-monotonic reasoning constitutes a previously unrecognised common ground that policy-oriented human and physical geographers can now begin to explore together.
Notes

1 We are not rejecting the use of deduction by applied geographers as a form of reasoning (cf. Barnes 2006). Instead, we are saying that deduction cannot be a geographical form of reasoning. The difference between the two formulations is subtle, but significant.

2 Geographical beliefs are defined broadly, so as to include beliefs about the real world out there (Geography with a capital G), ‘imaginative geographies’ (Gregory 1994), as well as beliefs about the relative merits and demerits of competing theories and schools of thought in geography (geography with a lowercase g; e.g. Aitken and Valentine 2006).

References


Adams P, Hoelscher S and Till K eds 2001 Textures of place: exploring humanist geographies University of Minnesota Press, Minneapolis, MN

Aitken S and Valentine G eds 2006 Key approaches in geography Sage, London


Barnes T 2006 Between deduction and dialectics: David Harvey on knowledge in Castree N and Gregory D eds David Harvey. A critical reader Blackwell, Oxford 26–46

Bracken L J and Oughton E A 2006 What do you mean? The importance of language in developing interdisciplinary research Transactions of the Institute of British Geographers NS 31 371–82


Buttimer A 1993 Geography and the human spirit John Hopkins University Press, Baltimore, MD

Couper P 2007 Fluvial geomorphology and semiotics: a Wittgensteinian perspective of the divide between human and physical geography Transactions of the Institute of British Geographers 32 279–90

Dewsbury J D and Naylor S 2002 Practising geographical knowledge: fields, bodies and dissemination Area 34 253–60

Doel M 1999 Poststructuralist geographies: the diabolical art of spatial science Edinburgh University Press, Edinburgh

Gatrell J and Jensen R eds 2009 Geotechnologies and the environment: socioeconomic and planning applications Springer, Heidelberg

Gould P 1999 Becoming a geographer Syracuse University Press, Syracuse, NY

Gregory D 1994 Geographical Imaginations Blackwell, Oxford


Harvey D 1969 Explanation in geography Edward Arnold, London


Inkpen R 2004 Science, philosophy and physical geography London, Routledge


Koskela B 1993 Fuzzy thinking. The new science of fuzzy logic Hyperion, New York

Ley D 2003 Forgetting postmodernity? Recuperating a social history of local knowledge Progress in Human Geography 27: 537–60

Lipton P 2004 Inference to the best explanation 2nd ed. Routledge, London


Massey D 1999 Space–time, ‘science’ and the relationship between physical geography and human geography Transactions of the Institute of British Geographers NS 24 261–76


Mayo D 1996 Error and the growth of experimental knowledge University of Chicago Press, Chicago, IL

Mayo D and Spanos A 2006 Severe testing as a basic concept in a Neyman-Pearson philosophy of induction British Journal for the Philosophy of Science 57 323–57

Oaksford M and Chater N 2009 The uncertain reasoner: Bayes, logic, and rationality Behavioral and Brain Sciences 32 105–20

Olsson G 1975 Birds in egg Michigan Geographical Publication No. 15 University of Michigan, Ann Arbor, MI

Pile S 2010 Emotions and affect in recent human geography Transactions of the Institute of British Geographers 35 5–20


Rescher N 2009 Ignorance. On the wider implications of deficient knowledge University of Pittsburgh Press, Pittsburgh, PA


Rose G 1993 Feminism and geography. The limits of geographical knowledge University of Minnesota Press, Minneapolis, MN


© 2012 The Author. The Geographical Journal © 2012 Royal Geographical Society (with the Institute of British Geographers)
Commentary

Shapiro S ed 2007 The Oxford handbook of philosophy of mathematics and logic Oxford University Press, Oxford
Simandhan D 2011 Error, quality, and applied geography: an editorial on process Applied Geography 31 780–83
Soja E 1989 Postmodern geographies: the reassertion of space in critical social theory Verso, London

Thrift N 2008 Non-representational theory: space, politics, affect Routledge, London
Whatmore S 2002 Hybrid geographies Sage, London
White R 2005 Explanation as a guide to induction Philosopher’s Imprint 5 1–29