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To the memory of
DENIS COSGROVE AND LESLIE HEPPLE

THE DICTIONARY OF Human Geography

5th Edition

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WILEY-BLACKWELL
A John Wiley & Sons, Ltd., Publication

The early and middle nineteenth century saw the formation of several societies in the former category – both national (the Royal Geographical Society – RGS – and the American Geographical Society – AGS, for example) and local (e.g. the Manchester Geographical Society). Set within the context of a massive expansion of TRADE – associated with COLONIALISM, IMPERIALISM and MILITARISM (Driver, 1998) – the societies promoted EXPLORATION, by financing expeditions and the dissemination of their findings, and CARTOGRAPHY, to represent the 'new worlds' that were mapped. Some of that dissemination was focused on commercial and government users (cf. COMMERCIAL GEOGRAPHY), but the societies also popularized geography, through their lecture programmes and publications. Some continue both functions. In their popularizing role they have been joined by others, such as the National Geographic Society, whose *National Geographic Magazine* sells millions of copies each month: similar magazines are produced as commercial ventures, such as *New Zealand Geographical* and the *Geographical Magazine*, now called simply *Geographical*, which is owned by the RGS.

In the late nineteenth century, many of these societies identified the need for geography to be included in school curricula, as part of children's general education as world citizens as well as a means of promoting national identity (cf. NATIONALISM). They were more successful in some countries (notably the UK and several in continental Europe) than others (the USA, for example: Schulten, 2001). They then turned their attention to their countries' universities, seeking to have the discipline taught there in order to ensure an adequate supply of trained teachers and others knowledgeable about geography and its techniques: the RGS funded the initial appointments at Oxford and Cambridge, for example, and also provided support to fledgling departments at Aberystwyth, Edinburgh and Manchester (Johnston, 2003).

With the establishment of geography as a school and university subject, separate professions were created and societies formed to promote geographers' interests: for school teachers, for example, these included the Geographical Association in the UK and the National Council for Geographic Education in the USA. In the universities, the research culture was nurtured by professional learned societies such as the Association of American Geographers (AAG) and the Institute of British Geographers (IBG), whose main functions were to hold conferences and other meetings and to publish journals and monographs. These learned societies operated largely independently of the longer-established societies with their wider briefs, although the AGS provided much early support for the AAG: the IBG and RGS merged in 1996.

Identification of geography as an important subject in contemporary society and then the creation and continued existence of the academic discipline owes much to the pioneering and continued efforts of these societies – critical 'spaces of science' in Livingstone's (2003c) geographies of scientific knowledge (see SCIENCE). The societies are major nexuses in the social NETWORKS through which academic geographers collaborate and promote their discipline – especially at a national level – and their journals are widely considered as among the leading media for the dissemination of and debate over research findings. RJ

Suggested reading

Bell, Butlin and Heffernan (1995); Brown (1980); Capel (1981); Dunbar (2002); Martin (2005); Steel (1983).

geographically weighted regression (GWR) Standard REGRESSION models, like most QUANTITATIVE METHODS, fit an average relationship across all measured units; that is, an overall global MODEL is fitted, thereby assuming that processes are constant over space. GWR, as proposed by Brunsdon, Fotheringham and Charlton (1996), is an EXPLORATORY DATA ANALYSIS technique that allows the relationship between an outcome and a set of predictor variables to vary locally across the map. The approach aims to find spatial non-stationarity and distinguish this from mere chance; as such it is a development of Casetti's (1972) expansion method. With its emphasis on the potential importance of local contextuality, GWR is similar in intent to MULTI-LEVEL MODELLING: indeed, GWR-like models can be regarded as a specific type of multilevel model, the multiple membership model (Lawson, Browne and Vidal Rodeiro, 2003). As always, however, there is the danger that the results reflect not genuine spatial non-stationarity but, rather, simple misspecification, as when important predictor variables have been omitted from the model, with these variables themselves varying geographically.

The GWR technique works by identifying spatial subsamples of the data and fitting local regressions. Taking each sampled areal unit across a MAP in turn, a set of nearby areas that form the 'local' surrounding region is selected, and a regression is then fitted to data in this region in such a way that that nearby areas are given greater weight in the estimation of the regression coefficients than those further from the sampled unit. This surrounding region is known as the *spatial kernel* or bandwidth; it can have a fixed spatial size across the map, but this could result in unstable estimation in some regions where there are relatively few areas on which to base the local regression, and possibly miss important small-scale patterns where a number of local areas are clustered together spatially. Consequently, an adaptive spatial kernel is often preferred, so that a minimum number of areas can be specified as forming the region and the kernel extends out until this number has been achieved. Changing the kernel changes the spatial weighting scheme, which in turn produces estimates that vary more or less rapidly over space. A number of techniques have been developed for selecting an appropriate kernel and testing for spatial stationarity (Leung, Mei and Zhang, 2000; Paez, Uchida and Miyamoto, 2002).

Once a model has been calibrated, a set of local parameter estimates for each predictor variable can be mapped to see how the relation varies spatially. Similarly, local measures of standard errors and goodness-of-fit statistics can be obtained and mapped. An increasing number of applications of GWR includes models of house price and educational attainment level variations. Software for GWR is available from the original developers at http://ncg.nuim.ie/GWR. KJ

Suggested reading

Fotheringham, Brunsdon and Charlton (2002).

geography Literally, 'earth-writing' from the Greek *geo* (earth) and *graphia* (writing), the practice of making geographies ('geographing') involves both writing about (conveying, expressing or representing) the world and also writing (marking, shaping or transforming) the world. The two fold in and out of one another in an ongoing and constantly changing series of situated practices, and even when attempts have been made to hold 'geo-graphing' still, to confine its objects and methods to a formal discipline, it has always escaped those enclosures. In consequence, as Livingstone (1992, p. 28) insisted, 'The idea that there is some eternal metaphysical core to geography independent of circumstances will simply have to go'. While the history of geography (see GEOGRAPHY, HISTORY OF) is neither bounded by its disciplinary formation nor the North Atlantic, recent historians of geography have paid close attention to the institutionalization of geography as a university discipline in Europe and North America from the closing decades of the nineteenth century onwards. This focus on the academy overlooks two important considerations. First, 'the institutional and intellectual form of the university is itself a series of [situated] practices that have changed over time': the present sense of a 'discipline' was alien to the early modern university, but this did not prevent the provision of instruction in both descriptive and mathematical geography (Withers and Mayhew, 2002, pp. 13–15). Second, like Molière's M. Jourdain, who was astonished to learn he had been talking prose all his life without knowing anything about it, many scholars (and others) have produced what could be regarded as geographical knowledge in the course of enquiries that they construed in quite other ways. More than this, their reception within the discipline has been uneven. Some contributions have been recognized (and even appropriated) as geography, while others have been disavowed for nominally 'professional' reasons: so, for example, research in spatial statistics may be seen as central to the discipline by some geographers, while TRAVEL-WRITING may be rejected as the impressionistic work of the amateur. As these examples suggest, however, such evaluations are themselves necessarily historically contingent, and Rose (1995) has cautioned that disciplinary geography 'has so often defined itself against what it insists it is not, that writing its histories without considering what has been constructed as not-geography is to tell only half the story'.

All boundary-drawing exercises are fraught with difficulties, therefore, and intellectual landscapes are no exception: such projects are never 'only' about ideas, but also about the grids of POWER in which they are implicated. The boundary question became intrusive with the creation of modern disciplines, and the inclusion of modern geography among them. Its disciplinary formation was a response to political and economic concerns (most viscerally, the demand for a MILITARY GEOGRAPHY in the service of modern WAR and, in the UK at least, a COMMERCIAL GEOGRAPHY to underwrite international trade) and also to pedagogical ambitions (the desire to transmit particular, nationalistic geographical knowledges through school curricula: see

EDUCATION; NATIONALISM). These practical considerations were hardly unique to the nineteenth century. Geography had long articulated political and commercial interests – in the seventeenth century Varenius had emphasized the importance of Special Geography (or REGIONAL GEOGRAPHY) to both 'statecraft' and the mercantile affairs of the Dutch Republic, for example – and it was already deeply invested in what Withers (2001) calls 'visualizing the nation'. But its academic institutionalization raised questions about the distance between 'professional' and 'popular' geographies, and about the very possibility of geography as a field of scholarly *research* (rather than the compilation of others' observations) that continue to resonate today. Soul-searching (or navel-gazing) about the 'spirit and purpose' or 'nature' of geography has become markedly less common in recent years, however, as the contingency and fluidity of intellectual enquiry have been embraced. There has been much greater interest in charting future geographies, whose variety confirms the radical openness of geographical horizons: there is no single direction, still less a teleological path, to be pursued (cf. Chorley, 1973; Johnston, 1985).

It follows that no definition of geography will satisfy everyone, and nor should it. But one possible definition of the contemporary discipline is: *(The study of) the ways in which space is involved in the operation and outcome of social and biophysical processes*. When it is unpacked, this summary sentence provides six starting-points for discussion:

(1) As the opening brackets indicate, 'geography', like 'history', has a *double meaning*: it both describes knowledge about or study of something (most formally, a discipline or field of intellectual enquiry) and it constitutes a particular object of enquiry, as in 'the geography of soil erosion' or 'the geography of China' (so that 'soil erosion' and 'China' have geographies just as they have histories). In fact, the relations between geography and history have long exercised philosophers. Classical HUMANISM distinguished between CHOROLOGY and chronology, for example, orderings in space and orderings in time, while ENLIGHTENMENT aesthetics asserted that the object of the visual arts (painting or sculpture) was the imitation of elements coexisting in space and that of the discursive arts (narrative poetry) the expression of moments unfolding in time. In the course of the twentieth century, disciplinary geography was increasingly troubled by both ways of making the distinction.

First, Hartshorne's attempt to legislate *The nature of geography* (1939) had treated geography and history as non-identical twins born under the sign of EXCEPTIONALISM. They were held to be different from one another because they classified phenomena according to their coexistence either in space (geography) or in time (history), but this also made them both different from all other forms of intellectual enquiry, which classified phenomena according to their similarity to one another (see KANTIANISM). This, in its turn, was supposed to limit concept-formation in geography and history to particularity rather than generalization, to the IDIOGRAPHIC rather than the NOMOTHETIC (which was the preserve of the sciences). These distinctions proved to be constant provocations. Most geographers insisted that TIME and history could not be excluded from geographical enquiry, and Hartshorne eventually conceded the point. Indeed, studies of landscape evolution, physical and cultural, were regarded as such mainstays of geographical enquiry that Darby (1953, p. 11) could describe geomorphology and HISTORICAL GEOGRAPHY as its twin foundations: even then, 'space' was not understood as a static stage. More than this, however, particularly after the QUANTITATIVE REVOLUTION of the 1960s, the study of DIFFUSION, the development of dynamic modelling and the capacity to capture the modalities of environmental and social change required any rigorous analysis of the concrete specificities of geographical variation to be informed by the theories and methods of the mainstream sciences and social sciences: geography could not be separated from other fields by philosophical fiat.

Second, the emphasis on geographical change raised what Darby (1962) called 'the problem of geographical description': How was it possible for a field that placed such a premium on the visual to convey any sense of PLACE and LANDSCAPE by textual means? Darby's original sense of this reactivated that Enlightenment sensibility: 'We can look at a picture as a whole,' he wrote, 'and it is as a whole that it leaves an impression upon us; we can, however, read only line by line.' The question (and Darby's way of framing it) later seemed problematic to many human geographers, who enquired more closely into practices of REPRESENTATION and interpretation. They examined the visual ideologies of CARTOGRAPHY and the poetics of prose, for example, both the nominally objective prose of scientific enquiry that dominated geographical journals and more evocative modes of expressing places and landscapes. En route, geography's connections with the HUMANITIES spiralled far beyond history, to include ART history, dance, FILM studies, the literary disciplines, MUSIC and PERFORMANCE studies. These were more than exercises in critical interrogation or DECONSTRUCTION; they also involved creative experiments in writing (see, e.g., Harrison, Pile and Thrift, 2004; Pred, 2004) and collaborations with artists, curators, film-makers and performance artists.

(2) These close encounters with the sciences, social sciences and humanities have ensured that there is no single PARADIGM or method of enquiry in geography. In order to elucidate the *multiple ways* in which space is involved in the conduct of life on Earth and in the transformation of its surface, geographers have been drawn into many different conversations: human geographers with anthropologists, art historians, economists, historians, literary scholars, psychologists, sociologists and others; physical geographers with atmospheric scientists, botanists, biologists, ecologists, geologists, soil scientists, zoologists and others. These conversations have varied through time, and the history of geography (see HISTORY OF GEOGRAPHY) is an important part of understanding how the contemporary field of geographical enquiry has come to be the way it is, marking both its ruptures from as well as its continuities with any presumptive 'geographical tradition' (Livingstone, 1992). These conversations have also varied over space, so that there is a 'geography of Geography' too. The same claims can be made about any discipline, but in geography they have been increasingly interconnected. Most recent studies of the history of geography have recognized the importance of the spaces in which geographical knowledge is produced and through which it circulates. This has involved attempts both to *contextualize* geography – to understand the development of geographical ideas in relation to the places and situations from which they have emerged and the predicaments to which they were responding – and to *de-territorialize* geography: to open the disciplinary ring-fence, to appreciate that geography is not limited to the academy and to interrogate the production of geographical knowledges at multiple sites (Harvey, 2004a).

These studies have produced a heightened sensitivity to the specificity and partiality of Euro-American and, still more particularly, Anglo-American geography. Contracting geography's long and global history, Stoddart (1985) proclaimed that modern geography was a distinctively *European science* that could be traced back to a series of decisive advances in the closing decades of the eighteenth century. It was then, so Stoddart argued, that 'truth' was made the central criterion of objective science through the systematic deployment of observation, classification and comparison, and in his view it was the extension of these methods from the study of NATURE to the study of human societies 'that made our subject possible'. But the critique of the assumptions that underwrote such a claim, sharpened by the rise of POST-COLONIALISM, prompted many commentators to re-situate that project as a profoundly Eurocentric and, more recently, Euro-American science (see EUROCENTRISM: Gregory, 1994). Geography has thus come to be seen as a SITUATED KNOWLEDGE that, of necessity, must enter into conversations with scholars and others who occupy quite different positions.

This is not only (or even primarily) a matter of interdisciplinary dialogue; it also implies inter-locational dialogue. The more restricted idea of an *Anglo-American geography* was largely a creature of the 1960s and 1970s when, at the height of the QUANTITATIVE REVOLUTION, it seemed that a unified and coherent MODEL-based geography was emerging on both sides of the Atlantic. 'THEORY', too, seemed to offer a universal language that held out the promise of a unified, even unitary discipline. The subsequent critique of SPATIAL SCIENCE opened up many other paths for geographers to explore, and in that sense promoted diversification, but in human geography in particular it also heralded divergence as it prised apart the commonalities that once held the Anglo-American corpus together (cf. Johnston and Sidaway, 2004). This coherence (or rigidity, depending on your point of view) has also been assailed by a growing concern about the grids of power and privilege that structure the international academy, and in particular the silences and limitations of a narrowly English-language geography. If, as Wittgenstein observed, 'the limits of my language mean the limits of my world', then a geography that privileges one language is not only limited: it is also dangerous (Hassink, 2007). This poses an obvious difficulty for dictionaries of geography such as this one (cf. Brunotte, Gebhardt, Meurer, Meusburger and Nipper, 2002; Levy and Lussault, 2003).

That said, Anglophone geographers have not been wholly indifferent to work in other

languages. Hartshorne's (1939) enquiry into the nature of geography was an exegesis of a largely German-language tradition, and British and American historians of geography have long acknowledged the foundational role of figures such as Alexander von Humboldt (1769–1859), Karl Ritter (1779–1859), Friedrich Ratzel (1844–1904) (see ANTHROPO-GEOGRAPHY) and, in France, Paul Vidal de la Blache (1845–1918). From the closing decades of the twentieth century, however, as human geography took an ever closer interest in continental European PHILOSOPHY – Giorgio Agamben, Alain Badiou, Jacques Derrida, Michel Foucault, Martin Heidegger, Jürgen Habermas, Julia Kristeva and Henri Lefebvre have all occupied prominent positions in contemporary discussions – there was, until very recently, little or no equivalent interest in continental European geography (apart from the work of Nordic and Dutch geographers available in English). One of the ironies of Stoddart's thesis about geography as a European science has been the extraordinary indifference of much of the Euro-American discipline to the *multiple* European genealogies of geographical discourse (cf. Godlewska, 1999; Minca, 2007b: see ANGLOCENTRISM). COLONIALISM and IMPERIALISM continue to cast long shadows over the discipline too: outside DEVELOPMENT GEOGRAPHY there has been a comparable lack of interest in the work of geographers from the global SOUTH (cf. Slater, 2004).

It is true that conferences under the auspices of the International Geographical Union and major national GEOGRAPHICAL SOCIETIES (especially the Association of American Geographers and also the Royal Geographical Society/Institute of British Geographers) attract participants from all over the world, but being together is not the same as talking together. Smaller, more focused meetings have usually been more successful at encouraging dialogue, and the activities of the International Critical Human Geography Group, the Aegean Seminars and international conferences in HISTORICAL GEOGRAPHY and ECONOMIC GEOGRAPHY have all helped to dissolve these parochialisms. But it has proved remarkably difficult to facilitate a less episodic, global exchange of ideas, and concern continues to be expressed about the HEGEMONY of English-language geography in nominally 'international' meetings and journals (Garcia-Ramon, 2003; Paasi, 2005). It may be that physical geographers have been more successful in resolving these issues, and that their ideas travel through more effective and multi-directional channels. Their main journals attract contributions from authors in many countries, and the International Association of Geomorphologists has promoted a series of international and regional conferences. But this apparent success may also reflect a problematic conviction that 'science' is itself an international and 'interest-free' language (cf. Peters, 2006).

(3) To make '*space*' focal to geographical enquiry is not to marginalize PLACE, REGION or LANDSCAPE. These constructs have often been opposed in geography's theory-wars, but while they are certainly different concepts with different entailments, genealogies and implications (all of which need to be respected) they all also register modes of producing SPACE as a field of differentiation and integration. To say this is to recognize geography's dependence on a series of technical and theoretical devices. This was so even when geography was conducted under the sign of a supposedly naïve EMPIRICISM, what William Bunge and William Warntz once called 'the innocent science', because the production and certification of its knowledges involved a series of calculative and conceptual templates. Technically, the ongoing formation of geography has been intimately involved with the changing capacity to conceive of the Earth as a whole (Cosgrove, 2001) and to fix and discriminate between positions on its surface (in geodesy, navigation and the like), and thus with the development of CARTOGRAPHY and GEOGRAPHIC INFORMATION SYSTEMS (GIS) that provide compelling demonstrations of the relevance of 'location, location, location' to more than real estate sales (Pickles, 2004; Short, 2004). The history of these procedures is closely associated with that of EXPLORATION, the politico-economic adventures of CAPITALISM, the occupations and dispossessions of COLONIALISM and IMPERIALISM, modern WAR and the deep interest of the modern STATE in the calculation and imagination of TERRITORY. To list these entanglements is not to imply a simple history of complicity, but this in its turn is not a plea for exculpation of 'Geography Militant' (Driver, 2001a): it is merely to note that many of these technical devices can be (and have been) turned to critical account, as the development of critical or radical cartographies and critical GIS attests (Harvey, Kwan and Pavovska, 2005; Crampton and Krygier, 2006), and to underscore that the 'technical' is never far from the political. These means of knowing and rendering

the world have been reinforced by formal theories about location, spatialization and interdependence that have offered an increasingly sophisticated purchase on geographies of UNEVEN DEVELOPMENT and the variable intersections between capitalism, war and GLOBALIZATION (Smith, 2008 [1984]; Harvey, 2003b; Sparke, 2005). These formulations are themselves marked by their origins, and the privileges of location that they address – and incorporate (Slater, 1992) – have been underwritten by less formal but no less rhetorically powerful IMAGINATIVE GEOGRAPHIES that not only inculcate a 'sense of place' that is central to identity-formation and the conduct of EVERYDAY LIFE, but also work to normalize particular ways of knowing the world and to produce allegiances, connections and divisions within it (Gregory, 2004b: see also GEOGRAPHICAL IMAGINARIES).

By these various means, 'space' has been produced, at once materially and discursively, through a series of what are profoundly political technologies. Hence, for example, Pickles' (2004, p. 93) pithy sense of the PERFORMATIVITY of cartography: 'Mapping, even as it claims to be reproducing the world, produces it.' Attempts to understand these processes of production have involved historical accounts of the development of concepts and the systems of practice in which they have been embedded, in both physical and human geography (see, e.g., Beckinsale, Chorley and Dunn, 1964/1973/1991; Gregory, 2008). They have involved explorations of other versions of those spatializations too: experiments with different concepts of LANDSCAPE, PLACE, REGION and SPACE itself (see, e.g., Holloway, Rice and Valentine, 2003). In the same vein, there have been repeated forays into the vexed question of SCALE, which most physical geographers – in the wake of Schumm and Lichty's (1965) classic essay – seem to regard as the very skeleton of their subject (Church and Mark, 1980), while at least some human geographers see it as the disarticulation of theirs (cf. Sheppard and McMaster, 2004; Marston, Jones and Woodward, 2005). The interrogation of these concepts has been an increasingly interdisciplinary project – none of them is the peculiar possession of geography, even if geographers have done their most characteristic work with the tools they provide: 'Space is the everywhere of modern thought' (Crang and Thrift, 2000, p. 1) – and some commentators have identified a 'spatial turn' across the whole field of the humanities and the social sciences (Thrift, 2002).

(4) This turn has been sustained, in part, by a recognition that the *outcome* of processes differs from place to place. The variable character of the Earth's surface has long driven enquiries into AREAL DIFFERENTIATION in both physical and human geography, and contrary to the predictions of prophets and critics of MODERNITY, the transformations brought about by globalization have not planed away differences: instead, they have produced new distinctions and juxtapositions. Physical geography has always been acutely sensitive to macro- and meso-variations in landforms and processes, particularly those related to climate and geology. But we now have a clearer sense of the ways in which those variations have been culturally coded and constructed: W.M. Davis' once canonical (1899a) description of fluvial erosion in temperate regions as the 'normal' cycle of erosion (which would startle people living in other regions), for example, and the vast discursive apparatus of TROPICALITY that yoked land to life in low latitudes. Spurred on by the rapid rise of Earth Systems Science, we also have a much surer understanding of the global regimes and interdependencies in which environmental variations are enmeshed (Slaymaker and Spencer, 1998). In much the same way, human geography retains its interest in the particularity of PLACE, but now usually works with a 'global sense of place' (Massey, 1994a; cf. Cresswell, 2004). Similarly, REGIONS are now rarely seen as the independent building blocks of a global inventory; a revitalized REGIONAL GEOGRAPHY focuses instead on the porosity of regions and on the intersecting processes through which their configurations are produced and transformed (Amin, 2004b). Here too, geography is not alone in its interest: AREA STUDIES, INTERNATIONAL RELATIONS and international studies have declared interests in these issues too, though where these interests have been wired to the conduct of foreign policy they have typically provided a narrower, more instrumental framing of interdependence than is now usual in geography.

More fundamentally, however, the spatial turn has also been sustained through investigations of the ways in which space affects the very *operation* of processes. It is now widely recognized that processes are not indifferent to the circumstances and configurations in which they operate, and it is this 'thrown-togetherness' that has prompted a renewed interest in spatial ONTOLOGY (Massey, 2005). This was, in a way, precisely Hartshorne's point – and it is also the pivot around which

so much of Torsten Hägerstrand's extraordinary experiments with TIME-GEOGRAPHY moved – but it is now being sharpened in radically different ways. It is also why geography has always placed such a premium on FIELDWORK (which was focal to Stoddart's account too). Unlike field sciences, laboratory sciences can, in some measure, control for disturbances and isolate parameters to create idealized states. In much the same way, spatial science was an attempt to prise apart different spatial structures – the hexagonal lattices of CENTRAL PLACE systems, the wave forms of DIFFUSION processes – and then search for commonalities within these spatializations (market areas and drainage basins as hexagons) or combine them in idealized MODELS (the diffusion of innovations through central place systems). These were all attempts to order what is now most often seen as a partially ordered world – to tidy it up. As the philosopher A.N. Whitehead warned, however, 'Nature doesn't come as clean as you can think it', and it is in this spirit that much of geography is increasingly exercised by the ways in which the coexistence of different spatializations perturbs, disrupts and transforms the fields through which social and biophysical processes operate. Physical geography was in the vanguard of attempts to find the terms for what B.A. Kennedy (1979) memorably described as 'a naughty world', and since then human geography has also recognized the non-linearity, contingency and complexity of life on Earth.

(5) The processes with which geography is concerned are conventionally and collectively identified as '*social*' (economic, cultural, political etc.) and '*biophysical*' (biological, chemical, geophysical etc.). These two realms have often been assigned to a separate HUMAN GEOGRAPHY and PHYSICAL GEOGRAPHY, and the relations between the two have frequently prompted concern, on occasion even antagonism. In some institutional systems the two are more or less completely separate – in the Nordic countries, for example, there are usually separate university departments of human and physical geography – while in others one more or less dominates to the virtual exclusion of the other (in India, human geography is considerably more prominent than physical geography, for example, while in the USA, until very recently, 'Geography' was overwhelmingly human geography). Although most major geographical societies publish general journals that include papers in both physical and human geography – in the English-speaking world, these include the *Annals of the Association of American Geographers*, *Canadian Geographer*, *Geographical Journal*, *Geographical Research*, *Geographical Review*, *South African Geographical Journal* and the *Transactions of the Institute of British Geographers* – in recent years many of them have found it difficult to attract physical geographers to their pages. (In Sweden, the English-language *Geografiska Annaler* is published as separate series in physical and human geography.) There are some newer, general journals produced by commercial publishers too, notably *Geoforum*, *GeoJournal* and *Geography Compass*, and also technical journals such as *Geographical Analysis* and the *International Journal of Geographical Information Science*. Publishing in the same journals does not imply a common discursive community, of course, and neither does it necessarily produce one: the sheer volume of academic publication makes most readers ever more selective (and perhaps idiosyncratic). But in any case the numbers of general journals have been dwarfed by the explosion of specialized, sub-disciplinary journals such as *Earth Surface Processes and Landforms*, *The Journal of Biogeography*, *Physical Geography* and *Progress in Physical Geography* on one side, and *Antipode*, *Cultural Geographies*, *Economic Geography*, the *Environment and Planning* journals, *Gender, Place and Culture*, *Journal of Historical Geography*, *Political Geography*, *Progress in Human Geography* and *Social and Cultural Geographies* on the other. Many of these journals advertise themselves as 'interdisciplinary', but the two groups reach out in opposite directions – to the atmospheric, biological and Earth sciences, or to the humanities and social sciences – rather than to each other.

Openness to other disciplines is widely accepted as indispensable for intellectual vitality, but there has also been a persistent anxiety that arrangements and practices such as these make a mockery of claims that geography studies the relations *between* the human and physical worlds, and at the limit threaten geography's institutional survival when ecological awareness and demands for SUSTAINABLE DEVELOPMENT are being articulated by other disciplines and emerging interdisciplinary fields (cf. Turner, 2002). To be sure, human geographers have long had important things to say about NATURE – it was only on the isotropic planes of spatial science that the biophysical environment was erased – and a host of studies in CULTURAL ECOLOGY, ENVIRONMENTAL HISTORY, HAZARDS research and POLITICAL ECOLOGY testify to the power of their contributions. Similarly, physical geographers have long been interested in the intersection of human and physical systems (cf. Bennett and Chorley, 1978). In geomorphology, many consultative, geotechnical projects – perhaps most obviously on flooding, soil erosion, slope stability and the like – reveal the continuing vitality of this stream of work, and the atmospheric sciences have placed considerable emphasis on their practical relevance. In the future, a revitalized BIOGEOGRAPHY (as a sort of 'living Earth science') may well make some of the most direct connections to human geography and, indeed, to green politics, while pressing issues of global environmental change and GLOBAL WARMING require a transdisciplinary approach that speaks across the sciences, social sciences and humanities (see also Turner, Clark, Kates, Richards and Mathews, 1990).

But to have important things to say – and vital questions to address – does not mean that human and physical geographers speak the same language, and translation has its own problems (Bracken and Oughton, 2006). Many commentators, inside and outside geography, have insisted on a fundamental distinction between the methods of the natural sciences (that probe an 'object-world') and those of the humanities and social sciences (that probe a 'subject-world'). Unlike pebbles rolling along the bed of a river or grains of sand cascading over the crest of a dune, human beings are suspended in webs of meaning: those meanings make a difference to conduct in ways that have no parallel in the domain of the natural sciences, and their elucidation requires radically different interpretative procedures. Proponents of HUMANISTIC GEOGRAPHY were among those most likely to advance these arguments in the 1970s and 1980s, but the rise of POSTMODERNISM and the correlative CULTURAL TURN across the humanities and social sciences in the 1990s – and in particular the so-called 'science wars' epitomized by the Sokal affair (in which physicist Alan Sokal successfully submitted a spoof 'cultural studies' article to the journal *Social Text*; cf. Ross, 1996) – must have convinced many physical geographers that their commitment to 'Science' put them at a considerable distance from many, if not most, human geographers.

There have been three major responses to such polarizing views. The first has been to appeal to science studies (see SCIENCE) to argue that physical geography, like 'science' more generally, is a social practice too; it has its own, highly formalized rules, but it constantly traffics in meanings and interpretations. Seen thus, physical geographers are caught in the HERMENEUTIC circle, and as invested in (serious) language games and qualitative modes of representation – and hence in textualization, RHETORIC and the like – as human geographers (Sugden, 1996; Spedding, 1997; Phillips, 1999, pp. 758–9; Harrison, 2001). These commonalities extend beyond the notebook or the printed page, however, and include, crucially, the performance of FIELDWORK (Powell, 2002). The second response has been to return to PHILOSOPHY and explore post-positivist philosophies of science that provide more nuanced explanations of both social and biophysical systems, and allow for a more sophisticated understanding of contingency than the objectivist canon. REALISM has played a pivotal role here, not least through its qualified NATURALISM, and following its early consideration by human geographers (Sayer, 1992 [1984]) it has been explored by a growing number of physical geographers (Richards, Brookes, Clifford, Harris and Lane, 1998; Raper and Livingstone, 2001). The third response, stimulated by attempts to theorize the PRODUCTION OF NATURE (Smith, 2008 [1984]), has been to call into question the very distinction between the 'social' and 'biophysical' (Braun and Castree 1998; Castree and Braun, 2001) and to recognize the vital importance of 'hybrid geographies' (Whatmore, 2002b). A host of new approaches has confounded the deceptively commonsensical partitions between 'culture' and 'nature', including ACTOR-NETWORK THEORY, AGENT-BASED MODELLING, COMPLEXITY THEORY and NON-REPRESENTATIONAL THEORY. With one or two exceptions, it seems that human geographers are more drawn to some of these possibilities and physical geographers to others, and they do not in themselves constitute a common intellectual language. But what C.P. Snow famously castigated as 'the two cultures' in the late 1950s, one literary-social and the other physical-scientific, has come to be recognized as an artifice, and there have been a number of attempts to conduct what the Royal Geographical Society/Institute of British Geographers called 'conversations across the divide' (Harrison, Massey, Richards, Magilligan, Thrift and Bender, 2004).

Not all observers of interventions like these are sanguine about the prospects for a plenary geography (cf. Johnston, 2005b; Viles, 2005),

ı at the end of the day it may not matter y much. Most physical and human geoghers are probably too involved in their own ching and research to bother very much ɔut such meta-issues. If they are interested (say) residential segregation in cities or the ıamics of gravel-bed rivers, most scholars ·sue whatever avenues of enquiry seem st promising, and do not draw back at disliinary borders or worry about disciplinary egrity. It is hard to say – or see – why they ɔuld. To be sure, some work is by its very ure hybrid – hence the rise of various 'enɔnmental' geographies – but it is a mistake identify institutional politics with intellecl substance. Funding for teaching and rerch has become a crucial issue for all ciplines, and its impact should not be minzed. Advertising the capacity of geography bring together the sciences, social sciences l humanities may bring its institutional rerds, but the intellectual realization of an erdisciplinary project through disciplinary vilege is surely a contradiction in terms. ɔciplines are contingent institutional arıgements, and while each has a canon of ts, activated through courses and textɔks, students and professors, societies and rnals, and while there have often been atıpts to police the frontiers (or to extend m through disciplinary imperialism), the t remains that intellectual work of any sigıcance has never been confined by administive boundaries. Most scholars travel in erdisciplinary space, and while geography y have been unusually promiscuous in its ɔunters, it is by no means alone: as Gregson)05, p. 7) astutely remarks, 'ours is increasly a post-disciplinary world in which the ıgraphical is critical but not ours to possess'.

The emphasis on *process-based explanɔns* is common to human geography, physl geography and many of the interchanges ween them. Contemporary geographical quiry does not stop at mapping outcomes – ort of global gazetteer – and the FRICTION OF TANCE is no longer viewed as an adequate rogate for the operation of the processes t produce those outcomes. Hence the focus practices and structures, micro-processes l SYSTEMS. In human geography, the ument was put with characteristic force by ia (1989, pp. 37–8), who identified a perent disciplinary tendency to limit enquiry the description and calibration of 'outcomes iving from processes whose deeper theortion was left to others' in 'an infinite regression of geographies upon geographies'. His solution, like those of an increasing number of his peers, was not to import theorizations of processes from SOCIAL THEORY, but (much more radically) to 'spatialize' social theory *ab initio* and to think about the PRODUCTION OF SPACE in ways that eventually troubled the dualism (even the DIALECTIC) of spatial form and social process. Others followed other routes to different destinations, but the common result was to underline the importance of ONTOLOGY to human geography. Some physical geographers had started to focus on process-based explanations in the 1950s, under the influence of American geologist and geomorphologist Arthur N. Strahler (1918–2002) and his graduate students, and by the time human geographers were recoiling from SPATIAL FETISHISM, their physical colleagues were heavily invested in the measurement of atmospheric, biological and geomorphological processes. But here too there has been a concerted attempt to think about process in less mechanistic terms than those early projects allowed, and in consequence to recognize the practical importance of 'philosophical speculation about the fundamental "stuff" or *substance* of reality' for geomorphology and other fields of physical geography (Rhoads, 2006, p. 15; cf. Harvey, 1996).

This interest in PROCESS is, in one sense, a peculiarly modern fascination: in a world where, as Marx so famously put it, 'all that is solid melts into air', there is a particular premium on describing, monitoring and accounting for change. But there is also a vital interest in planning, predicting and implementing change. This has had two crucial impacts on the development of contemporary geography. The first is a renewed interest in political and ethical questions. Intervening in situations of politico-ecological catastrophe or war, where ENVIRONMENTAL JUSTICE, HUMAN RIGHTS and even our very survival as a species may be at stake, requires more than a detached, analytical gaze. In its classical, Greek form, geography was closely associated with political and moral philosophy, and the luminous writings of the gentle anarchist geographer Pyotr Kropotkin (1842–1921) provided a rare, modern insistence on the importance of such questions. These were revived most effectively by David Harvey in the second half of the twentieth century, whose forensic dissection of late CAPITALISM through a close reading and reformulation of Marx's writings did much to alert human geographers to the ineluctable politics of their enquiries. This raised a series of questions about EPISTEMOLOGY and the limits of geographical knowledge that required a critique not only of geography's technical and conceptual armatures – including those derived from its newfound interest in MARXISM – but of (for example) the MASCULINISM that was reproduced through its concepts and practices (Rose, 1993). The ongoing formation of a CRITICAL HUMAN GEOGRAPHY, including CRITICAL GEOPOLITICS and FEMINIST GEOGRAPHIES, reinforced and generalized these concerns (see also RADICAL GEOGRAPHY). Physical geographers were by no means indifferent to them, but they seem to have been more directly moved by the consideration of an explicitly environmental ETHICS. Indeed, moral philosophies more generally have assumed such prominence alongside philosophies of science in contemporary geographical enquiry that some observers have discerned a 'moral turn' across the discipline as a whole (Barnett and Land, 2007; cf. Smith, 2000a; Lee and Smith, 2004).

The second consequence of orienting geographical enquiry towards change and the future has been a recognition that geography's responsibilities extend beyond a critical involvement in PUBLIC POLICY – important though that is – to a considered engagement in public *debate* (Murphy, 2006). This involves a more rigorous REFLEXIVITY: not only a careful and constructive critique of theories, methods and materials, but also an examination of the *circumstances* in which geographies are being produced and circulated and of the *consequences* in which they are implicated. This process might well begin 'at home', in the classroom and the lecture theatre, but it cannot end there. The late-modern corporate university, with its audit culture, its vested interest in the commodification of knowledge, and its incorporation of many of the modalities of NEO-LIBERALISM, materially affects teaching and research. At the same time, however, precisely because geographical knowledges are produced at so many sites outside formal educational institutions, public responsibility also involves a willingness to learn from and engage with audiences far beyond the academy, many of whose lives have been ravaged by the unregulated intrusions of the supposedly 'free' market, by new rounds of ACCUMULATION by dispossession and by the forcible installation of radically new geographies (Harvey, 2003b; Lawson, 2007). To analyse and challenge these impositions requires more than 'earth-writing' in its literal sense; geographers neglect the art of writing at their peril, but they also need to write in different ('non-academic') styles for different audiences, to explore new technologies and MEDIA, and to experiment with different modes of presentation. None of this is about experimentation for its own sake, because the new-found interest in PUBLIC GEOGRAPHIES is not only about producing counter-publics imbued with a critical GEOGRAPHICAL IMAGINATION: it is also, crucially, about learning from and engaging them in open and respectful dialogue. This matters because geography is not, as the old saw has it, 'what geographers do': it is, in an important sense, what we *all* do. Claims about 'the end of geography' have been made since at least the early twentieth century, but (then as now) they have also always been claims about the rise of new geographies and, less obviously perhaps, the grids of power that they forward (Smith, N., 2003c). 'Geo-graphing', whether 'professional' or 'popular', thus never works on a blank surface: it always involves writing over (superimposition) and writing out (erasure and exclusion: Sparke, 2005, p. xvi). Textbooks and dictionary entries are no exception. DG

Suggested reading

Bonnet (2007); Castree, Rogers and Sherman (2005); Livingstone (1992); Thrift (2002) [and subsequent debate].

geography, history of The term 'GEOGRAPHY' defies simple definition. The standard, non-specialist dictionary characterization of it as 'The science which has for its object the description of the Earth's surface' fails to capture the complexity of geography's history: the disorderliness of the past, to put it another way, resists ESSENTIALIST specification. As an enterprise – whether scholarly or popular, whether in terms of disciplinary history, discursive engagements or practical operations – geography has meant different things at different times and places. In fact, geographical knowledge and practice been intimately intertwined with a host of enterprises: natural magic, imperial politics, celestial cartography, natural theology, conjectural prehistory, mathematical astronomy, speculative anthropology, TRAVEL-WRITING, national identity and various species of literary endeavour. It is therefore understandable that there is no unchallenged consensus on what it means to write geography's history. And although the task of reconstructing geography's history has had its critics, some of whom are suspicious of the entire enterprise (Barnett, 1995), it would

not be unreasonable to suggest that some of the most significant interventions into recent debates on the relationships between knowledge, REPRESENTATION and POWER have emanated from those concerned with the ways in which geographical knowledge is constituted socially, historically and spatially.

As a professional *discipline*, geography's GENEALOGY is part and parcel of the story of the division of intellectual labour that delivered modern 'disciplines' around the end of the nineteenth century. It has been claimed that before this period, in particular during the period of the European ENLIGHTENMENT, the label 'geography', as the precursor of the modern discipline, had fairly specific connotations that distinguished it from other fields of endeavour through its focus on the determination of relative location and description of 'phenomena to be found in those locations' (Mayhew, 2001, p. 388). But it has been shown that boundaries around the subject were never quite so sharply delineated and that geography took various shapes in different texts, at different sites and in different practical pursuits (Withers, 2006). However that particular terminological debate is to be resolved, histories of geography as a DISCOURSE continue to be written without the definitional constraints that recent history and contingent institutional arrangements necessarily impose on the modern-day discipline. To be sure, the histories of geography as discourse and discipline are interrelated in intimate ways, and there is good evidence to suppose that recent practitioners of these enterprises deploy similar historiographical tactics, though there do remain differences of substance and style in the conduct of these two enterprises. The increasing acknowledgement too that geographical pursuits in the public sphere – popular geographies – are in need of further scrutiny parallels, in some respects, the surge of interest in social studies of popular science.

So far as the modern *discipline* of geography is concerned, then, those chronicling the course of historical change have conducted their investigations in a variety of ways. A range of different strategies has been pursued. First: institutional history. Those dwelling on the history of geography's institutions have concentrated on the subject's organizational expression, and accordingly have produced narratives of a range of GEOGRAPHICAL SOCIETIES, or have enquired into the evolution of geography in different national traditions. Such projects have tended to concentrate on geography's modern narrative, but even in its pre-professional guise, the subject's institutional manifestation was significant. Its presence in university curricula, for example, has been traced back to the period of the SCIENTIFIC REVOLUTION, when it was taught in conjunction with practices such as astronomy and practical mathematics (Withers and Mayhew, 2002; Livingstone 2003c). Yet there remains significant work to be done. For the English-speaking world, to take a single example, the dimensions of the Royal Geographical Society's influence on the mutual shaping of geographical knowledge and Victorian society still remain to be charted. In other national and provincial settings, similar questions are in need of resolution.

Second: biography. The life stories of a number of key professional geographers, including Halford Mackinder, Ellsworth Huntington, Mark Jefferson, William Morris Davis and Elisée Reclus, have been narrated. Some (though not all) of these accounts have been frankly disappointing in their lacklustre narrative line and an absence of historiographical sophistication, though N. Smith's (2003) more recent analysis of Isaiah Bowman displays a richness and depth to which other accounts could profitably aspire. Alongside these full-length studies, a suite of shorter biographical sketches of a wider range of figures continues in the serial *Geographers: Biobibliographical Studies*. Biographical treatments are also available of figures looming large in the history of the subject's pre-professional past, including more recently studies of Alexander von Humboldt (Rupke, 2005), George Perkins Marsh (Lowenthal, 2000) and Nathaniel Shaler (Livingstone, 1987b). New energy has also been injected into the biographical impulse by the pursuit of what might be called 'life geographies' or 'life spaces' – namely, by taking with much greater seriousness the sites and spaces through which human beings transact their lives (Daniels and Nash, 2004). Recent autobiographical experiments by geographers have also added to this perspective; these raise significant questions about the relative value of autobiography and biography, the difference between a 'life as it is lived' and 'a life as it is told', and the inescapable HERMENEUTIC complications involved in fusing present horizons with those of the past.

Third: histories of ideas. Alongside institutional history and biographical narrative, a number of works dwelling on the history of geographical ideas within academic geography have appeared. Some are specialist treatments of how modern geographical thought has engaged with wider theoretical currents (Peet, 1998); some rehearse the internal history of sub-disciplines (for HISTORICAL GEOGRAPHY, for instance, see Butlin, 1993); others have centred on school geography texts and their role in conveying imperial attitudes about RACE and GENDER (Maddrell, 1998). Cumulatively, works such as these demonstrate the diverse range of interests and styles employed to interrogate geography's academic history.

Contributions dealing with geographical *discourses* also come in a variety of guises and encompass a wide spectrum of topics. Beazley's (1897–1906) *The dawn of modern geography* emphasized the history of medieval travel and exploration; Eva Taylor's (1930) portrayal of Tudor geography centred on mathematical practice, surveying and navigation; and J.K. Wright's (1965 [1925]) account of the *Geographical lore of the time of the Crusades* rehearsed place description, cartographic ventures and cosmographical convictions in a project that self-confessedly covered 'a wider field than most definitions of geography' (p. 2). Newer ways of thinking about medieval geography have also recently surfaced, notably the researches of Lozovsky (2000), who explores medieval scholars' perceptions and representations of geographical space and its transmission. Glacken's (1967) monumental *Traces on the Rhodian shore* mapped the contact zone between NATURE and CULTURE, and openly acknowledged that he transcended the conventional limits of the modern discipline. Bowen's (1981) compendious survey of geographical thought from Bacon to Humboldt constitutes a sophisticated historical apologia for an ecological, anti-POSITIVISTIC vision of the subject. Alongside these treatments of geographical discourse is a range of related contributions dealing with allied subjects such as BIOGEOGRAPHY (Browne, 1983), meteorology (Anderson, 2005a), Earth and environmental science (Bowler, 1992; Rudwick 2005), CARTOGRAPHY (Edney, 1997; Burnett, 2000), oceanography (Rozwadowski, 2005) geomorphology (Davies, 1969; Kennedy, 2005), HUMAN ECOLOGY (Mitman, 1992) and ideas of Nature (Coates, 1998). In many cases, these undertakings have deepened connections between geographers and historians of SCIENCE, and opened up new and fertile lines of enquiry.

If these works are indicative of geography's long-standing location within the scientific tradition, there is equally abundant evidence for the subject's textual heritage that connects it with the HUMANITIES. Since the period of the scientific revolution, geography has also been concerned with matters of commerce and strategy, and also with regional descriptions (Cormack, 1997). This realization has led Mayhew (2000) to argue that early modern geography was deeply implicated in debates about political theology and cultural identity during the so-called long eighteenth century. The subject's intimate connections with historical scholarship, moral philosophy, speculative anthropology and various species of literary endeavour, alongside its association with natural philosophy, have thus been emphasized. One mark of this connection is the way in which geographical works depicted denominational spaces, the Dissolution of the Monasteries and political insurrection at the time of the English Civil War; thereby, the inescapably political character of regional description and geographical compilation is disclosed. Another indication is the extent to which writers such as Samuel Johnston and Shakespeare's commentators were concerned with matters of geographical sensibility (Roberts, 1991).

These relatively specialist studies are supplemented by a number of what Aay (1981) calls 'textbook chronicles' – synthetic treatments designed for student consumption that provide an overview of the field. It is now plain, however, that these surveys have all too frequently lapsed into apologetics for some particular viewpoint – geography as regional interrogation, the study of occupied space or some such. Moreover, their strategy was typically *presentist*, namely using history to adjudicate on present-day controversies (though the inescapability of certain dimensions of the present as indicated above need to be registered); *internalist*, in the sense that they paid scant attention to the broader social and intellectual contexts within which geographical knowledges were produced; and *cumulative*, portraying history in terms of progress towards some perceived contemporary orthodoxy. Scepticism about precisely these assumptions has fostered greater sensitivity to currents of historiographical thinking, and a range of strategies have therefore been deployed in the endeavour to deepen analyses of geography's genealogy.

Leaving aside their problematic reading of Kuhn, some have turned to his *Structure of scientific revolutions* (1970 [1962]) to characterize the history of geography as an overlapping succession of PARADIGMS enshrined in a number of key texts: Paul Vidal de la Blache's POSSIBILISM, Ellsworth Huntington's ENVIRONMENTAL DETERMINISM, Carl Ortwin Sauer's

LANDSCAPE MORPHOLOGY, Richard Hartshorne's AREAL DIFFERENTIATION and Fred K. Schaefer's EXCEPTIONALISM are typical candidates for paradigm status (see SCIENTIFIC REVOLUTION(S)). In such scenarios, however, a good deal of historical typecasting and editorial management has had to be engaged in. Others have taken more seriously the role of 'invisible colleges' and 'socio-scientific NETWORKS' (Lochhead, 1981). At the same time, perspectives from HISTORICAL MATERIALISM have been marshalled as a means of elucidating the way in which geographical knowledge and practices have been used to legitimate the social conditions that produced that knowledge in the first place (Harvey, 1984). Still others have seen in the philosophical literature on the cognitive power of METAPHOR a key to unlocking aspects of geography's history (Buttimer, 1982), through delineating the different uses of, say, mechanistic, organic, structural and textual analogies. The insights of Foucault on the intimate connections between SPACE, SURVEILLANCE, POWER and knowledge, and of Said on the Western construction of 'non-Western' realms (see ORIENTALISM) have also opened up new vistas to the history of geography by unmasking the pretended neutrality of spatial discourse in a variety of arenas both within and beyond the academy. The related need to open up conventional histories of geography to non-Western traditions is a real *desideratum*.

More recently, rapprochement with SCIENCE STUDIES has opened up new lines of enquiry in which the social constitution of knowledge and an empirical examination of actual knowledge-making practices have come to the fore. Barnes (1996, 1998), for example, has drawn on the methodology of social studies of scientific knowledge in his account of the history and conceptual structure of modern ECONOMIC GEOGRAPHY in general, and geography's QUANTITATIVE REVOLUTION in particular. Other applications of this general perspective within human geography are advertised in this *Dictionary*'s entry on SCIENCE (including SCIENCE STUDIES). Among these are the ACTOR-NETWORK THEORY of Bruno Latour, the so-called Edinburgh strong programme in the sociology of knowledge, a range of feminist epistemologies, the ethnographic methodologies of the micro-anthropology of science and various other constructivist perspectives. All of these combine to situate cognitive claims in the conditions of their making, and to render problematic distinctions between internal and external history of scientific knowledge.

Cumulatively, such calls for re-reading geography's history have contributed to a wide range of revisionist accounts of particular episodes, among which mention might be made of the links between magic, mysticism and geography at various times (Livingstone, 1988; Matless, 1991), geography's complicity in the shaping of imperial ambitions and national identity in the early modern period (Withers, 2001: see IMPERIALISM), the intimate connections between geography, EMPIRE, HEALTH and racial theory (Livingstone, 1991; Bell, 1993; Godlewska and Smith, 1994; Driver, 2001a), the relations between LANDSCAPE REPRESENTATION, artistic convention and denominational discourse (Cosgrove and Daniels, 1988; Mayhew, 1996), the circumstances surrounding debates over the boundary between geography and sociology in turn-of-the-century France (Friedman, 1996), the imperial mould in which early ENVIRONMENTALISM was cast (Grove, 1995), the relations between geography and TRAVEL-WRITING, and calls for feminist readings of the tradition (Domosh, 1991, Rose, 1995). There is a growing recognition too that the narrative of Western geography cannot be sequestered from its wider channels of intellectual exchange even in the early modern period. Patterns of TRADE and the transmission of knowledge between 'East' and 'West' played a major role in the shaping of various European geographies. As for practical engagements, Ryan's (1998) account of the connections between geography, photography and racial representation in the Victorian era, and feminist reflections on FIELDWORK have opened up these arenas to theoretically informed interrogation. Embedded within at least of some of these accounts is a conviction that 'geography' is a negotiated entity, and that a central task of its historians is to ascertain how and why certain practices and procedures come to be accounted authoritative, and hence normative, at certain moments in time and in certain spatial settings.

It is plain, then, that the 'history of geography' comprises a variety of enterprises that have been engaged in various ways. Nevertheless, a broad shift can be detected from the 'encyclopaedism' of earlier works (which operated in a cumulative-chronological fashion) towards a more recent 'genealogical' perspective (which aims to disclose the tangled connections between power and knowledge). The subversive character of the latter has been embraced with differing degrees of enthusiasm: some now insist that the idea of history as a single master narrative is a Western 'myth', while others, unenamoured of an altogether radical RELATIVISM (in which truth is taken to be relative to circumstance) or suspicious that the genealogist is implicated in an impossible self-referential dilemma (namely, that the thesis is self-refuting), suggest that there is more value in thinking of discourses as 'contested traditions' – socially embodied and temporally extended conversations that act as stabilizing constraints on the elucidation of meaning (MacIntyre, 1990). Insofar as 'encyclopaedia', 'GENEALOGY' and 'tradition' as modes of historical interrogation reflect differing attitudes towards what has come to be called the Enlightenment project, the history of geography – as a scholarly pursuit – has a significant role to play in debates within the discipline over the relations between knowledge, power, representation and SOCIAL CONSTRUCTION (Gregory, 1994).

Moreover, recent reassertions of the significance of PLACE and SPACE in historical investigations of human knowing (Shapin, 1998; Livingstone, 2003c) are bringing the issue of geography's own knowledge spaces to the fore. Thus attention is beginning to be directed towards understanding the different sites and spaces – at a range of SCALES – within which geographical knowledge is produced and circulates. Investigations of the PERFORMATIVE geographies in seventeenth-century court masques and triumphal processions (Withers, 1997), field sites and expeditionary settings as venues of geographical enquiry and evocation (Driver and Martins, 2005), museums as spaces of display (Naylor, 2002), archives and the construction of geographical knowledge (Withers, 2002), the use of personal diaries and field journals to reconstruct learning experiences (Lorimer, 2003), mission stations as imperial sites of local knowledge (Livingstone, 2005b), ships as instruments of geodetic survey (Sorrenson, 1996), and meteorological stations (Naylor, 2006) are illustrative of this spatial turn. The CITY itself – as a laboratory field-site – has also been investigated as an epistemic 'truth-spot' and thus fundamental to the credibility of certain scientific claims; this is exemplified *par excellence* in the CHICAGO SCHOOL of urban studies (Gieryn, 2006). Other venues such as CENSUS bureaus, GIS laboratories, botanical gardens, trading floors, art studios, fields of military operation (see WAR) and government departments – where geographical knowledge of various sorts is made and remade – are no less in need of interrogation. Interest too is developing on the ways in which geographical TEXTS have been read in particular locations, and of regional differences in what has been called reviewing cultures (Rupke, 1999). All this confirms that 'the history of geography' as an undertaking is now beginning (all too ironically) to take 'geography' much more seriously – namely, by reconceptualizing the enterprise as 'the historical geography of geographical knowledges and practices'. DNL

Suggested reading

Glacken (1967); Johnston and Sidaway (2004); Livingstone (1992); Stoddart (1986).

geo-informatics Geo-informatics is the interface and collaboration between the Earth and the information sciences (notably computer science) to use geocoded data (see GEOCODING) to better model, visualize and understand the Earth's complexity. More specific topics of research that have been included at the annual international conference in geo-informatics have included: discovery, integration, management and VISUALIZATION of geoscience data; INTERNET-enabled GEOGRAPHIC INFORMATION SYSTEMS (GIS); location-based services, including GLOBAL POSITIONING SYSTEMS; spatial data modelling in HYPERSPACES; REMOTE SENSING; and INTEROPERABILITY.

Looking at the research themes listed above, it is evident that the interests of geo-informatics overlap with those of GEOGRAPHIC INFORMATION SCIENCE and GEOCOMPUTATION. To find common ground is not surprising: each has an interdisciplinary nature, bound by an interest in geographical datasets and the computational requirements to store, process and make sense of them. Each also brings a spatial perspective to answer the questions of social and physical science (and also the interactions between social and physical SYSTEMS). And each is a young field of research, born out of much older traditions. However, whereas the origins of GISc are in navigation, CARTOGRAPHY, DEMOGRAPHY, RESOURCE MANAGEMENT and SPATIAL ANALYSIS, and the roots of geocomputation lie in using high-performance computing for applied SPATIAL SCIENCE, the seeds of geo-informatics were germinated in the geodetic (e.g. SURVEYING) traditions of engineering, geology, oceanography and other geosciences.

These geodetic and geoscientific foundations are revealed by the keen focus of geo-informatics on geographical data – their

e all academic disciplines, human graphy involves the interpretation of texts, lerstood as a corpus of written or printed erial; first-order texts such as CENSUS re- is, diaries and transcriptions (convention- called 'sources' – but this is misleading, e they are complex transcriptions and cod- , whose origins lie elsewhere, and they are often as not sedimentations of multiple, etimes contradictory layers of meanings); second-order texts (articles, monographs, onaries) that offer competing interpret- is of those interpretations. This may seem nonplace, but it is not: 'reading' and 'writ- are not often included in discussions of ODOLOGY, yet they are central to the prac- f geographical enquiry. They also have own geographies, and Livingstone a) has argued for an historical geography xtual circulation and interpretation. ced by ACTOR-NETWORK THEORY, he de- written texts as 'immutable mobiles', means that 'knowledge does not move the world as an immaterial entity'. tone argues that the production and re- of texts are practices that *take place* in l spaces, and that geographers should to the geographical conditions of the en- nt between texts and readers that trans- terpretations and exclude as well as audiences. In another sense, of course, es texts highly *mutable* mobiles: they are tly subject to new interpretations and new effects (Ogborn, 2007).

ideas have been extended still further all productions of MATERIAL CULTURE , including MAPS and LANDSCAPES. ork has been influenced by POST- RALISM and sees cultural productions ble practices of meaning-making. At- s focused on a multiplicity of compet- nings: hence ambiguity, volatility and of interpretation. The core argument ne principal characteristics of written also describe social life: meaning n texts is concretized through inscrip- social practices are concretized in rial landscape; as authors' intentions reception of texts often fail to coin- ocial practices become detached from ciousness of agents whose collective onstitute such practices; written texts rpreted under changing circumstan- social events are continually reinter- ad as the meaning of written texts is and dependent on interpretations of o social action and institutions are multiplicity of interpretations.

Post-structuralism has had a considerable influence on the reading of maps as texts (Harley, 1989; see CARTOGRAPHY, HISTORY OF), but readings of landscape as text have a more complex genealogy (Duncan and Duncan, 1988). Although cultural geographers have long regarded landscapes as palimpsests of culture–nature interactions to be read by specialists, notably themselves, many of those who have adopted the METAPHOR of landscape as text have eschewed the role of the 'expert decoder' in favour of an ostensibly reciprocal approach to landscape interpretation that moves in a HERMENEUTIC circle. A key influence here has been the recovery of multiple layers of meaning through the THICK DESCRIPTION of American anthropologist Clifford Geertz (1926–2006) rather than their destabilization through the DECONSTRUCTION of Derrida. Geertz's hermeneutic–ETHNOGRAPHIC approach to culture as text has guided the recovery of multiple readings proffered not by experts on the history of a generic landscape type but, instead, constructed by people who inhabit a particular landscape and who mobilize different readings as part of a politics that is central to its lively production and transformation (Duncan, 1990). And yet the recovery, reproduction and transmission of those constructions and contestations for a wider public audience is hardly the work of non-experts: not only do 'first-order' and 'second-order' texts bleed into one another, but the composite textualizations provided by Geertz may be read as the articulations of 'an invisible voice of authority who declares what the you-transformed-to-a-they experience' (Crapanzo, 1986, p. 74; see also Gregory, 1994, pp. 147–8).

Many geographers have questioned the usefulness of the text metaphor altogether, arguing that it leads to an over-emphasis on communication, intentionality and the discursive rather than the material or unintended (cf. NON-REPRESENTATIONAL THEORY). Defenders of the metaphor respond by arguing that cultural productions with text-like qualities (such as landscapes) are heterogeneous, material realities that are mutually constitutive with reading practices and interact with other non-human processes. It is also argued that landscapes are normally read inattentatively or subconsciously, so that the norms and values that shape the landscape become naturalized and unconsciously absorbed. There are further differences of opinion on the degree of fluidity or stability of cultural practices and productions, and on the extent to which interpretations are constrained by discourses. However, an expansive definition of text need not assume in advance of empirical investigation any particular degree of stability, instability or constraint. Fluidity versus stability is a matter of emphasis, not an either/or question. JSD/DG

Suggested reading

Barnes and Duncan (1991); Duncan (1990); Ogborn (2007).

textuality In many versions of POST-STRUCTURALISM, 'textuality' refers to the expansion of the term 'TEXT' to include cultural practices and material productions such as architectural forms and LANDSCAPES that may be read for meaning, connotation and contestation (cf. Barnes and Duncan, 1991; Duncan and Duncan, 1998). Such meanings are regarded as inherently unstable and incessantly recontextualized so that defined in this way textuality *is* indecidability. To investigate the textuality of the world is to investigate the PERFORMATIVITY of DISCOURSE: the ways in which meanings and objects are produced, contested, negotiated and reiterated. To view the world textually is also to see cultural productions as becoming detached from their authors and reinterpreted and recontextualized by interpreters as their relations to those productions change in often complex and unexpected ways. A textual approach thus brings into play indeterminancy, and involves both the denial of an unmediated access to the world and a critical questioning of notions of authenticity and ESSENTIALISM. It focuses attention on the relations between texts and between their multiple contexts of production, reception and reinterpretation: on the play of *intertextuality* through which texts draw on other texts which in turn draw on other texts...

Textuality is sometimes seen to be compromised by the danger of *textualism*. This concern has two proximate sources. First, Said's critique of ORIENTALISM has been immensely influential in HUMAN GEOGRAPHY, not least in expanding and 'worlding' texts, and asking what these cultural productions – these 'doings' – *do* in the world. Said uses the term 'textuality' in an opposite way to that described above, however, to disparage an over-emphasis on the mechanics of the text at the expense of the mechanics of the material world outside the text (cf. Smith and Katz, 1993). Second, Derrida's famous remark that 'there is nothing outside the text' has often been used to accuse him of precisely this sort of textualism. To the contrary, however, Derrida's point was that there can be no pre-discursive, non-contextual and non-intertextual understanding of the world: context is vital to his method of reading texts (see DECONSTRUCTION). Worries about textualism are real enough, and serious questions have been raised in human geography about the limits of the text METAPHOR and the privileges that it smuggles in to critical enquiry through its focus on cognition, meaning and interpretation (see NON-REPRESENTATIONAL THEORY). JSD

theory The term 'theory' is used in various senses in the HUMANITIES and social sciences. At its broadest, theory can be understood as any set of statements and propositions used in explanation or interpretation. From the perspective of various versions of POSITIVISM, theory is subordinated to the tribunal of empirical validation – theories generate HYPOTHESES that are tested against evidence, with the aim of generating general laws. In this tradition, the value of a theory lies in its predictive ability and explanatory power. In geography, this notion of theory was associated with the QUANTITATIVE REVOLUTION, and was distinguished by the attempt to develop uniquely *geographical theories* as the hallmark of a distinctively SPATIAL SCIENCE. The development of various post-positivist approaches has led to a shift in the meaning of theory in the discipline. These approaches all share the view that there can be no theory-neutral observation, and that the validation of any theoretical proposition is underdetermined by empirical evidence. Rather, theories are viewed as at least partly constitutive of the objects of empirical study (cf. DISCOURSE). This leads towards forms of *grounded theory*, wherein empirical observation, concrete analysis and abstraction are combined in ongoing dialogue with one another (Sayer, 1992 [1984]).

Since the 1980s, there has been a veritable explosion of theory in HUMAN GEOGRAPHY. Graff (1992, p. 53) argues that theory *breaks out* in disciplines when 'what was once silently agreed to in a community becomes disputed, forcing its members to formulate and defend assumptions that they previously did not even have to be aware of'. This idea of theory 'breaking out' is particularly pertinent to the increasing presence of cultural theory in human geography (see CULTURAL TURN). This is both a mark of heightened division within the discipline around methods and objects of

research, but also of an opening out to other disciplines. The interdisciplinary or even post-disciplinary nature of the theory circulating through human geography has become increasingly evident in the past two decades: if in the 1980s the agenda of MARXIST-inflected human geography focused on the spatialization of SOCIAL THEORY, since the 1990s the heightened GEOGRAPHICAL IMAGINATION of other disciplines has generated original contributions to the theorization of traditional topics such as LANDSCAPE, PLACE, SPACE and SCALE (Gregory, 1994).

This pluralization of the sources of theory has also been associated with increasing attention to the *politics of theory*. From within geography, the growth of post-positivist approaches was closely associated with Harvey's (1973) distinction between revolutionary, counter-revolutionary and status-quo theories. Geographers have also used Habermas' (1987a) analysis of the different forms of human interest sustained by distinct types of theoretical knowledge, with its explicit argument that 'critical theory' best serves the causes of human emancipation (see CRITICAL THEORY). Human geographers' treatment of the relationship between theory and politics has, however, developed beyond this idea that some theories harbour inherent political virtues in themselves, towards a more REFLEXIVE focus upon the forms of authority embedded in the practices of 'doing' theory. Three related issues have attracted attention:

(1) Geographers have been sensitive to the phenomenon of TRAVELLING THEORY. A great deal of theory now circulating in geography has been 'imported' from other disciplines, and this in turn allows geographers to talk across sub-disciplinary divisions and out to other scholars. But this raises contentions questions about expertise, competence and the external validation of positions staked internally within the discipline. Theory also has a real geography of its own. For example, most theory in the humanities and social sciences is actually produced and published in the USA, and more broadly in 'the West' (Barnett and Low, 1996). Other parts of the world are often not accorded value as sources of theoretical insight, being relegated to the status of sites for empirical investigation. This raises the challenge of 'learning from other regions', where this refers to the acknowledgement of versions of theoretical work belonging to traditions beyond the confines of Western Europe and North America (Slater, 1992: see also ETHNOCENTRISM; EUROCENTRISM; SITUATED KNOWLEDGE).

(2) Building on this first issue, there is a set of concerns about the types of interpersonal authority embedded in the prevalent modes of theoretical commentary in human geography. Theory, and not least cultural theory, is associated with forms of mastery that construct patterns of closure, emulation and influence that belie overt claims to political radicalism (cf. MASCULINISM). FEMINIST writers have been particularly creative in developing new *styles* of theoretical writing that challenge these prevalent forms of academic reasoning (Katz, 1996: see also MINOR THEORY).

(3) In its self-consciously 'critical' forms in particular, theory is often understood as a tool for exposing the contingent, constructed qualities of phenomena, as an instrument for debunking IDEOLOGIES, mythologies and misrepresentations. In turn, theory is often assumed to be an essential aspect of any practical politics of radical social transformation. This is indicative of a deeply rooted 'scholastic disposition', whereby it is assumed that the detached insights accorded to sceptical academics provide a privileged entry-point for changing the motivations of ordinary people and the mechanics of worldly processes (Bourdieu, 2000). In response to this sort of scholastic attitude, Thrift (1999a, p. 304) recommends what he calls *modest theory*, understood as a 'practical means of going on rather than something concerned with enabling us to see, contemplatively, the supposedly true nature of what something is'. NON-REPRESENTATIONAL THEORY is meant to exemplify this notion of modest theoretical practice. However, its characteristic modes of presentation reiterate many of the rhetorical devices of distinction and exclusion associated with conventional forms of GRAND THEORY.

GEOGRAPHY remains a discipline deeply suspicious of theory, heavily invested as it is in notions such as 'the field', 'empirical work', 'politics' and 'practice'. These notions are often invoked to sustain their own forms of authority, closure and exclusion. Debates about relevance in the discipline often take the form of arguments that there is *too much* theory in geography, or too much of the *wrong sort* of theory. When faced with such arguments, it is always best to remember a simple dictum: 'Hostility to theory usually means opposition to other people's theories and an oblivion to one's own' (Eagleton 1983, p. viii). CB

Suggested reading
Bourdieu (2000, chs 1 and 2); Gallop (2002); Garber (2001); Hammersley (1995).

thick description A term coined by the philosopher Gilbert Ryle (1971) and introduced into the humanities and social sciences by the anthropologist Clifford Geertz (1973b), 'thick description' refers to rich ethnographic descriptions based on intensive investigations of informants' actions and their interpretations of their own practices placed within their cultural context. It is an intrinsically HERMENEUTIC method that recovers and represents the researcher's interpretation of informants' interpretations.

Thick description is contrasted with 'thin description' based on the tenets of behaviourism, where a detailed description of the informants' contextualized meaning systems is considered unnecessary (cf. BEHAVIOURAL GEOGRAPHY). Thick description is usually produced through grounded, long-term ethnographic research, based on (principally) QUALITATIVE METHODS applied to small-scale settings (see ETHNOGRAPHY), but it has also been used in intimate, archive-based historical research with considerable success (Darnton, 1985). Thick description is not simply about collecting details: it is about uncovering the depth of multiple, intersecting webs of meaning within which individual actors understand their own actions. Geertz conceives of individual behaviour as informed by complex, situated conceptual structures that are culturally and historically produced. As such, behavior is best interrogated contextually to reveal the systematic quality of 'cultural patternings' that are 'extra-personal institutionalized guides for behavior'. These are emphatically not 'essences' of broader cultures studied in a microcosm, the 'Jonesville is America writ small' model that Geertz dismisses as 'palpable nonsense'. An important implication of this cultural patterning is that social life has a public, TEXT-like quality to which all who share in a CULTURE interpret, negotiate and contribute. It then follows that ethnographers and other like-minded scholars must 'read over the shoulder' of those whose culture they study. Cultures as meaning systems intertextually infuse all forms of social practice, and Geertz also saw cultural texts as literary texts to be looked at critically and not just through. Such a textual orientation (see TEXTUALITY) made him an important early figure in the cultural turn across the social sciences, and in opening up conversations between the social sciences and the HUMANITIES. Geertz's influence spread well beyond anthropology into the work of the New Historicists in literary studies and the work of the New Cultural Historians (see HISTORICISM). In CULTURAL GEOGRAPHY, his writings influenced Duncan's (2004) interpretation of the symbolic/political system of the Kandyan kingdom in Sri Lanka.

Geertz's 'cultural patterning' perspective has been critiqued in anthropology for allowing little space for the inner, private, non-cultural components of the self. Thus while Geertz was instrumental in shifting anthropology from a focus on social structure to the interpretation of meanings, his analysis remains somewhat structural. However, this is not to say his approach is at all REDUCTIONIST or determinist. He rejects tight arguments and conceptualizations 'purified of the material complexity in which they are located'. He sees structures of meaning as historically specific, fluid, fragmentary, negotiated and situational. The researcher's interpretations are interpretations of the interpretations of others and thus are always open to contestation and deeper grounding in ongoing, changing cultural meanings systems. That said, among human geographers the textual conception of culture that underpins Geertz's project has been critiqued by Gregory (1994, pp. 148–8) for its structural stasis and by Rose (2006) for its emphasis on representation, meanings and consciousness (cf. NON-REPRESENTATIONAL THEORY). JSD

Suggested reading
Geertz (1973a,b); Rose (2006).

third space A space produced by processes that exceed the forms of knowledge that divide the world into binary oppositions. Bhabha (1990b) argues that third space is a consequence of HYBRIDITY, suggesting that certain forms of post-colonial knowledges challenge the division of the world into 'the WEST and the rest' by producing third spaces in which new IDENTITIES can be enacted (see POST-COLONIALISM). For Bhabha, third space is a position from which it may be possible 'to elude the politics of polarity and emerge as others of ourselves' (1994, p. 39). Some