

# 1 Geographical visions: the evolution of human geographic thought in the twentieth century

Peter Gould and Ulf Strohmayer

*My utmost ambition is to lodge a few poems  
where they will be hard to get rid of.*

—Robert Frost

The poet's ambition speaks to other realms. Throughout the twentieth century, and particularly in the latter half, it has been the ambition of successive generations of geographers 'to lodge a few poems where they will be hard to get rid of' – in other words, to set the professional discipline of geography on such a sound conceptual and methodological footing that it will be hard to dislodge it from the true and rightful path revealed. Have any groups succeeded? The general answer, in this eclectic discipline, must be no. And yet, as each phase has appeared and disappeared, it has left a residue, a kernel of insight that has given geographers much enhanced methodological competence, as well as deeper conceptual perspectives viewed from positions of greater sensitivity, which have developed as a result of more critical and reflective traditions (Abler 1999).

In this first chapter, we seek to present critically some of the key positions and voices that have shaped (or attempted to shape) the discipline as a whole. Needless to say this cannot but be a highly selective attempt and one that is influenced by the interests and generational affiliation of its authors. These limitations, among others, will become apparent in the relative space allocated to pre- and post-Second World War developments within the discipline. As such, this essay will provide a context for the chapters to follow, as it concentrates on the philosophical positions and theoretical issues that surround the more topical debates within human geography. In the interest of the volume as a whole, we have made every effort to reduce repetitive overlaps with subsequent chapters. The overall aim of this introductory chapter is to provide a context for what is to follow rather than to give its readers a definitive account of theoretical considerations. Given the scope of the present undertaking, any pretence of comprehensiveness would be dwarfed by the sheer number of traditions and voices that demand to be heard. The relative neglect of many important voices from this chapter –

Harold Mackinder, Vidal de la Blache and Carl Sauer, to name but a few – is thus in no way intended as a negation of their importance for twentieth-century human geography.

Throughout, we have attempted to give weight to individual practitioners contributing to change within the discipline just as we have sought to do justice to the power of structural conditions shaping geographical discourses. Clearly, the precise mechanisms through which individual creativity and persistence contribute to (and are in turn shaped by) networks of power, technologies and institutions within a discipline and beyond constitute one of the more hotly contested subject domains within the social and human sciences today. The following pages will not attempt to resolve the issue; they will, however, be quite content to provide some material for future discussions.

## STANDING IN THE NINETEENTH-CENTURY HERITAGE

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The roots of geography, considered broadly as a sense of place and space, go back a long way in human history. It is not our intention here to imply in any way that geography ‘started in the nineteenth century’, even though these were the years that saw many geography departments emerge in universities in Europe. In an essay looking back on the changes in twentieth-century geography, we can only tip our hats to Herodotus, and many other Greek writers, who wrote thoughtfully about the conjunctions of the physical and human worlds (Staszak 1995). And the same polite but cursory acknowledgment must be given to the geographers, cartographers, navigators and explorers who opened their own worlds to other peoples, places and civilizations, all the while introducing other worlds to the often one-sided power of mercantile and later industrial forms of capital (Livingstone 1992; Wallerstein 1974, 1980).

But centuries are arbitrary demarcations, and justice demands that we point to a few geographers of the eighteenth century who laid a thoughtful foundation of teasing questions, not least of which was the notion that the natures and characteristics of human beings were largely a product of physical environmental conditions and thus differed across space. The theme of environmental determinism would provide a powerful organizing concept right up through the first quarter of the twentieth century, a concept that received full expression in Montesquieu’s concern for the effects of soil and climate on human nature. Thus a broad theme of spatial variation took its place in human geography.

This was soon challenged by Johann Herder, who, perhaps more than any other of his time, extolled a sense of *Bodenständigkeit*, a sense of being at home, of rootedness or a sense of place. This still made room for pleasure in the great spatial variety of places and people throughout the world and, more importantly, for respect for indigenous cultures that in turn informed the revival of cultural relativism in ethnography and anthropology characteristic of those working in the non-imperialistic tradition of the twentieth century (Boaz 1928; Herskovits 1962). Further dissent with the position of

environmental determinism came from Immanuel Kant, who was prepared, on occasion, to elevate geography to the status of a universal science. His dissent was shared by Alexander von Humboldt, even as he acknowledged the intimate relationships between plant life and soil variations in micro-climatological conditions. Indeed, so powerful were the voices antagonistic to environmental determinism in human affairs, that we remain astonished that it maintained its strong, eventually almost ideological, position in geography through the nineteenth and early twentieth centuries. The students of empire may be less amazed, but the longevity of this seventeenth-century doctrine remains a puzzle nevertheless.

So although there are ancient roots to geographical curiosity and inquiry, the heritage of the past hundred years stems from the mid- to late-nineteenth century. While von Humboldt's *Kosmos* (1845) and Elisée Reclus' *Nouvelle Géographie universelle* (1876–94) may have been prominent in the homes of educated Europeans, it is difficult to characterize the overall inheritance as 'rich' in any genuine intellectual sense. In the USA, most geographies were texts for schoolchildren (one or two were required reading for freshmen in a few colleges and universities), and all tended to be strongly oriented towards physical geography, with some facts thrown in about the human world – although generally these were presented in list form only. The physical emphasis would continue to dominate through to the 1920s. Human geography was largely presented as environmental determinism, despite George Perkins Marsh's splendid, and deterministically inverting, *Man and Nature, or Physical Geography as Modified by Human Action*, published in 1864, and *The Earth as Modified by Human Action*, which appeared in 1874. The gradual softening of the environmental deterministic paradigm may be seen in the language of Ellen Churchill Semple, as 'determinism' becomes 'control', which elides into 'influence' and finally 'adjustment' (Martin 1998: 10).

Some European influences were felt in the USA during this period – a pertinent example would be the writings of Arnold Guyot from Switzerland, introducing the writings of Carl Ritter – but the stronger, though still highly ephemeral, influences from France, such as Jean Bruhnes, Paul Vidal de la Blache and the annual lectures of Raol Blanchard of Grenoble at Harvard, would not arrive until the late 1920s. Geoffrey Martin (1998: 11) has described geography's development as a university subject as 'punctiform', a most appropriate adjective capturing the 'on again, off again' nature of geography's representation at major universities. In the USA in particular, the 'off again' would continue to characterize the fate of a number of departments, such as those at Harvard, Yale, California (Santa Barbara), Michigan and Chicago, well into the 1970s.

In Europe itself, geography became reasonably securely established, frequently as an arm of imperial conquest and colonization. An early and quite singular chair of geography had been held by Carl Ritter at Berlin since 1820, but it was not renewed upon his death. In German-speaking Europe generally, Vienna (1851) and Giessen (1864) were the first genuine departments (Taylor 1985a), but over the next half-century, virtually every university formally founded departments of geography. Like many departments, their purpose was twofold: to train teachers for the growing state school system and to be useful to the worlds of expanding commerce and imperialism. These aims were not viewed by other scholars as reasons for university status, and the

nineteenth-century need for constant justification would be felt well into the twentieth century.

## A CRITICAL TRADITION

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What geography lacked in the first half of the twentieth century was a general critical tradition, in contrast to the second half, in which a critical tradition slowly emerged, although still occasionally focusing on the person or the ideological base rather than the ideas (Symanski and Agnew 1981). As a small, emerging discipline, in which many professional geographers were acquainted with one another through national and international meetings, many felt that criticism would be taken personally, misinterpreted or simply provide fuel for those perceived to be antagonistic to geography's presence in the university. Much time and effort was spent defining and redefining 'geography' – time which, with hindsight, might have been better spent in geographical inquiries with some intellectual depth, commanding the respect of others.

Such a background of intellectual insecurity informed two important events in the USA. The first was the founding of the Association of American Geographers (AAG) in 1904. It rapidly led to an exclusive club, in which further memberships were formally proposed and voted upon. Only real, professional and research-oriented geographers were to pass such exacting standards. This led to a revolt, a renegade group calling themselves the American Society of Professional Geographers, advocating a larger, much more public and involved membership, including students who would form the future of the profession. Differences would be resolved in 1948, when the two groups joined again as the AAG at the annual meeting in Madison, Wisconsin, but the mark of division can still be discerned in the two publications, the *Annals of the AAG* and *The Professional Geographer*. In Europe, the teaching of geography had a firmer foundation, and geography's emergence as a university discipline, although not without its difficulties, had an easier time, not least because of the long and splendid tradition of scientific exploration and the cosy ties to the rampant imperialism so characteristic of the late nineteenth century.

The second event was the publication of Richard Hartshorne's *The Nature of Geography* (1939), a text through which a whole generation would wade in order to learn the true chorographical path of the discipline. Written in Germany and Austria in 1937–8, it claimed that geographical inquiry should focus exclusively on spatial distributions and their possible juxtapositions, and that geographers had no business dealing with time, process and the emergence of change in such geographical distributions, which would be a 'poem' dislodged. Alfred Hettner (1927) was frequently invoked as a source of authority for the chorographical path to geographic enlightenment, and he was not averse to using what was essentially his own journal, the *Geographische Zeitschrift*, to excoriate young upstarts like Hans Spethmann (1928, 1936), who dared to think in dynamic terms and had the temerity to write a three-volume work on the development of the Ruhr. Yet Hettner, strongly influenced, like many educated Germans of the time, in Kantian and neo-Kantian philosophy, was himself

equivocal. And as Lukermann points out (1983, 1989), Kant never separated what were for him fundamental dimensions of the human world – space and time.

What strikes us, looking back, is the total lack of any critical appraisal of a work that was to have such an intellectually dominating effect upon a whole generation of geographers, many of whom, in eastern and midwestern universities, were forced to write as the first chapter of their dissertations a justification of why they were constraining their research to the chorographic tradition. Critical dissent did exist, although it was so muted it was never heard in public. Carl Sauer, writing to John Leighly, was scathing about *The Nature of Geography* and its excision of time from space (Bancroft Library Archives, Berkeley), but we have no public evaluation. Jacques May's (1970) mild, diffident, but deeply informed appraisal was essentially dismissed out of hand (May 1972). Elsewhere, *The Nature of Geography* appeared to make little impact, receiving only one review by John Wright in 1941 in *Isis*, a history of science journal. These were the war years in Europe, and other matters became more important. In Sweden, as Stefan Helmfrid (1999: 27) has noted, '... the Hettnerian anathema of time series in geographical analysis was never really understood or accepted ...'. An older, strongly intellectual tradition of landscape evolution and historical geography would inform a later emphasis on spatial dynamics and change, invoked in new and highly imaginative ways.

In many ways, however, the climate contextualizing the reception of Hartshorne's *magnum opus* was indicative of the 'taken for granted' positions within geography in many countries. Often referred to as the idiographic tradition, it was characterized not merely by its overt emphasis on descriptive methods and techniques, but also lent credence to a cumulative, conflict-free vision of geography as a science, with a unique but largely homogeneous point of view. Despite different national traditions, it was this rendition of geography that reigned supreme throughout the first half of the twentieth century; in fact, the existence of different national traditions made the persistent lack of critique and alternative visions all the more easy to maintain within national boundaries.

## POST-WAR DEVELOPMENTS AND CHALLENGES

It is as dangerous to assign strict boundaries to time periods as it is to draw strict lines on a map separating regions. Nevertheless, the years immediately following the Second World War saw a definite sea change in the way geography, as a teaching and research enterprise, began to be conducted. One question, easily posed but difficult to answer, was what the influence was of wartime experiences upon those returning to teach and learn (Balchin 1987). For those who held university teaching positions before the war, the answer appears to be very little. Many in Britain spent much of their energy compiling factual handbooks about the various theatres of war (Tuan 2001) or marshalling cartographic evidence about the physical conditions of potential invasion sites – neither task particularly helpful for post-war teaching or research.

In the USA, a number of American geographers served in the Office of Strategic Services (OSS), the forerunner of the Central Intelligence Agency (CIA). A few have made much of this 'nefarious' connection, but only in the light of subsequent cold-war developments and particular ideological stances that became prominent in the late 1960s. While there appears to be no intrinsic reason to condemn geographers and other scholars for their involvement in the OSS, the link that was thus re-established between the state as a recognized source of power on the one hand and science on the other proved to be one of the points of most heated debate in the late 1960s. True, many scientists served their country in the best way they could and in a cause they saw as just. In the case of German geographers, however, this 'service' in the years leading up to and throughout the Second World War was anything but a neutral and benevolent involvement of science with power, as the slowly unravelling history of geography's complicity in the justification and maintenance of the Nazi state makes abundantly clear (Sandner and Rösler 1994).

In the sphere of theory, wartime activities of factual compilation and the production of handbooks reinforced the 'checklist approach', discussed frequently at the time for the pertinence of the items to be included. Whether geography saw itself as *Landeskunde* (the knowledge of countries or places) or regionalism (*géographie régionale*) matters little in this context; what is important is a persistent deficiency, the almost complete erasure of temporal aspects from the realm of geography, facilitated by a widespread 'collector's ethos' prevailing within the discipline in most countries. But in this business-as-usual tradition, there is a small caveat to be made. In the USA in particular, several future professional geographers entered graduate schools after serving as meteorological officers in the European and Pacific theatres of war, namely John Borchert, Edward Taaffe, William Garrison and William Wartz. The first three would go on to become presidents of the AAG, while William Wartz would produce one of the most remarkable macro-perspectives on the discipline, including a prescient work drawing a direct analogy between the advance of weather fronts and what he would call 'income fronts' (Wartz 1965). John Borchert (1961) essentially opened up the dynamic study of cities, while Edward Taaffe's studies of airline passenger traffic were grounded in the dynamics of central place structures and their interactions. All four men had spent past years with questions of spatial dynamics, process and time inherent in weather maps and forecasts, so to return to an atemporal chorographic tradition must have seemed bizarre. As for William Garrison, whose applied research always looked to the future effects of transportation development, he simply noted: 'The Hartshornian world never bothered me because I thought it was just dumb' (Garrison 1999).

Unfortunately, the unchallenged authority of the chorographic imperative still moulded thinking in most eastern and midwestern universities of the USA, although the intellectual connections between checklist compilations and deeply informing regional syntheses were too shallow for a number of universities with high standards of scholarship. Although particular local conditions were clearly influential, geography departments were dismissed at Harvard, Yale and Stanford and were never appointed at many other universities with strong liberal arts traditions. Sometimes even the popular press got wind of a particularly egregious case of 'gut courses' and banal instruction

(*Time Magazine* 1963) and such adverse, but generally well-deserved, publicity generally hastened the case for dismissal – for example, at Yale.

With the intensification of the cold war, feelings of anti-communism reached fever pitch in the USA, exacerbated by the notorious hearings of the House of Un-American Activities Committee (HUAC) and the accusations liberally broadcast by Senator Joseph McCarthy and his aides, such as Richard Nixon. It is difficult, two generations later, to invoke the fearful feelings of the time, when prominent people from the State Department and other branches of the government, major foundations – especially those with an Asian (particularly Chinese) connection – and even Hollywood actors, directors and writers were pulled up before the bullying HUAC questioners. Nor were academics immune, particularly those whose writings had expressed sympathy for the ordinary people of Asia and criticized the corruptions of the Chang Kai-Chek regime, which had received the support of the USA since before the war.

The case of Owen Lattimore is particularly, and quite deservedly, notorious, for it involved not only a scholar of Johns Hopkins who was an acknowledged world authority on Mongolia and China, but a man denounced on the flimsiest of grounds: snatches of conversation at a picnic overheard by a fellow geographer, George Carter. ‘One must understand the pathology of that decade’, wrote Robert Newman in a definitive study of the Lattimore case (Newman 1992), and that may be precisely the problem for those who come later. The academic world, too, was marked by fear, and few were courageous enough at the time to stand up in support of those under suspicion.

The feelings of the time also permeated attempts to honour prominent scholars from abroad. In the early 1960s, for example, the Association of American Geographers (AAG) attempted to honour the theoretical contributions of central place theory by Walter Christaller, then living a penurious existence in his native Germany. Unfortunately, as a young man, and during the despairing years of the 1920s, Walter Christaller had joined the Communist Party for a few months. This was enough to condemn two successive visa applications in 1964 to visit the USA to receive a prestigious award at the AAG annual meeting, and it was left to Sweden to publicly honour this theoretical pioneer with a gold medal a few years later.

## LATER POST-WAR DEVELOPMENTS AND CHALLENGES

It was against this backdrop that the most momentous of breaks in the theoretical orientation of human geography took place. Initiated from within key university locations, mostly on the west coast of the USA, and against considerable resistance, a new orientation gradually moulded human geographic practice according to its premises and ideals. Nowadays mostly recast as the ‘quantitative revolution’, this revolt actually had a much wider spectrum and broader set of goals than such a designation would have us believe. At stake was little short of the status of geography as a rigorous science. With a new wave of graduate students entering expanding, not to say explosive,

university systems, voices of discontent began to be heard that were unnerving to an older generation grounded in traditional and authoritarian ways (Lukermann 1983, 1989; Butzer 2001). Any 'narrative of revolt' is difficult to pen in a simple linear fashion, because signs of moving forward to more intellectually demanding topics and methodologies developed at many places (Billinge, Gregory and Martin 1984), but there appear to be three fairly consistent themes of influence common to most attempts to rethink the future directions of geographic inquiry and, therefore, teaching.

The first of these was the courageous though difficult to define influence of Walter Isard at the University of Pennsylvania. Isard had become dissatisfied with the totally aspatial aspects of traditional economics. In his first book (Isard 1956), the initial publication of which he had to pay for himself (subsequent editions and later volumes were paid for by MIT Press), he brought attention to the works of earlier economists and geographers, including Heinrich von Thünen (1826), the extraordinary and pioneering work of August Lösch (1954) and the theoretical geometries of central place systems proposed by Walter Christaller (1966). These works, never previously offered to graduate students, provided not simply a body of informing spatial theory, but also a realization that there were more intellectually demanding ways of approaching and describing geographical phenomena (Haggett 1965). Hartshorne could dismiss von Thünen with a one-liner, but those in daily contact with Third World agricultural students (Chisholm 1982) or those trying to elucidate almost identical patterns of development in America's older cities (Bunge 1962) had very different, empirically informed views.

With a growing awareness of theoretical issues came a realization that appropriate methodologies were badly needed. It is this relation between theory and methodology that marks the second theme of influence: the extraordinary conjunction of students working under William Garrison at the University of Washington in the late 1950s and the similar, but somewhat less innovative, stirrings at Iowa and Northwestern Universities. Those in the Washington group, later to be nicknamed the Space Cadets, clearly had a catalytic effect upon each other, exploring and then sharing methodologies and topics, virtually all of which were empirically grounded. It must be noted that those who took part in this quantitative revolution had all received thoroughly traditional undergraduate educations in geography, but went on to graduate school with a sense that there was a higher level to achieve. Brian Berry (1966, 1967) quickly became known for his pioneering work in central place studies; William Bunge's concern for spatial theory became well-known when his *Theoretical Geography* (1962) was finally published in Sweden, after being excoriated by traditional American reviewers; Waldo Tobler (1962, 1993), perhaps the only true analytical cartographer of the twentieth century, led pioneering work in map projections, transformations, 'winds of influence' and many other areas of cartographic analysis and expression; while Richard Morrill (1970b) was the first to use optimization techniques (linear programming) for such topics as physician care and patient services.

This was also the time that the computer, utterly archaic by today's standards, emerged as a practical way to undertake the computations for advanced multivariate methods and optimization procedures. Duane Marble, another of the Washington group, became



highly adept at writing 'pre-language' computer instructions and was instrumental in furthering a number of methodological breakthroughs. It was the sheer practicality of computing, combined with Richard Morrill's astuteness in recognizing the expanding conditions of possibility for asking geographic questions that previously had been unthinkable, which introduces the third theme informing the quantitative sea change then taking place.

Sweden, with a traditionally strong concern for landscape evolution, appears to have taken for granted the dynamic possibilities of geographic research. There seems to have been an openness to new approaches combining space and time, at least in a few, highly innovative geographers at the University of Lund. The full story is complex and cannot be explained here; suffice to say that a childhood friend of Torsten Hägerstrand, Karl Erik Fröberg, a physicist who had built Lund's first and very primitive computer SMIL, returned from a visit to the USA, where he had come across a mimeographed copy of a paper presented by the mathematicians John von Neuman and Stanislav Ulam, on the Monte Carlo methods used to compute the thickness of concrete shielding around some of the first atomic reactors. Given the heterogeneous nature of concrete, classical mathematical approaches were intractable. At the time, Hägerstrand had moved on from a series of detailed studies of out-migration (1949) and was focusing on the spread of ideas and innovation in Swedish farming. His subsequent research on the diffusion of innovations (Hägerstrand 1952, 1953) using Monte Carlo methods stands as the first use of this methodology in the social sciences as a whole. In 1959, he spent a semester at the University of Washington, where Richard Morrill was quick to realize the potential of these methods, subsequently spending a post-doctoral year at Lund, where he conducted studies in the dynamics of central place systems (Morrill 1965a) and then applied this same approach to 'blockbusting', and all its ugly ramifications, in highly segregated neighbourhoods in the USA (Morrill 1965b).

The second 'Lund voice' was that of Sven Godlund, whose innovative studies of changes in transportation and central place structures were outstanding for their time (Godlund 1956). Yet two other 'Baltic voices' must be acknowledged. The first is that of Edgar Kant, formerly of the University of Dorpat in Estonia, who escaped to Sweden ahead of the advancing Russian armies. Holding a personal chair, his encouraging influence is acknowledged by all those who were postgraduate students at the time, not least for his ability to recall innovative ideas published up to a century before in the eight different languages that were familiar to him (Hägerstrand 1983). The second is that of Reino Ajo in Finland. Rejected by the 'folklorists' of his day for a permanent university post, he supported himself and his family as an inspector of automobiles in Turku, while conducting highly innovative studies (Ajo 1953, 1955). These were often hard times for innovators in a highly conservative discipline.

## THE REACTION OF THE TRADITIONALISTS

But no science ever progresses in a uniform manner. Instead, shifts in emphasis, aim and methodology – in short, shifts in 'paradigms' (Kuhn 1962) – compete with older

theories and practices for some time before new hegemonies emerge, if they emerge at all. In the case of the displacement under investigation, it is extremely difficult, at the beginning of this century, to give an account of the degree of vituperation and vindictiveness often contained in the reactions of traditionalists and be believed (Gould 1979; Warntz 1984). Most of the evidence that could document the vehemence of the reaction consists of highly ephemeral material – letters, reviews, etc. – some of which were circulated at the time, only to be thrown out as people cleared out old files as they reached retirement. After all, it occurred a long time ago. Yet Carl Sauer (1956), with geomorphologists and climatologists in his department at Berkeley, could write with a sneer: ‘Enumeration we can leave to the census takers’, while Richard Hartshorne (1939), warning neophytes of the dangers of bringing time into geographic studies, wrote: ‘the purpose of such dips in the past is not to trace developments’, thus dismissing one of the strongest intellectual traditions of the time in historical geography. In Britain, we have the now amusing, but then deadly serious, confrontation of Professor Steers of Cambridge with a young Peter Haggett, whom he accused of ‘bringing the discipline into disrepute’ (Chorley 1995), after a presentation at the Royal Geographic Society using trend surface analysis in an innovative way (Taylor 1976).

With the reactions came a high degree of ‘gatekeeping’ by traditional editors. Joseph Spencer, editor of the *Annals*, became notorious for the sarcasm in his letters of rejection, many of which were circulated, while the then editor of *Economic Geography* reluctantly wrote that no paper submitted for review would be sent out if it contained mathematical notation. An exception was Wilma Fairchild, editor of *Geographical Review*, who was much more open to new ideas clearly expressed. And so, parallel to the gatekeeping, came the first ‘discussion papers’ in geography, produced on shoestring budgets by individual departments such as Washington, Iowa, Ohio State, Pennsylvania State and the consortium of Michigan, Michigan State and Wayne State Universities known as the Michigan Inter-University Community of Mathematical Geographers (MICMOG). Such attempts to bypass the traditional journals and circulate freely new ideas for comment and criticism were a harbinger of new geographical journals to come in the 1970s (chief among them *Progress in Human Geography*, possibly the first geographic journal aimed at a general audience that acknowledged a growing alienation between physical and human geographers), a development which was to continue sporadically as new fields of specialization and new challenges came into view, along with the necessities of publication for promotion and tenure which become more and more intense over the next few decades.

## INCREASING THE METHODOLOGICAL CONDITIONS OF POSSIBILITY

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In these days of readily available software and powerful personal computers, it is difficult to recall that these are relatively recent developments of the last two decades of the twentieth century. Many software packages allow ready access to highly sophisticated,

multivariate and optimization techniques, some so sophisticated that users may easily become misusers. Sometimes, for example, canonical correlation may only expose canonical ignorance, for an interpretation of empirical analysis depends on knowing exactly what is going on between data input and output. Early users formulating field theory, examining relations between traditional concepts of homogeneous and functional regions (Berry and Garrison 1958a and c) or the effects of lag and lead on infrastructure investment and regional growth (Gauthier 1968), grounded themselves thoroughly in a highly complex and sophisticated approach that only became practical with the growth of computing power. Too often taxonomic algorithms were 'taken off the shelf' – they came in many varieties producing somewhat different results – and used without much thought about the set of things being partitioned by an equivalence relation (Gould 1999). Users of multivariate techniques often invoked standard tests of significance, unaware that a fundamental assumption underlying them was almost certainly broken in any problem of the slightest geographic interest.

Yet one must be aware that question posing and methodological advances may be two sides of the same coin. While traditionalists decried (sometimes quite rightly, albeit for the wrong reasons) methodological applications for their own sake, we must realize that new approaches opened up thinking and questioning that were literally unthinkable before. Good examples would be linear programming, which raised seriously and for the first time in geography whole questions of normative possibilities based on practical optimization procedures. And in Leslie Curry's conceptual thinking based on queuing theory (1966, 1998), the whole notion of random processes and a random spatial economy appeared for the first time. What is thinkable, and therefore what is approachable from an entirely new perspective, becomes a new 'condition of possibility' for geographic inquiry.

As for testing theory – using the word in the traditional sense recognizable by all the physical sciences, where a statement, a positing of how things are, may be accepted conditionally but may be refutable in the Popperian sense (Popper 1959) – the new methods often made significant contributions. Unfortunately, the meaning of 'theory' has become so general, often used as little more than a cachet of intellectual respectability, that it now stands as a general term for almost any body of speculation, testable or not (Strohmayer 1993). Nevertheless, the term invokes one of the most remarkable, if generally unremarked upon, developments of geography in the latter half of the twentieth century: namely, the confrontation of the sheer spatiality and specificity of place inherent in geography with bodies of 'theory' in other overlapping or osculating fields.

## CONFRONTING THEORY WITH GEOGRAPHY'S CONCERN FOR SPACE AND PLACE

Largely implicit in our rendition of the turn towards more challenging and mature theories in the wake of the quantitative revolution is a specific relationship between

genuinely geographic theories and those imported from other disciplines. The shift away from idiographically confined regional concerns and the incorporation of time into geographic analyses was felt at the time by many as a development of the latter at the expense of the former. Those critical of change professed a wistful nostalgia for bygone days, with clearer boundaries and a more pronounced academic division of labour. But a real concern remained – and remains to this very day: is it possible simply to ‘spatialize’ theoretical constructions or methods developed in other contexts, for different goals and by dissimilar disciplines?

We acknowledge at once here the influence and perspicacity of David Harvey. He was the first to note explicitly the way in which the aspatial theoretical constructs in adjacent disciplines began to disintegrate when confronted with space and place, often to the point where theoretical concern had to be rethought, radically modified or abandoned altogether. Working from a Marxist perspective, he insisted that the dominance of nineteenth-century temporal and historical thinking was inadequate, and that for any attempt to ground research in Marxian theory, the theory itself had to be modified and rethought to include the geographic fundamentals of the specificity of place and the generality of space (Harvey 1982). Today, after the turn of the millennium, with a marvellous variety of local cultures under fire from ‘Coca-Colarization’, and with small nations being constantly hammered by the multinational corporations hunting for the next ‘spatial fix’, we can see how extraordinarily perceptive he was.

But a number of other examples of confrontation are available. Perhaps the earliest stems from the research of Tjallingis Koopmans and Martin Beckmann (1957), as they tried to maintain price – the Holy Grail, not to say fetish, of economics – as the mechanism capable of producing equilibrium in locational assignment problems, while accounting simultaneously for agglomerative effects. Yet as soon as transportation costs were introduced, neo-economic theory fell apart. So disquieting was this development that the authors delayed publication ‘for several years’ (Koopmans and Beckmann 1957: 71) and they pleaded with their fellow econometricians to come to the rescue.

A third example of a discipline confronting the spatiality of geography was the collision of spatial analytical methods with the assumptions of what was then classical statistical theory. After a number of inappropriate invocations of tests of significance, including the temporal and spatial independence of observations, both geographers and statisticians realized that crucial assumptions underlying both parametric and non-parametric tests of significance seldom, if ever, held in problems of the slightest geographical interest (Gould 1970). In both spatial and temporal problems, true independence of observation would simply produce the ‘white noise’ of a time series, or the oxymoronic random pattern of the map – neither, by definition, containing information of the faintest interest to the geographer. It is true that Ronald Fisher, working on early experiments at the Rothamsted Agricultural Experiment Station, recognized the effects of spatial heterogeneity in field trials (Fisher 1958) and devised elaborate block designs to overcome some effects (Fisher and Mackenzie 1922; Fisher and Eden 1929; Fisher and Wishart 1930). But such concerns appear to have been confined to experimental design in the analysis of variance, and the related problem of

spatial autocorrelation does not appear to have been involved or invoked (Cliff and Ord 1973).

Closely related is aetiology's and epidemiology's virtual abandonment of the nineteenth-century heritage of mapping disease occurrences and their subsequent spatial developments. Here we have a distressing case of techniques – mainly time series analysis and related approaches – becoming so prominent that they shape the thinking of a whole discipline. For most modern epidemiologists, time is dominant, made all the more attractive by canned programs of differential equations which extrapolate often sensible initial assumptions into banal and generally useless conclusions. The notion that there might be a geography as well as a history to an epidemic, that valuable scientific information might be contained in spatial series, appears to have been forgotten. Yet at a time when 13 million people fly between Los Angeles, Houston, Chicago, New York and Miami each year, one would expect some sense of the spatial to penetrate epidemiological thinking concerned with the intervention and control of new diseases. There is some evidence that spatial series are beginning to emerge once again as data of interest. A concern for the geographic clustering of cases never entirely disappeared (Mantel 1967), and many recent advances in this most difficult area of marshalling evidence have been led by geographers (Bailey and Gatrell 1995), often in collaboration with challenged and concerned statisticians.

The confrontation of geography's spatiality with adjacent fields continues; in the case of the new-found interest in cosmopolitanism by political scientists, it continues in a real sense, since the concern goes back to the publication of Kant's essay 'Perpetual Peace' (Habermas 1998). Kant, aware of difference in a world literally opening up, and never quite comfortable with it, recognized the 'contrast between the universality of [his] cosmopolitanism and [his] ethics and the awkward and intractable particularities of his geography . . .' (Harvey 2000: 535). Harvey continues: '. . . Kant's geography is heterotopic. Cosmopolitanism cast upon that terrain shatters into fragments. Geography undermines cosmopolitan sense' (2000: 536). This particular confrontation constitutes an insertion of space and place in yet another attempt to formulate social theory as a universal framework within which *all* human life is viewed. Only theoretical constructs which take into account the spatiality of the world from the very initiation of their development will stand as pertinent constructs to knowledge that may be pleased to call themselves genuinely useful and illuminating.

## LATER REACTIONS TO QUANTIFICATION AND SPATIAL SCIENCE

Every reaction produces a counter-reaction as new perspectives make ever greater claims, which begin to receive increasingly hostile criticism (Hanson 1999). Perhaps the classic case is Romanticism's rise in the early nineteenth century contra the sometimes excessive claims of the Enlightenment (Berlin 1999), although sweeping statements

such as these tend to obscure the subtleties and complexities of important eddies forming in mainstreams. Yet there is no question that opposition emerged to the essential mechanism that lay behind much of the quantified sea change of the 1950s and 1960s.

The first was a challenge less to the methodological orientation of the evolving landscape of spatial science than to its behaviourist underpinnings. Where much of the early quantitative work was constructed around largely implicit models of what caused and influenced human behaviour, these models gradually took on a life of their own and began to mature into fully fledged psychological approaches to the analytical problems caused by the acceptance of sub-optimal spatial distributions or patterns, or outright irrational human behaviour (Lowenthal 1961; Wolpert 1964; Saarinen 1966). The best known development of the resulting interest in the spatiality of human perception is probably the evolution of 'mental maps' as a distinct area of geographical knowledge (Gould and White 1974).

In hindsight, the turn towards environmental perception clearly paved the way for a second challenge that is customarily summarized as the rise of 'humanistic geography'. This movement owed its designation to its attempt to bring back human beings to centre stage in human geography, a position from which a number of geographers thought they had been displaced by the functional mathematics and 'geometricizing' of the spatial turn. The fundamental concern was woven from a number of strands, prominent among which were wide-ranging Christian influences, from Catholicism to Welsh Evangelical Protestantism, and more philosophical approaches that attempted to incorporate phenomenological insights into geographical research (Seamon 1979). Basic human (read western) values were often ignored (Buttimer 1974), both in approaches and topics chosen, and a desire to bring out the truly human element within a more general analysis began to be exemplified in research programmes (Ley 1974). There was a sense that much of the world, both nationally and internationally (Webber and Rigby 1996), was a miserable and unjust place for many human beings, and that geography's business-as-usual approach to research too frequently resembled those who walked by on the other side in the New Testament parable of the good Samaritan.

It was also a sense of justice, sharing Marx's horror and outrage in the mid-nineteenth century's traumatic years of the Industrial Revolution, which mobilized the highly influential turn to the Marxian perspective and its economically grounded analysis. Few would deny that David Harvey's *Social Justice and the City* (1973) was a major catalyst. Applications of rent surfaces might account for similarities in some locations within the land use patterns of America's cities, and topological inversions might account for the *favelas* of Latin America and the growing rings of slums in some European cities, but what about the plight of the real human beings living in such conditions? The search for deeper explanations occurred during the rise of other, then radical movements (the vehement protests against the war in Vietnam, etc.), and confrontations between 'quantitativists' – who came to be viewed as the Old Guard – and those who saw enlightenment in Marxian analysis became increasingly bitter. So bitter, in fact, that some who had made the running in the late 1950s and early 1960s now appeared to be little more than technologically motivated practitioners. Many, who may not have been

persuaded entirely by the Marxist turn, were markedly sensitized by the underlying current of concern for a more decent and just world. It is difficult to document such an increase in social sensitivity, but many chose research topics trying to illuminate injustice at home or turned their attention to relationships of power between north and south, centre and periphery. Many subsequent developments in, or incorporations into, geographic theory from the late 1970s onwards – including feminism, the rise of ecological concerns, postcolonialism and the study of hitherto underrepresented groups in society at large – find their roots and take their motivation from such a perception of injustice.

If the idea of justice was shaping and continues to shape the passions of many engaged in the Marxist turn, its importance derives equally from its advocacy of a new and different conceptualization of theory within human geography (Peet 1977). Put briefly, this emerged as a direct challenge to the linearity of the causal relations that were at the heart of the quantitative revolution. ‘Scientific Marxism’, in particular, insisted on the importance of treating geographical relations as the outcome of processes rather than as spatial patterns. Since all such processes were historical, they could, in effect, be changed, a fact customarily rendered invisible by pattern-orientated, ‘positivist’ pursuits of geographic knowledge (Smith 1979a). As a particular form of practice, Marxist geography derived much of its force from the ensuing claim for the necessity of socially useful forms of geographic knowledge (Lacoste 1977; Harvey 1984). But it is the insistence of Marxists on the link between theory and the procedural character of social reality that was of lasting influence: it was through this crucial nexus that ‘social theory’ gained widespread acceptance within the discipline at large (Gregory 1978a). What is more, the most intellectually challenging outgrowths in recent geographic theory, such as the rise in postmodern (Dear 1988; Hannah and Strohmayer 1992, 1995) or post-structural thinking (Doel 1999) and the turn towards network-oriented modes of analyses (Bingham 1996; Hinchliffe 1996), all emerged in a manner reminiscent of the emergence of Marxist geography in the early 1970s: from critical analyses of the perceived general failures of homogeneous theoretical assumptions or epistemological foundations (Claval 1980). In the context of the 1980s, and as we might expect in this narrative of reaction and counter-reaction, the Marxist perspective was to receive challenges in its turn, not least of which was the charge that it was a nefarious ‘meganarrative’, ignoring a number of ‘constituencies’ – although it was sometimes difficult to see anything particularly geographic in these otherwise perfectly legitimate concerns.

Predicting future developments is a hazardous occupation, and even as various confrontations were being played out in the 1970s and 1980s, a development of enormous geographical importance was beginning. Few had the prescience to recognize the rise and impact of geographical information systems (GIS), and even the most astute seers could not have imagined the developments and ramifications based on modern satellite and other technologies. Such an important emergence requires an interlude in this narrative before returning to the latest challenges and developments, but an interlude with great import for geographic inquiry and the infusion of spatial thinking into many other areas of modern life.

# GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

So rapid was the emergence of geographical information systems (GIS) in the last 20 years of the twentieth century, and so swift was their impact on many applied sciences and areas of practical affairs, that it might be tempting to consider them as a separate and distinct field. This would be a mistake, however, ignoring the roots in more traditional forms of cartography and geographical analysis and their strengthening relationships to GIS (Brewer 1999; Brewer and McMaster 1999). Five main strands can be discerned in the rise of GIS, the beginnings of which owe much to David Simonett's (1964) vision in the 1960s of the then seemingly futuristic potential of combining satellite sensing and the orders of magnitude increases expected in the speed and capacities of computers (Simonett and Brown 1965; NASA 1966). It was he who persuaded the National Aeronautics and Space Administration (NASA) to sponsor a conference on what was then the distant future at the end of the century, a future that was to arrive with breathtaking speed. John Pickles (1999), quoting Stephen Hall (1993), notes that the rise of GIS is '... arguably the greatest explosion in mapping, and perhaps the greatest consideration of "space" (in every sense of the word) since the times of Babylon'.

The first strand is represented by the sheer technological advances in remote sensing, advances that were made possible by the colossal investments in instrumentation and satellite launching systems by government agencies, particularly NASA and its branches, such as the Jet Propulsion Lab (JPL), but also by its European equivalent, the European Space Agency (ESA). Hyperspectral cameras, the result of NASA and JPL developments, now record up to 224 bands for 1 m pixels and, quite apart from planetary sensing, they are used increasingly for earthbound ecosystem management, agriculture, mining, hazardous waste clean-up and many other applied uses (Robbins 1999). Terabyte capacities are required to run the software, and one Environmental Protection Agency (EPA) project cleaning up Leadville, Colorado gathered the data in 45 seconds, but required 10 months to analyse it!

The second strand lies in traditional cartography and its age-old concern to represent human and earth phenomena at various scales. Since such concern must be shared by those wishing to transform electronic impulses into useable and useful forms, it is hardly surprising that relationships between cartography and GIS today sometimes make certain strands in both virtually indistinguishable.

The third informing strand is the quantitative analytical tradition that arrived in the late 1950s and early 1960s with the quantitative revolution. From its inception, the analytical tradition was entwined with the map as a source of data, an effective medium of presentation and a possibility for visually effective spatial transformations. Harold Moellering (1991) has noted: 'Analytical cartography... has become the core of modern GIS'. The early developments are closely associated with, if not inspired by, the research of Waldo Tobler (1966), who pioneered work on effective data compression, map projections and transformations, and many other analytical approaches.

The fourth strand is essentially political; it is the desire of government agencies (in the US context, particularly NASA and the Defense Mapping Agency) to demonstrate the



way in which military and planetary research contains great potential benefits for civilian use. Such practical applications make good fodder for congressional sympathies for increased funding. Those in the academic world, whose research can demonstrate its usefulness in problem-solving within a clearly defined context, are generally welcomed by such agencies, which show their appreciation in the form of generous research and institutional grants. As ever, the relationship between empirical geographic research and power, which is expressed in the approval or disapproval of research funds, is a highly complex one; suffice it to point to the discrepancy between the official – and often industry-backed – total funding provided for GIS-based projects and the lack of funds made available to other, seemingly less relevant, projects.

Finally, the fifth strand consists of a growing concern across many applied scientific fields for the question of visualization (MacEachren 1994; MacEachren and Kraak 1997), particularly the animation of sequential data to disclose dynamic phenomena that sometimes would never be suspected, let alone seen (Fisher 1993). As a result of the workings of all five strands, it is difficult to think of a greater contrast in geographical research than ‘the map writ large’ in 1900 and 2000. While other areas of important research – one such being the History of Cartography Project inspired by Brian Harley and David Woodward (1992–4) – still have discernible roots in the nineteenth century *fin-de-siècle*, the overwhelming technological advances of the past 30 years have literally revolutionized cartography by its association with GIS and the concomitant developments opening out into the twenty-first century.

Almost as an aside, and despite the emphasis placed on remote sensing as the major provider of GIS data, it must be noted specifically that GIS is a development allowing entirely new analytical approaches, as opposed to simply carrying out older, and now traditional, approaches more quickly. It is in this context that a progressive use of new technologies manifests itself most rigorously. A prime example is Stan Openshaw’s Geographical Analytical Machine (GAM), first used to establish scale-examined clusters of leukaemic children around the atomic reprocessing plant at Sellafield in northern England (Openshaw *et al.* 1988). By organizing the data in a GIS format, he was able to examine 9 million hypotheses of clustering at many scales to establish the fact – initially criticized heavily (to no avail) by conventional statisticians hired by the atomic industry – that there was indeed the strongest of evidence that high densities of leukaemic children were associated with spatial proximity to the reprocessing plant. This, along with other highly imaginative data-dredging and exploratory approaches to huge data sets, makes GIS a methodological development undreamt of 30 years ago.

In fact, so rapidly have GIS methods and perspectives penetrated many civilian and academic areas of concern, that a new Center for Spatially Integrated Social Science has received large-scale funding at Santa Barbara. At least part of the difficult dream of bringing the social sciences back together may be realized by the growing recognition of the spatiality inherent in all human phenomena. Geography and space appear to be taking their rightful place alongside history and time after a century of neglect, as well as the realization of new opportunities and perspectives opening into the next century.

The developments have not been without their critics, as some involved in the developments of GIS appear either unaware, unreflective or oblivious to its social implications and the way in which such taken-for-granted developments can create a 'world' of thinking that goes unexamined (Schuurman 2000). The first signal that a critical stance should be taken came from Brian Harley (1990), who pointed to the subtexts of traditional maps (typically within national, not to say nationalistic, atlases). His penchant for 'Deconstructing the map' (1989) was taken up in a GIS context by John Pickles (1995), who was concerned that the social implications of the exploding geographical information systems were not being examined and thought through. In particular, he was concerned that those extolling the possibilities for the democratization of GIS – and all that meant in terms of providing 'everyone' (that is to say, the relatively rich with personal computers) with vastly increased access to spatial information – seemed to be ignoring the simple fact that many important developments and databases were within often secretive businesses, government agencies and centres of military planning. Another disturbing aspect of the GIS revolution, increasingly loaded with its virtual reality paraphernalia, is that it may resemble all too closely '... the display technologies of panorama, arcade, world exhibition, and shop-window of end-of-century Imperial Paris' (Pickles 1999). At the beginning of the twenty-first century, we face greatly increased possibilities for re-presentation. One can only hope that they are used wisely, thoughtfully and with a sense of justice by those practising these skills and embedded within institutional frameworks that develop representational techniques for non-propagandistic ends.

## THE NON-QUANTITATIVE TRADITION

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As we suggested earlier in this chapter, broadly conceived quantitative methods and approaches were not alone in shaping the overall picture of the discipline in the second half of the twentieth century. The last quarter of the century, in particular, witnessed the emergence and gradual solidification of a number of alternative visions and practices within human geography, three of which we should like to discuss in this penultimate section. Instrumental in the rise of critique to an unprecedented status within human geography was beyond doubt the changed perception of politics that originated in the late 1960s in general and in the worldwide civil unrest during the summer of 1968 in particular (Wallerstein 1991). The most important of outcomes of this watershed, from a scientific point of view, was the critique of the boundary separating science from politics. If before 1968 most social and human scientists held on to the belief that their scientific activities could be described as 'neutral' practices contributing to some greater good, after 1968 this belief gradually became a minority position. What most geographers today would accept as the 'social construction' of science in general takes its roots in this politicization of human geography in the 1970s.

This, then, was not a critique that sought to contrast an alleged 'objective' form of human geography with more 'subjective' approaches. While such a response had been instrumental in the 'humanist' reply to the quantitative revolution, it was now seen

increasingly as a mere sidestep where a more radical approach was needed. Aided by the eventual proliferation of new journals like *Antipode* and *Society and Space* in the United States, *Hérodote*, *Espaces et sociétés* and *EspacesTemps* in France, new forms of social theory began to transform the landscape of geographic epistemology. We have already mentioned the Marxist turn earlier in this chapter. The 1970s witnessed a gradual refinement of Marxist approaches in geography, culminating in its convergence with humanistic concerns in the appraisal of 'structuration theory' in the 1980s (Thrift 1983). This refinement is all the more remarkable since it incorporated a strand of genuine geographic theory that had originated in Scandinavian geography. 'Time geography' was seen by many at the time as a solution to the problem of how to render theoretical claims about society more geographic in kind (Carlstein, Parks and Thrift 1978; Pred 1981); what is more, its two-dimensional weaving together of space and time appeared to hold the key to moving human geography beyond the chorological impasse (Hannah 1997). A similar motif may well have been the driving force behind a second strand of refinement in Marxist geography: the enormous interest sparked by work of Henri Lefebvre and his notion of the 'production of space' (Merrifield 1993; Unwin 2000).

But Marxist geography was not alone in responding to the call for a 'progressive' and 'engaged' form of geographic inquiry; feminist approaches, in particular, heeded the call and developed their own brand of geographical theory. Influential at first as a call for inclusiveness and as a critique of concrete practices within a host of sub-disciplines (Monk and Hanson 1982), feminist geography gradually developed a theoretical agenda of its own. This included, among other issues and topics, a reinterpretation of the uses and structures of specific places (Massey 1984; England 1993), a reappraisal of wider methodological issues in human geography and a critique of underlying assumptions within geographical theory as such (Rose 1993).

Implicit in many of the theoretical advances and propositions of this time was a turn towards 'everyday' forms of geography. This was most apparent in the reappraisal of 'culture' as a broad theme in much geographic writing during the 1980s and 1990s, but it also left a mark in the ongoing development of many other theoretical positions. For example, the eventual convergence of many of the theoretical strands mentioned earlier in this chapter into ever smaller and more refined elements of social reality – be they called 'daily' or 'life paths' (time geography; Dyck 1990), 'performances' (humanistic geography; Crang 1994), designated by specific sexual preferences (Valentine 1993) or the 'body' (feminist geography; McDowell and Court 1994) – is indicative of this desire to 'ground' empirically theoretical claims in concrete experiences. It should thus come as no surprise that this *de facto* reduction in analytical scale in geographic analyses quite effortlessly incorporated an emerging focus on language that took place elsewhere in the social and human sciences (Pred 1990). This 'linguistic turn', and the simultaneous elevation of 'discourse' to centre stage, highlighted both the textual nature of knowledge (Curry 1996; Barnett 1998a) and the importance of representation in human geography (Barnes and Duncan 1992; Duncan and Sharp 1993; Grant and Agnew 1996).

A similar change affected geographic thinking and visions of nature and the environment. Where a previous century saw fit to hypothesize 'nature' in the form of a

largely constant context, the turn towards cultural modes of explanation increasingly constructed environmental factors through discourse and contestation. ‘Nature’ here emerges both as a social construct and as shaped through particular manners of representation (Henderson 1994; Willems-Braun 1997a), resulting in a certain historicizing of the conceptual apparatus sustaining particular notions of ‘nature’ (Fitzsimmons 1989; Demeritt 1994), which can be contrasted with the notion of environmental determinism in order to gauge the distance separating human geography at the end of the twentieth century from its earlier predecessors, thus introducing a useful notion of difference and critique into environmental discourses in general (Harvey 1996a).

These changes may well have resulted in a loss of causalities across a host of contexts, but in our view they represent a clear gain in topological breadth in general and focused analyses of geographical realities in particular. Here, as elsewhere, the importance of the kind of ‘spatial thinking’ that is embedded in human geography appears best promoted not through grandiose theoretical claims, but by attempts to illuminate concrete conditions of existence everywhere. From Harvey’s writing about the plight of workers in the meat industries of the American South (Harvey 1996b) to the works of Sibley and Cresswell on spatial means of exclusion within modern democracies (Sibley 1995; Cresswell 1996), from analyses of the implications of legal constructs on people’s everyday lives (Chouinard 1989; Blomley 1994; Peters 1997) to historical studies of systemic features of imperialism (Gregory 1995a) – just to mention a number of remarkable geographical projects of recent origin – the discipline appears to be in a healthy state indeed. A state, we hasten to add, that is further enriched by the sheer explosion of methodological possibilities within the discipline. The old dichotomy between qualitative and quantitative forms of research – which had been implicit in many of the debates surrounding the quantitative revolution – has been shattered for good: just as GIS multiplied the different possibilities available to anyone with a knack for numbers, so the non-numerical canon has been opened up with the help of largely ethnographic insights and practices (Katz 1992; Cook and Crang 1995), which has led to a multiplication in choices for anyone interested in ‘alternative’ scientific practices (Rocheleau 1995; Sharp 2000). Here again, the recognition of ‘language’ is at the forefront of developments (Tuan 1991).

## POSTMODERNISM AND THE RELATIVISTIC TURN

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The forms of critique we have portrayed in the previous section of this chapter all share, to some extent, a concern for neglects and injustices brought forth by (an increasingly globalized) society at large. Whether this is represented as ‘capitalism’, ‘patriarchy’ or ‘colonialism’, or some complex intertwining of the three, matters little at this juncture; what is important is that these considerations obey a certain normative imperative to produce knowledge that is both critical and useful. Yet there is another strand of

geographical theory that attempted to shed some light on this connection between critique and usefulness that has become known as a postmodern form of geographic inquiry. Questioning common assumptions about the accessibility of reality and the desirability of stable theoretical constructs, postmodern ideas erupted with some fanfare in human geography in the early 1980s (Dear 1988; Claval 1992b) and have since led to a broad field of inquiry (Harvey 1989) that remains ill defined and somewhat fuzzy around the edges (Benko 1997). Dreaded by some because of an alleged inability to make clear distinctions and an ‘anything goes’ attitude, postmodern geography has nonetheless initiated a set of radical new practices within human geography. The best known of these are probably those attempts to redefine parts of social reality as postmodern in one way or another. Urban areas appear to be the main focus of this kind of analysis, with Edward Soja in particular proclaiming and analysing the intrinsically postmodern metropolis, Los Angeles, where new forms of urbanism are explored and contrasted with older, ‘modern’ forms of planning (Soja 1989, 2000; Dear and Flusty 1998).

Different in kind from these considerations are those ‘postmodern geographies’ that do not make claims about a new and postmodern era and its alleged characteristics, but attempt to mount a critique of ‘modern’ scientific approaches to social reality as such. Where paired with a creative licence and wit, the latter can produce often startling insights about language and its role in the creation of geographic knowledge and practice (Olsson 1991; Doel 1999). What unites both strands is a concern for the heterogeneity of human existence and a perceived failure of traditional geographic inquiry to do justice to such differences. Yet the most obvious consequence of the geographic flirtation with postmodernity has certainly been a change in attitude within the discipline as a whole. The ‘plurality’ of geographic knowledge, once a byword for unresolved theoretical issues, has become the norm. This is all the more surprising given that even conflicting forms of knowledge are increasingly accepted and placed alongside one another. In short, ‘geography’ begot ‘geographies’, often within the space of a single paper.

This increase in diversity has led to a further significant influence of the postmodern on the discipline: the novel awareness of often incompatible ‘positionality’ that situate knowledge within specific cultural contexts (Rose 1997). To what extent this insight circumscribes degrees of incompatibility between different forms of knowledge remains to be seen; at the very least, it forces the discipline to rethink the manner in which it has achieved some degree of consensus in the past. One of these – the strategic deployment of dualities, where stable theoretical configurations like ‘numerical’ and ‘non-numerical’ or ‘public’ and ‘private’ were used to guarantee the status of knowledge – had already been questioned by feminist geographers. Now it was to become a fruitful practice in many areas of human geographic inquiry (Demeritt 2000). The determined attempt to dislodge these (and other) ‘modern strategies’ is sometimes referred to as ‘deconstruction’ (Harley 1989; Barnes 1994) and has perhaps yielded the most promising insights in the growing field of postcolonial geographic research (Gregory 1994; Barnett 1997; Sidaway 2000); however, the extent to which this strategy can be categorized as postmodern remains a subject for debate (Doel 1999).

What unquestionably has become more difficult through these interventions is the construction of coherent bodies of geographical knowledge. Knowledge in today's rapidly changing academic world has become more akin to a socially constructed crossword puzzle, where some pieces fit while others do not and where the overall picture is not known to anyone at the beginning, rather than representing solid pieces of reality uncovered (Haack 1998; Curry 1998). Sustaining the analogy, we could further lament the continued fragmentation of geographic insights into crossword puzzles bound by specific national traditions; all too few are willing to shed light on the construction of other people's knowledge puzzles. The global hegemony of English as the prime medium through which scientific insights are communicated has to some extent helped to overcome this problem; at the same time, however, it has eliminated a wide array of practices from the fold (Beaujeu-Garnier 1983). Synthetic disciplines (such as geography), in particular, are threatened by many of these developments in that the fragmentation of concerns both within and outside the discipline proper results in ever smaller audiences (witness the explosion in the number of geographical journals during the 1990s). At the same time, however, the fragmentation of the human sciences in general has arguably led to an increased reception of geographic knowledge within such diverse fields as cultural and gender studies, regional and urban studies, or within the realm of more philosophically oriented interests like postmodernism or feminism. Whether the discipline as a whole stands to profit from this evolution remains to be seen.

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## CONCLUDING THOUGHTS

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The often disparate image of the discipline notwithstanding, there are a number of clearly identifiable epistemological issues that run through many of the debates and theoretical positions taken up by various practitioners within human geography. It is to these that we would like to turn as we conclude this chapter. The first of these common topics or problems is a time-honoured one, centring round the idiographic–nomothetic dichotomy that separates and unites the social sciences at one and the same time. A central point of contention, especially during the early debate about 'exceptionalism' in geography (Schaefer 1953), this axis had been a dominant one in the human and social sciences at least since the *Methodenstreit* in the German *Staatswissenschaften* during the second half of the nineteenth century (Strohmayer 1997b). Is geography a science concentrating on the specific, on difference and the uniqueness of place(s)? Or is its goal to uncover law-like structures that apply under observable conditions and which can be used for planning and other socially relevant purposes? Human geography has found many different answers to these questions during the course of the twentieth century and has witnessed seemingly stable configurations vanish every so often. Take, for instance, the resurrection of a concern for particularity within the postmodern paradigm: was this a return to an earlier geographical practice or something altogether new and different? Was it a child of its time just like any other epistemological break and thus necessarily a form of 'local' knowledge (Ley 2003)?

Mention of 'particularity' should remind us not to overlook a second axis that structured geographic theories during the twentieth century. Often hidden beneath the idiographic–nomothetic divide, the difference between generality and particularity is thought by many to be synonymous with the former. However, one can well imagine a nomothetic approach to particulars, just as idiographic concerns for generalities exist. Implicit in this difference, therefore, is little less than the importance of scale (Marston 2000) or the reminder that the geographies we observe change depending on context, frame of reference and point of view.

Both axes mentioned revolve around epistemological issues in that they present us with a choice between different conceptualizations of what kind of science geography is and should be. But there is a third axis we can identify that centres around questions of causation. Centrally implicated here is the dichotomy between structure and agency. Largely implicit in the theoretical assumptions of human geography up until the 1970s, this axis provided geographers with a whole set of answers to the question of what or who was responsible for the creation and maintenance of geographic realities: was it people's preferences that shaped spaces, or was the particular context within which such choices were made responsible for the geographies we could observe empirically? For as long as geography held fast to the kind of 'checklist' mentality observed earlier in this chapter, this latter part of the question apparently did not become an issue. Things started to change, however, with the move towards more theoretically informed research agendas: here the choice between prioritizing individual actors over social structure (or vice versa) was often perceived to be fundamental.

But what about these axes? The real change in the closing decade of the twentieth century has been to view them less as essential and mutually exclusive choices and to appreciate their commonality of construction. Here, again, we need to acknowledge the importance of the debates surrounding structuration theory in the late 1970s and throughout the 1980s for the overall shape of theoretical discourse within the discipline (Harris 1991; Chouinard 1997). Together with simultaneous developments in feminist geography, it was in these debates that the connective nature of alleged opposites was first acknowledged: what had presented itself previously as a choice between mutually exclusive positions or theoretical points of origin was now increasingly viewed and theorized as a field in which mutually constructive elements acted to bring forth geographic realities (Thrift 1983; Gregory 1994). In fact, the closing years of the last century witnessed a proliferation of papers that analysed a professed instability and constructed nature of the categories that were used to manufacture (often polarized) axes in the first place (Gibson-Graham 1996; Battersbury *et al.* 1997; Whatmore 1999). In the emerging hybrid world of networks, a future generation of geographers may well find many of the issues and conflicts of old unresolved, perhaps even unresolvable (Thrift 2000a).

We would like to end by expressing our admittedly minimalist hope that a geography for the twenty-first century will no longer have to deny the contested nature of its categories and move towards mature and tolerant manners of dispute and discourse. The emergence of research in the years flanking the turn of the millennium that aims to integrate rather than divide positions that were previously thought to be only loosely

connected, exclusive or downright opposed, might be read as a sign that such hopes are not in vain (Mattingly and Falconer-Al-Hindi 1995; Dixon and Jones 1998; Barnett 2001; Castree 2003; Jacobs and Nash 2003; England 2003). However, it might also be a sign of fatigue: only history can judge us now.