

Cartography's defining moment: the Peters projection controversy, 1974-1990

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ABSTRACT (ABSTRACT)

His work on projections took place against this religious activity, and at least one author has noted that [James Gall, Jr.] "valued his work on map projections as a form of relaxation" ([Freeman], 1963, p. 177). In fact, Gall wrote only three short pieces on projections. That is somewhat insignificant, compared to his other, more extensive writing.(f.5) Despite their later importance, Gall never wrote anything else on his terrestrial projections, and it took him thirty years to publish those he did write. In fact, like [Arno Peters], he can be characterized as a cartographic dabbler, but, unlike Peters, he was not dismissed as such, despite his own cartographic errors. In the most interesting of these errors, Gall claimed originality for a projection that had already been devised (labelled as "Gall's Isographic Projection" in Gall, 1885)--cited by one projection expert ([Derek Maling], 1992) as "originally attributed by Ptolemy to Marinus of Tyre, c. AD 100, and is therefore known as Marinus' projection" (p. 432). This projection is also attributed to Marinus in [John Snyder] and [P. M. Voxland] (1989), where it is called the Equirectangular projection (p. 24). While Peters has often been harshly attacked for his errors and false claims, Gall's own claims to creation of a projection that previously existed would appear to have escaped criticism. Part of the reason is no doubt that Peters went much further with his claims (notoriously stating that his was the only projection ever needed and selling an atlas based on his projection), but Gall's immunity also raises the possibility that some cartographers were prepared to adopt a blind spot about him during the Peters map controversy. Others may simply have been ignorant about Gall's own claims.

As we have seen, the Peters world map and atlas have been sharply criticized over the years, but notice that the controversy was limited to particular areas: that of Peters's technical cartographic claims (that only one projection is needed, that maps should have the ten qualities of fidelity he defined, that he originated the projection, etc.) These claims have been usefully distinguished by Harley (1988b) as internal claims, because they refer only to the everyday concerns of a discipline, and not to the kinds of discipline-society relations Edney (1993b) discusses. Only rarely have cartographers addressed what Peters would presumably see as the main point of his work, the social agenda. This agenda is firmly situated in the external realm. [Arthur Robinson], for instance (1985, 1987), has spent considerable time discussing Peters's claims and has demonstrated that, cartographically, Peters is much mistaken. Robinson has taken Peters to task on his cartographic claims, and indeed, thoroughly and sensibly repudiates them. Cartographically, Robinson cannot be gainsaid. But, curiously, Robinson is practically silent on Peters's ideological claims for the map. For example, Peters often claims that his map overcomes a Eurocentric mentality that favours the developed world at the expense of the third world. Why was this point not more fully addressed by those cartographers who attacked Peters for his cartographic na!!! ERROR BAD CHAR 8b !!!ete? Peters also criticizes the "hidebound" cartographers who help perpetuate the separation of the role of the map into "rhetorical" and "non-rhetorical" agendas. Is such a separation attainable? Robinson's own rhetoric is open to criticism because of his silence about the marketing efforts on behalf of his projection by the National Geographic Society (NGS). The marketing by Peters and his advocates has often included claims that the Peters world map is the best in 400 years (i.e., since Mercator's Atlas), and Robinson and other cartographers have been quick to debunk this claim. Yet advertising material put out by the NGS has made quite similar claims concerning the Robinson projection, which is introduced with the claim that "because it comes closest of all flat maps to rendering the round surface of the earth without distortion, this Robinson projection is now the National Geographic standard for reference purposes".(f.17) Such a claim to accuracy made on behalf of the Robinson projection is just as mistaken as that made on behalf of

the Peters, but it has never been criticized by those cartographers who have often been quick to debunk Peters's claims and mark him down as a publicist. Is marketing only bad when it is done for a competing product?

FULL TEXT

Abstract This paper documents a famous cartographic controversy played out in the cartographic literature for more than fifteen years. In 1974, a German historian, Arno Peters, introduced what he called The Peters Projection to the cartographic community. It was immediately and roundly condemned as being a copy of one by James Gall, a nineteenth-century evangelist. Both men are discussed in their own contexts. The controversy that then arose is used to illustrate several matters: first, that intellectual traditions proceed through debate and contest, rather than by increasingly accurately describing the world; second, that ideology is an instrumental aspect of cartography. Both these points inform my sense of defining moment, which is used in two ways: on the one hand, the fact that many academic cartographers participated in a controversy about the worth of the Peters projection 'defines' something of the nature of the dominant perspective in cartography; on the other hand, the period over which the controversy occurred marks a transitional 'moment' about which contemporary cartography balances. It is argued that post-Peters cartography should engage ideology for a fully informed theory of cartography.

Introduction

THIS paper documents a cartographic controversy that was played out in the literature over a period of more than fifteen years. In the nature of controversies, it produced much argument and counter-argument, and included its share of personal attacks and staking-out of intellectual turf. By commenting on this debate, I am aware of the dangers of merely perpetuating its (much rehearsed) arguments; it is nevertheless my goal to learn from the controversy rather than to take part in it. Sufficient time having elapsed since the last major statement involved, it is possible to draw conclusions from the argument that are relevant to our larger work as cartographers, rather than to merely rehash its claims.

These conclusions can be outlined as follows: First, the notion of controversies in general is used to argue that intellectual 'traditions' proceed more often than not through debate and contest that seek room in an ongoing conversation (science as story-telling), rather than as a linear progress of ever-increasing accuracy. It is a "cartography without progress" as Edney (1993) puts it, which relies less on a linear and progressivist view of cartographic history, and more on understanding the context of the relationships between cartography and society. The cartography referred to here particularly means the academic discipline, but does not necessarily exclude cartographers employed in the commercial and 'agency' domains of state and federal government who are part of the cartographic labour process (McHaffie, 1993).

Second, I will use the cartographic controversy itself over the nature and status of the Peters projection, or world map, to illustrate the point that an instrumental part of cartography (and more broadly of scientific practice) is ideology. This was especially apparent in the case of the Peters projection because it was partly what the controversy was about: to what degree are ideology and value-claims a valid part of cartography? Until the close of the controversy, the discipline of cartography was overwhelmingly governed by internal technical interests, and did not engage external ideological interests. This focus was a result of the historical tradition of cartography as an enterprise primarily interested in an accurate documentation of the environment--it was in fact a 'cartography of progress.' However, post-controversy work suggests that geographers and cartographers have begun to recognize these external interests. In particular, there is increasing attention to the relationship between what I call "spatial technologies" (cartography, remote sensing, and GIS) and society (Harley, 1988a, 1988b, 1989, Poiker, 1993, Crampton, 1995, Pickles, 1995). Although the controversy is only a part of this shift (which is itself still incomplete

and contested) we can read it as cartography's 'defining moment' in coming to grips with ideas such as the power and interests of maps (Wood, 1992), propaganda (Pickles, 1992), and representational roles (Woodward, 1992). In important ways it is far less conceivable that the controversy could occur at all now, given the current engagement with these ideas.

The sense of 'defining moment' can therefore be taken in two ways. On the one hand, the fact that many academic cartographers participated in a controversy about the worth of the Peters projection 'defines' something of the nature of the dominant perspective in cartography. And on the other hand, the period over which the controversy occurred marks a transitional 'moment' about which contemporary cartography balances. Both senses are discussed in this paper.

Controversies and Cartographic Traditions

The Peters projection controversy effectively began in 1974, when a German historian, Arno Peters, published an equal-area projection of the world (shown in Figure 1).

The close of the controversy cannot be as definitively dated, but, for the purposes of this paper, I will label it as approximately 1990, by which time all of the major statements in the controversy had been made. While there is much to be said in favour of both sides of this controversy, I am not really interested in promoting or criticizing the projection qua projection, nor am I interested in taking part in the controversy itself. My purpose here is to look at what the controversy says about the practice of cartography, and to address the following questions: Why would a simple cylindrical projection give rise to heated controversy? Why did Peters continue to make patently false and ignorant cartographic claims about his projection? What does the controversy imply about the role of cartographers? These questions cannot be answered without considering the intellectual context in which cartography is done--the 'traditions' of cartography. These traditions reveal interesting relationships between (historical and contemporary) mapping and society.

There is now a growing body of literature that attempts to re-situate cartography outside its empiricist origins, towards a more critically informed position. Part of the strategy of this literature is to gainsay the unproblematic notion that maps are independent records of the landscape, and to see this as a claim that is part of an ontological perspective (empiricism and positivism) adopted by science as a whole, of which cartography is a part. For example, in a series of books and articles, Denis Wood (1992, 1993a) has argued that the map is "a social construction of reality" (1993b, p. 52), which serves various "interests" (1992, *passim*) of those who make and use them, rather than reflections of the environment. On this view one can envisage "a sociology of the map... the knowledge it embodies [is] socially constructed" (1992, p. 18, *emphasis in original*). Although not described as such in Wood's writings, this is an established approach to scientific work more generally (it is sometimes called the "strong programme"). The subject of such a programme, as exemplified in the work of its best-known proponents, Robert Merton (e.g., 1957/1973) and Bruno Latour (e.g., 1990), is nothing less than the study of scientists and their work, interpreted in the context of their contingently situated relations to society. The work that scientists produce, like that of cartographers, is understood as a part of the producing culture, "a function of specifiable social circumstances arising only within certain social structures," as Wood (1993b, p. 50) puts it.

In the history of cartography, work by Brian Harley (*op. cit.*), Matthew Edney (1991, 1993a), Barbara Belyea (1992, 1993) and Robert Rundstrom (1993), among others, has taken a similar approach. Edney (1993b) argued that cartography "is not a neutral activity divorced from the power relations of any human society, past or present" (p. 54). He set this statement against a linear and indeed overtly progressivist view of maps as becoming ever more accurate representations of the landscape--a view that arose in the first place because of the Enlightenment's basis

in mathematical cosmography. Much cartographic thinking at that time had a peculiar affinity with the goals of the Enlightenment: domination of nature, measurement, rationality, progress. Many of these values found expression in the great national surveys of the eighteenth and nineteenth centuries (Edney, 1993a):

These surveys were the epitome of modern cartography. Based upon mathematically rigorous triangulation networks, they provided the truth against which all other maps were compared.... [r]eceived wisdom has made systematic surveys into an inevitable stage of cartography's historical progression ... but more careful study of the administrative development of these great surveys reveals that their adoption and prosecution was not so inevitable (p. 61).

He goes on to describe how the British mapping of India is a particularly indicative example of how the rhetoric of scientific progress can encircle cartographic activity. Among other things, the funding for the Great Trigonometrical Survey (GTS) was privileged "at the literal expense of the detailed surveys" (Edney, 1993a, p. 62), because it was "so thoroughly imbued with the rhetoric of accuracy and progress" (p. 63), despite the fact that small-scale local surveys were less expensive, and formed the basis of the larger surveys. In Edney's most recent paper (1993b), he suggests that cartography is not a monolithic attempt to collect accurate data about the environment, but comprises a set of cartographic modes. Each of these modes "is a set of specific relations which determine a particular cartographic practice. There are three sorts of relations: cultural, social, and technological" (p. 57). He provides a brief sketch of how these modes have played out in the history of cartography in the 300 years up to the mid-nineteenth century, of which the most relevant dimension for our purposes is that of 'mathematical cosmography.' Although not unambiguous, the practice of mathematical cosmography epitomizes the so-called 'encyclopedic' mentality of Enlightenment thinking: "that properly conducted rational debate can reconcile conflicting points of view" (Edney, 1993b, p. 62), and indicates how closely cartography was tied to astronomical and geodetic measurement.(f.1) Mathematical cosmography was the end-product of the convergence of many of the modes Edney identifies: charting, chorography, topography, etc. (see his Figure 1, p. 59). This convergence has since fragmented with increasing specialization in cartography, but its legacy is clearly apparent today in the emphasis on empiricist measurement. It is no wonder that maps that fall outside this tradition by embracing an ideological agenda become controversial--as the Peters world map did.

Edney's analysis terminates during the mid-nineteenth century, but it can be extended for contemporary cartography by analyzing the Peters controversy in the same contextual manner. The controversy suggests a fourth major relation for cartography, that of the political (which Edney tends to subsume within the social), which, I will argue in this paper, is the symptomatic mode of modern cartography. The Peters controversy marks the defining moment when modern cartography came to grips with the political mode--especially in its sense of ideology. On this view, the controversy revolves around the validity of the political in mapmaking as much as it was about the cartographically naive claims by Arno Peters. Now that this defining moment has occurred, it is already difficult to imagine the controversy playing out in the same way. It is more likely that the debate would be about the political stance involved, not whether there should be a political stance. This marks the second sense in which I use the controversy as a defining moment: it characterized cartography as struggling, and contesting an Enlightenment past where rational debate and neutral observation had left no room for ideology.

How did cartography come to acquire such an Enlightenment attitude? To what extent is contemporary cartography imbued with the Enlightenment attitude? Indeed, is a celebration of rationality, reason, and accuracy, necessarily bad?(f.2) These are complex questions that speak to cartography as a 'modernist' discipline in both practice and philosophy.(f.3) The Peters controversy crystallizes these issues by providing a 'contested site' where the arguments were on particularly visible display.

CARTOGRAPHY AND THE ENLIGHTENMENT PROJECT: JAMES GALL

To address these questions I will examine the life of James Gall, who is posed against Peters as the creator of the projection, and has been described as "a significant figure in the history of cartography" (Porter and Voxland, 1986, p. 27). It is important to pay attention to him because the Reverend James Gall, as a gentleman minister, was very much a part of the society and culture of the 'gentleman scholar' scientist of the time (see Morrell and Thackray, 1981). He gave talks to scientific institutions, wrote on the 'science' of missions, and generally contributed to the Victorian mentality that prized science so highly. Gall's life, then, encapsulates the Enlightenment Project from which contemporary cartography derives its philosophy (see Figure 2).

Gall was born in Edinburgh on September 27, 1808 to a family of Edinburgh printers and map publishers. Both he and his father (also named James Gall) were evangelists, and although James Gall, Jr., joined the family firm in 1838, when he was thirty years old, he stayed for less than a decade before leaving to found a mission in the High Street-Canongate area of Edinburgh (Freeman, 1963).

His father's firm was founded in 1810 as "James Gall Printer" at 24 Niddry Street in Edinburgh, according to a short pamphlet published about the company in 1960, and specialized in "religious tracts and editions of the 'Shorter Catechism' that was such a force in the spiritual training of the young throughout the nineteenth century" (Gall [?] [1960], p. 1).(f.4) The company changed its name in 1847 from "James Gall and Sons" to "Gall and Inglis" (when James Gall, Jr., left, and was replaced by his brother-in-law, Robert Inglis (see Royal Scottish Geographical Society, 1973), and continued well into the second half of the twentieth century, notably publishing a series of 'strip' route maps for cyclists and motorists (these folded into a convenient pocket size, and had major roads and routes marked in red ink on otherwise monochrome maps). The firm of Gall and Inglis also published The Edinburgh Imperial Atlas (1851), which shows the world by region. It is ironic to note that its one 'world map' is on the Mercator projection, which Peters later found so problematic, and which James Gall himself described as "unsatisfactory" (Gall, 1871, p. 159). Gall, Jr. lived a long life, dying in Edinburgh on February 7, 1895, at the age of 87 (Baptie, 1894/1972, p. 251). An obituary in The Bookseller noted "his extraordinary powers of organization, as well as his eloquence as a speaker" (1895, p. 215). Gall's eloquence provides a parallel across the gulf between him and Arno Peters, who is also often described as a good promoter, though for many professional cartographers the description takes on a flavour of media propaganda in which promotional ability is used to actively promote one's own work. In many cases, this can be attributed to the fact that academics do not traditionally write for fame or profit, and feel it is inappropriate for an outsider to do so within academia. But it goes deeper than that, because the issue of 'promoting' your work can hardly be avoided anymore (do we not do this in teaching and writing?) Perhaps more important, it asks us to consider what might be the role of an (academic) cartographer: to be focused on technical issues, or to engage with rhetoric and ideology? Indeed, are these alternatives entirely separable?

However, cartography and projections were only part of Gall's interests. He published widely on various topics, mostly relating to his evangelistic work as part of the Sunday School movement. For example, he is credited with The Science of Missions, and An Interpreting English and Greek Concordance of the New Testament with a Glossary of Greek Words. Gall seems to have been leisured enough not to have had to work at a regular job, instead devoting his time to missions, study (he was a student at Edinburgh University), and writing (at least a dozen books are listed under his name in critical dictionaries; see, for example, the Kirk, 1891, entry on Gall, Rev. James). He was also keen on psalms, and through his father's publishing company "published a number of cheap musical works" (Brown and Stratton, 1897). Among these were titles such as Children's Hymn Books, Scottish Psalm Tune Book, and others (see also Baptie, 1894/ 1972, which notes that Gall's own tunes, such as "Faloon," appeared in some of these works).

His work on projections took place against this religious activity, and at least one author has noted that Gall "valued his work on map projections as a form of relaxation" (Freeman, 1963, p. 177). In fact, Gall wrote only three short pieces on projections. That is somewhat insignificant, compared to his other, more extensive writing.(f.5) Despite their later importance, Gall never wrote anything else on his terrestrial projections, and it took him thirty years to publish those he did write. In fact, like Peters, he can be characterized as a cartographic dabbler, but, unlike Peters, he was not dismissed as such, despite his own cartographic errors. In the most interesting of these errors, Gall claimed originality for a projection that had already been devised (labelled as "Gall's Isographic Projection" in Gall, 1885)--cited by one projection expert (Maling, 1992) as "originally attributed by Ptolemy to Marinus of Tyre, c. AD 100, and is therefore known as Marinus' projection" (p. 432). This projection is also attributed to Marinus in Snyder and Voxland (1989), where it is called the Equirectangular projection (p. 24). While Peters has often been harshly attacked for his errors and false claims, Gall's own claims to creation of a projection that previously existed would appear to have escaped criticism. Part of the reason is no doubt that Peters went much further with his claims (notoriously stating that his was the only projection ever needed and selling an atlas based on his projection), but Gall's immunity also raises the possibility that some cartographers were prepared to adopt a blind spot about him during the Peters map controversy. Others may simply have been ignorant about Gall's own claims.

Gall announced his projections at an 1855 address to the British Association for the Advancement of Science (BAAS);(f.6) his stereographic projection was published in 1871 (Gall, 1871) and again in 1885, along with his Isographic and Orthographic projections, in the Royal Scottish Geographical Magazine.(f.7) Gall developed his projections because he wanted to map the heavens (albeit in their physical and secular manifestation as the constellations). Gall's long list of publications includes at least two on astronomy: *An Easy Guide to Constellations* (1866) and an *Atlas of the Stars*. The Guide proved especially popular, and in 1963, Freeman could find it still 'on the market.'(f.8)

The way in which Gall developed the terrestrial projection is relevant. It reveals a feature of Enlightenment cartography--the overlap between cartography and astronomy--that is part of the twin disciplines of measurement and accuracy. This so-called 'High' cartographic culture of state and commercial mapping by elite gentleman cartographers tended to adopt and promote a rationalist scientific mentality (Edney, 1991). These gentlemen were aided in this endeavour by the ever more accurate measuring instruments of astronomers, such as that given to Washington by David Rittenhouse, a prominent Philadelphia astronomer (Harley, 1976, p.594). Knowledge of astronomy was, of course, essential in carrying out these early cartographic measurements (such as determining true [ephemeris] longitudes on which to base the grid systems of future surveys). Gall was clear about the role of his Guide: it would "not only interest, but refine and enlarge and elevate [readers'] minds" (Gall, 1866, p. 9).

Together, astronomers and cartographers pushed for (and got) acceptance of accurate measurements as a sign of human control over nature (Katz and Kirby, 1991). After all, they were engaged in highly important activities: measuring the size and shape of the earth, and laying out a grid system--in which longitude, especially, was part of a nationalistic identity (an agreed prime meridian was only settled in 1885, and even then the French continued, until 1911, trying to secure its location in Paris). Astronomy was seen during this time as one of the more important sciences because it could be reduced to numbers and mathematics.(f.9) It had all the qualities of what was accepted at the time as a true science: it slowly and cumulatively made observations; it could test inductive theories experimentally; and on that basis it could make "true, mathematical generalizations" (Morrell and Thackray, 1981, p. 271). There is no doubting the prevailing ideology of science in William Whewell's day:

When our conceptions are clear and distinct, when our facts are certain and sufficiently numerous, and when the conceptions, being suited to the nature of the facts, are applied to them so as to produce an exact and universal accordance, we attain knowledge of a precise and comprehensive kind, which we may term science (Whewell,

quoted in Morrell and Thackray, p.272).

The epitome of such effort was physical astronomy, part of the powerful and well funded Section A (mathematics and physical science) at the BAAS (Section c, geology and geography, was "popular and lively" (Morrell and Thackray, p. 274) but not yet an "exact science"). It was to Section C that Gall presented his projections, and to Section G (mechanical sciences--one of the lowest ranking) that he spoke on rifling shot; see below). Gall's astronomical interests therefore reflected 'the' science of the times, as practiced by the elite gentlemen of science at the BAAS and the Royal Society. Cartography, in that it was associated with astronomy, would also be part of this drive toward rationalist domination of nature by ever more exact measurement and observation.

The problem that prompted Gall to develop a world projection was how to show the stars panoramically "including three-fourths of the heavens" (Gall, 1885, p. 119), rather than just in small sections. His problem was made harder by his wish to retain the form and area of the constellations, so that they looked the same as they do to an observer from earth. He first tried the Mercator projection, but it did not suffice. Gall writes that "[i]t then occurred to me that if, instead of rectifying the latitude to the longitude throughout, [as in the Mercator] we rectified it only at the 45th degree," a compromise projection could be formed that, while neither equal-area nor conformal, distorted area and scale much less at higher latitudes (Gall, 1871, p. 159). In other words, the spacing between the lines of latitude does not increase as rapidly when moving toward the poles as it does on the Mercator (which gets its great areal distortions from adjusting--or 'rectifying'--the latitudes in proportion to the amount that the converging meridians have been straightened). Gall's projection was to be a modification of the cylindrical projection, secant; that is, with two lines of true scale (at 45 degrees north and south of the equator; where there is one such line, e.g., the Equator, it is known as tangent).

It was not long before "Gall's Stereographic" projection (now often simply called "the Gall projection," see Snyder and Voxland, 1989, pp. 33-34) was applied to the world. Gall found this "a great improvement on Mercator" (1871, p. 159). At the same time, Gall also devised two other projections that are fairly similar to the Stereographic (all are cylindrical, and have standard lines at 45 degrees), and it is one of these, the so-called 'orthographic,' that Peters later developed. The Orthographic is equal-area, with two lines of correct scale, again at 45 degrees north and south (reproduced as Figure 3).

Gall found this "a valuable map for showing the comparative area occupied by different subjects" (1885, p. 121). Even then, Gall could see that it was "true that the geographical features are more distorted on this than on any of the others" (a criticism often leveled against Peters's map) but this did not stop Gall from concluding that it is "not distorted so as to be unrecognizable; and so long as that is the case, its disadvantages are not too dearly bought" (p. 121). Distortion of geographical features, making the shape of countries look odd ('pathophanic' to complement the 'orthophanic' or right-looking Robinson projection, Snyder and Voxland, 1989, p. 82), was thus a recognized--and accepted--aspect of the projection by its creator from its inception. Odd-looking projections can nevertheless be useful in certain circumstances. Indeed, Gall recommended that the orthographic projection was especially valuable for showing statistical distributions, and it is therefore interesting to note that the second half of the Peters Atlas (Peters, 1989) is devoted to global statistical distributions in just the manner that Gall recommends.

What kind of Society did Gall choose to present his work to, and what role did they play in the development and promotion of science? The BAAS was founded in 1831 as a counterpart to the older and more restrictive Royal Society (founded 1660), and its aims were both to promote science and to involve the informed layman--to draw educated gentlemen to science. One method of doing this was to hold meetings in different cities every year--to be a so-called peripatetic organization, visiting, among other places, Newcastle, Liverpool, Cork and Glasgow (in 1840) by mid-century. In its annual Reports of the meetings, the BAAS included its "Objects and Rules," among which

were "to promote the intercourse of those who cultivate Science in different parts of the British Empire" and "to obtain a more general attention to the objects of Science, and a removal of any disadvantages of a public kind which impede its progress" (BAAS, 1856, p. xvii). For instance, in the same year in which Gall gave his report on "Improved Monographic Projections of the World" (Gall, 1856), the Association heard a report of a Parliamentary Committee on the position of science and how it might be better communicated to the public. One of its recommendations was to "deliver gratuitous, or very cheap lectures, illustrated by philosophical apparatus, to Institutions, in London and at the principal provincial towns (BMS, 1856, p. xlix) by which "diligent hearers" could improve themselves (and even--for a small fee--"have the privilege of using the Lecturer's apparatus"). The noble purpose of science was thus to educate and enlighten the populace, and the BAAS was its leading exponent of this purpose.

It is no coincidence that Gall chose to present his work as a gentleman amateur at the BAAS meetings. Its presidents, members, and contributors included many of the famous scholars of the period: Darwin, Murchison, Babbage (whose son gave a talk on "mechanical notation" for the Difference Engine in the same session in which Gall spoke), Huxley, and even Dr. Livingston. It was studded with aristocracy--earls, marquises and viscounts, as well as Lords and Knights of the Realm. Its honorary member was the Prince Consort, Albert, husband to the Queen who gave her name to the age: Victoria. Its purpose was to advance science, a science that was progressive and objective. As Morrell and Thackray (1981) suggest:

Only if science were linked to progress and cut off from the controversial inquiries of statisticians and phrenologists would its appeal be authoritative and clear. Only if science were rendered attractive to various constituencies would it serve as an instrument of social expression and social integration (p.224).

So this was the job of the BAAS: to create, in its words, a stratum of "gentlemen of science" who would use the enlightening qualities of science for social good and improvement. It was an admirable and almost moral vision that guided the Association, but it was also one with firm views on how science should operate: value-free, progressive, and as a valuable cultural resource.

As a minister of religion, Gall satisfied the requirements of the gentleman scholar. Unlike contemporary American society, with its division of church and state, Victorian England saw religion as the framework for education. It is instructive, for example, that both Oxford and Cambridge were ecclesiastical corporations, and that their teachers and graduates were all members of the Established Church (Morrell and Thackray, pp. 224-225).

Morrell and Thackray's survey of the early years of the BAAS is a magnificently detailed study of the workings of the Association, using internal letters and documents coupled with observations of the culture and society of the time. Their central thesis is that the Association, especially its central members (the "gentlemen of science" (f.10)), used their friendship, ambition, and careers to "establish an idea of science that would powerfully affect Victorian culture and would become the most enduring of Victorian legacies" (p. xxii). It was not a society for reform or revolution directly, in that its idea was that objective and pure science should trickle down to the lower classes--in other words, to provide rational knowledge about the world that would literally enlighten. It may have been truth that the BAAS was after, "[h]owever, it was truth according to a particular construction; not simply scientia, but the Advancement of Science" (Morrell and Thackray, p. 224).

Their argument meshes closely with mine. Morrell and Thackray do not want to overthrow the benefits of science, but they do wish to recognize the penalties and limitations of using only the scientific method without any alternatives. Their particular interest lies in how the BAAS reflected, and was joined to, Victorian society, while my own lies in how an overly narrow view based on cartography as a science has led cartographers to misinterpret the

significance of the projection presented by Peters. We shall now examine how the Enlightenment project of Gall and the BAAS fueled the Peters world-map controversy a hundred years later.

Arno Peters and Ideological Agendas

Purely in terms of sheer numbers of distributed copies, Peters's world map may be the best-known map in the world, excepting only the Mercator and perhaps the Robinson projection. UNICEF alone has distributed over 60 million copies of the Peters map, including a special Christmas-time mailing of 100,000 in the UK (Devlin, 1983; *The Economist*, 1989); Christian Aid, which is a branch of the British Council of Churches, reported that 14,000 copies were sold between 1977 and 1983; the Lutheran Church has given out over 6,000 to its congregations (Robinson, 1985), and UNESCO, the National Council of Churches, and Methodist groups, all support and promote the map (Snyder, 1988). Major aid agencies regularly use it, and it was chosen for the cover of the Brandt Report. Peters has also reportedly earned plaudits from Pope John Paul (*The Economist*, 1989). Here we see one of many parallels between Gall and Peters; although used for different ends, the modern-day projection is recapitulating the religious origins of the Reverend James Gall's influence.

Arno Peters was born on May 22, 1916, to Bruno and Lucy Peters (Beleke, 1991), and graduated in 1945 from Berlin University in Journalism, History, and Art. As several commentators have noted, his Ph.D. was earned on the topic of film as propaganda ("Der Film als Mittel !!! ERROR BAD CHAR 94 !!!fentlicher F!!! ERROR BAD CHAR 81 !!!rung"), a fact that has attracted comments about his interest in (self) promotion and propaganda having had an early start.(f.11)

In 1952, he published a history of the world (the Synchronoptische Weltgeschichte or "Universal History") that was called "the biggest scandal of the last two weeks" by the German magazine *Der Spiegel* (1952).(f.12) According to the *Der Spiegel* article, Peters and his then-wife, Anneliese (he later married twice more, and had six children), were commissioned by the regional government of Lower Saxony, among others (including the Educational Department of the US Military Government), to write a school textbook on history. The couple's approach was to write a book acceptable to both East and West Germany (which at the time was being further divided by the new Berlin Wall), and as a rather predictable consequence neither the west nor the east liked it (Monmonier, 1995, p. 26, labels it "highly leftist," a comment presumably derived from US news reports during the McCarthyite era). The regional government sued Peters for the return of their 50,000 Marks (\$47,600), and sent over 5,000 copies back to the publisher (from a total of 140,000, according to Beleke, 1991, p. 1038). Again, according to *Der Spiegel*, Peters defended himself by pointing out that pre- publication copies of the manuscript had been circulated and approved by all concerned, and that the Education Department of the Military Government, which helped to distribute the book, had reported favourably on the manuscript in 1949, saying that it was "unique ... [of the] highest worth ... recommended for schools" (*Der Spiegel*, 1952).

To understand the basis for the 'scandal,' some context is needed. Germany was only some seven years distant from a debilitating defeat in war, and West Germany was (at least in part) under the governance of the United States Army at this time (1952). Significantly, of course, the Cold War was in full flow (Senator Joe McCarthy had, only two years previously, started his campaign against Communism in the United States). Because Peters was a fairly ardent socialist (though perhaps not doctrinaire, to judge by the *Der Spiegel* report), for him to have been approved as writer of a school textbook was a delicate choice. What made the whole matter controversial, however (and prompted the centre-right *Der Spiegel* to call the whole affair a scandal), was that a minister of the regional government of Lower Saxony, Herr Voigt of the SPD (Socialist party), had been among the original underwriters of the project in 1949. Voigt's contribution appeared to give the book the official imprimatur of the Communists, and it is, in fact, his involvement, according to news reports, that contributed to the scandal, rather than the book alone.

Der Spiegel goes so far as to say that, at first sight, the book is a "masterly undertaking," with world history in a "running overview in tables of eight colors divided into six bands: economics, intellectual life, religion, politics, war and revolution" (p.26). As with his projection, Peters was attempting "to bring equality and balance to the treatment of history" (Vujakovic, 1989c, p. 1, paraphrasing a personal communication from Peters). That is, he wanted a history book to include an account of all aspects of human endeavour--e.g., music, religion, and culture, and not just to concentrate, as is too often done, on war and politics.(f.13) As goals, these beliefs are laudable, and Peters would probably have attracted little attention if his attempts to fulfil the goals had not been interpreted as having an explicitly ideological approach so at odds with the Enlightenment style of cartographic practice.

It was around this time, in the early 1950s, that Peters apparently realized the importance (and unfairness) of maps. It is probable that it was at this point that he started thinking about an equitable map, and he hints in later publications that it was during the preparation of an atlas volume to accompany the Universal History that he first noticed that existing global maps were worthless (Peters, 1983, p. 146), although it may not have been until the early 1960s when he started work on what was to become the Peters world map.

Between 1958 and 1964, Peters was editor of a socialist magazine (Periodikum), but he remained interested in cartography. He was evidently thinking about, and constructing, a projection that would, as he saw it, rectify the wrongs of much modern-day cartography, founded on misleading maps like the Mercator projection. Shortly after his editorship, and still inspired by the principles behind his controversial history text, Peters showed his map in early form, and his mathematical basis for its construction, to the Hungarian Academy of Sciences in 1967 (Loxton, 1985, p. 106; Kaiser, 1985, p. 5). A few years later, in May, 1973, Peters showed the projection at a press conference in Bonn, West Germany (Morris, 1973).

It was at conferences like this that Peters began to state the claims for his projection (claims later written up as The New Cartography, 1983). First, he compared it favourably with the Mercator. Three of these claims are particularly relevant, for they show a mixture of cartographic and more ideological concerns. Peters claimed that

First, the Mercator places the equator below the middle of the map, so that Europe seems to be in the centre of the world (see Figure 4).

Second, Mercator distorts the relative sizes of land-masses, especially in higher latitudes. Peters argued that this results in a relative increase in the size of 'old world' countries over 'third world' countries (e.g., African countries). Indeed, at the Bonn press conference, Peters went so far as to say that the Mercator projection "overvalues the white man and distorts the picture of the world to the advantage of the colonial masters of the time" (quoted in Morris, 1973, p. 15). By contrast, his own map would be completely accurate in terms of relative size.

Third, he stated that his projection was also better at retaining the real shapes of countries (in fact it was "50 percent more accurate") than the Mercator.

Needless to say, these naive cartographic claims have contributed toward extensive and often heated opposition from cartographers and geographers, and the projection is now one of the most controversial ever made. According to various reports, it has "plagued" cartographers and become a "phenomenon" (Loxton, 1985); it is a "provocative" and "mischievous" product of "a thoroughly confused cartographer" whose work is "perverse and wrongheaded" (Porter and Voxland, 1986); it is "misleading" and allows "known scientific terms" to be "manipulated in a falsifying way with subjectively altered meanings" (German Cartographic Society, 1985); and it is a "cleverly contrived, cunningly deceptive attack" against cartography (Robinson, 1985). Perhaps John Snyder puts it best when he says:

From its initial announcement, the Peters' world map has been surrounded by controversy: in over 40 articles on the subject, cartographers have vigorously denounced a number of Peters' claims for the map, while he and his supporters have argued that his is the only world map that meets the concerns of people interested in social issues (Snyder, 1988, p. 190).

Part of the reason for this controversy is an incident involving the American Congress on Surveying and Mapping (ACSM) in the late 1970s.(f.14) In November, 1977, the ACSM reprinted an article favourable to the Peters world map (ACSM Bulletin, 1977) by what have been called "advocates" of the projection. The article had originally appeared in a German government publication earlier that year. The article is supportive of the projection, and was perhaps printed in the ACSM's journal in the interests of cartographic curiosity and discussion (no explanatory matter is included with the reprint, only information on its source, so it is hard to be sure of the ACSM's original purpose). By the next issue, however, both Arthur Robinson and John Snyder registered objections to Peters's claim of originality. But what happened ten years later incensed the sixteen-member board of directors of the ACSM. The reprinted article was quoted in part by Ward Kaiser, a Peters supporter, in his handbook *A New View of the World* (1987). He "twice treated it as the ACSM's endorsement of the Peters' Projection" (Snyder, 1988, p. 191, emphasis added). The source of Kaiser's claim can be traced to a compendium of favourable press clippings on the Peters world map, compiled by Peters and published in Germany by his publishers (Universum-Verlag, Munich) as "The Peters Projection, World Press, Professional Press," including the ACSM piece without the credit line of its original place of publication, and "ACSM" and "Bulletin" prominently across the top. This, Snyder feels, is a "deliberate misrepresentation" (Snyder, 1992, p. 3)

Kaiser used this compendium for his handbook, and was embarrassed enough by the misrepresentation and confusion he caused to write to Peters asking whether the endorsement was authentic (Snyder, 1992). He has since inserted a correction into his handbook. Although the ACSM has no 'official' position on the projection (Papa, 1991), it later unanimously passed a resolution asking that this misuse of its name, and the false claim of endorsement, be retracted.(f.15) As is the case with most controversies, however, this episode seems in retrospect to have missed the point. Nevertheless, it is hard to underestimate this whole episode in the controversy.

The projection was first widely available in the UK as a full-colour poster published by Christian Aid in 1977, but due to costs of production, its text (place names and so on), still appeared in German, with a surrounding commentary in English, written by Christian Aid, on the advantages of the projection. According to one of the people involved at the time, Pamela Gruber (then of Christian Aid), the German edition of the projection was seen as useful for development education in New Zealand during the 1970s, and this persuaded the charity to adopt it (see Vujakovic, 1989a).

In the next year, 1974, Peters demonstrated his projection (apparently by invitation, see Kaiser, 1985, p. 5) to the German Cartographical Society. This was to be the first time that Peters had shown the projection to professional cartographers, and reaction was immediate and unfavourable. The controversy was about to begin. In many short notes, German cartographers disagreed with and rejected the claims Peters had made for his projection. It was, after all, nothing special. For example, one cartographer, Wagner, took exception to the circulating claim that Peters had worked for a decade or more on the projection, by stating that "the whole ten-year wonderwork could be accomplished in ten minutes with the aid of a little elementary arithmetic" (translation by Maling, 1974a, p. 600).

The early criticism of the projection culminated in a piece by the British expert on projections, Derek Maling, who challenged the central claim of the Peters projection--it was not, as thought, an equal-area projection. If there was to be any one attack on the projection likely to do most damage in the eyes of cartographers, this would be it. For as we shall see, cartographers easily dismissed most of the other claims by Peters. Its 'equal-area' status was often all

that was left to recommend it, and now even that was challenged.

Maling's article was published in the German cartographic journal *Kartographische Nachrichten* for late 1973 (Maling, 1973). Maling called his article "Peters' Wunderwerk," but he thought it was no 'wonderwork' that Peters had produced. After obtaining a copy of an early Peters brochure, Maling was able to take measurements from a published example of the projection, and thus calculate its properties for the first time. Maling found that the standard parallels were at 46Degree02" (compared with 45Degree for Gall's projection), a scale of 1:67,498,000, and a corresponding earth radius of 94.4 mm. Using these figures, he was able to compare where the parallels should be with their positions on the map, and found "large" and "regular" errors. There was therefore only one conclusion: "Peters' Projection is not equal area" (p. 156).

For many years, this mathematical measurement, so reminiscent of the endeavours of the early BAAS and the era of James Gall, was to afflict Peters's world map. The error itself was quickly rectified (Maling, 1992a, p. 431, where he describes it as the "intended version of the map and therefore identical to Gall's orthographic").

Three events during the early 1980s were especially important in leading to the widespread adoption and increasing public familiarity with the map, as well as the continuation of the controversy surrounding it. The first was its use on the cover of the Brandt Report of the Independent Commission on International Development Issues (Brandt, 1980), as well as its sequel. The Report called the projection "innovative" and "accurate," and a move away from Eurocentrism. The second event occurred in 1983, when UNICEF, the United Nations Children's Fund, issued the map a few weeks before Christmas. This edition gave the map wide prominence in the United Kingdom at the time. The UNICEF map was, however, not the first English language edition. Earlier that year (June 1983), the New Internationalist (NI), in cooperation with the United Nations Development Program, published the map as a special issue (NI, 1983b). The NI is a development-oriented magazine that "exists to report on the issues of world poverty and focus attention on the unjust relationship between rich and poor worlds" (NI, 1983b, unpagged). This attitude obviously reflects, fairly closely, that of Peters himself. At the same time, these and other agencies within the United Nations began distributing the map (see Vujakovic, 1987, for a survey on why it was adopted by the agencies).(f.16)

The third event was Peters's publication of a complete thematic global atlas that used only one projection: his own. The atlas is published in the UK by Longman's under the title *The Peters Atlas of the World*, and was published in the US by HarperCollins after surviving "an intense lobbying effort by leading cartographers that dissuaded Prentice-Hall from publishing the map [sic]" (Miner-brook, 1991, p. 60). The atlas is in two sections: the first shows the world for reference purposes, the second shows the global distribution of various attributes.

Much of the atlas is conventional, with two exceptions. First, all the maps are supposed to use only the Peters world map. This is a direct consequence of Peters's arguments in the past that only one projection is needed, whatever scale, whatever region; a kind of grand unified theory of mapping. Peters has never appeared to recognize the advantages of large-scale mapping, and has sometimes criticized projections developed for regional maps that were never meant for world maps. Not surprisingly, this cartographically dubious claim has been marked for special attention by cartographers, and has for the most part been convincingly dismissed (for a typical example, see Vujakovic, 1989b, pp. 248-250). Peters's claims about his own atlas are also misleading. Apart from the fact that two polar projections are used (Lambert Azimuthal Equal-Area), the standard parallels are changed on the individual maps from 45Degree, as is stated in the Introduction. This makes "nearly all of them not Peters (in the non-thematic section) unless Peters is now taking credit for all forms of the cylindrical equal-area projection" (Snyder, 1992, p. 3, emphasis added). Sometimes these new standard parallels are even off the map in question, a fact discovered by Snyder when he was reviewing the atlas for Prentice-Hall. This can only be cartographic error (reminiscent of the early, badly drawn versions criticized by Maling). The Introductions to the British and American editions of the Atlas

are different, reflecting realization of this error.

The second unusual aspect of the atlas is that all maps are at the same scale. Most atlases vary the scale according to the area covered, so that more detail is discernible in the smaller regions of the world (e.g., Europe, which can fit a number of times into Africa or North America). The disadvantage is that it is often quite difficult to get an idea of the size of a region being shown, because they all tend to occupy the same amount of space on the page. There are a number of tricks that can be used to mitigate this problem: sometimes atlases will show the relative size of Europe in an inset on the North America page. Peters's way to get a sense of distance and size is to print all the maps at the same scale. However, on cartographic grounds, the argument for an atlas with only one scale is quite limited; Monmonier writes that "Peters's claim of 'fairness to all peoples' seems less accurate than 'fairness to all acres'" (1995, p. 39). Contra Peters, it is often very useful to have multiple scales in a world atlas because of the varying sizes of places around the world and the need for more detail in smaller areas. The National Geographic Atlas, for example, has maps with scales up to 1:160,000 for the Pacific Islands, as well as small-scale global maps.

How does Peters's "fairness to all acres" compare with other atlases? Peters gives less page space to the traditional areas of the western world, such as Europe, and more page space to developing areas, such as Africa and China, because Europe is physically smaller than Africa or China. This approach gives an impression quite different from that of a traditional atlas, even one that uses equal-area projections. More focus is also usually given to Europe and North America in atlases by including more maps of these areas, despite their relatively smaller land area. This point can be illustrated with the NGS Atlas, which gives the following coverage:

Africa (20% of the earth's land area) is given only three maps at a scale of 1:8,250,000

the United Kingdom (a mere 0.16% of the earth's land area) is mapped at 1:1,932,000, with two more 'enlarged' maps at approximately 1:1,250,000

North America (16.3% of the earth's land) has no less than sixteen maps at various scales (Crampton, 1993a).

The underlying assumption in the Peters Atlas is that page space and attention should be proportional only to land area, rather than to level of industrialization and western development. That importance is in the eye of the beholder. That position, however, over-emphasizes land area at the expense of other factors that may be more important (e.g., political power, military strength, economic position, probable audience of the atlas, and so on). The most useful thing about the Peters atlas is not whether he has a 'better' or 'worse' method of mapping the world, but that he generates reflection and challenges preconceptions. In the final section of this paper, I shall conclude that the most paramount of these preconceptions is that cartography is only a technical activity without an ideological context.

Lessons from the Controversy

As we have seen, the Peters world map and atlas have been sharply criticized over the years, but notice that the controversy was limited to particular areas: that of Peters's technical cartographic claims (that only one projection is needed, that maps should have the ten qualities of fidelity he defined, that he originated the projection, etc.) These claims have been usefully distinguished by Harley (1988b) as internal claims, because they refer only to the everyday concerns of a discipline, and not to the kinds of discipline-society relations Edney (1993b) discusses. Only rarely have cartographers addressed what Peters would presumably see as the main point of his work, the social agenda. This agenda is firmly situated in the external realm. Robinson, for instance (1985, 1987), has spent considerable time discussing Peters's claims and has demonstrated that, cartographically, Peters is much mistaken. Robinson has taken Peters to task on his cartographic claims, and indeed, thoroughly and sensibly repudiates them.

Cartographically, Robinson cannot be gainsaid. But, curiously, Robinson is practically silent on Peters's ideological claims for the map. For example, Peters often claims that his map overcomes a Eurocentric mentality that favours the developed world at the expense of the third world. Why was this point not more fully addressed by those cartographers who attacked Peters for his cartographic naivete? Peters also criticizes the "hidebound" cartographers who help perpetuate the separation of the role of the map into "rhetorical" and "non-rhetorical" agendas. Is such a separation attainable? Robinson's own rhetoric is open to criticism because of his silence about the marketing efforts on behalf of his projection by the National Geographic Society (NGS). The marketing by Peters and his advocates has often included claims that the Peters world map is the best in 400 years (i.e., since Mercator's Atlas), and Robinson and other cartographers have been quick to debunk this claim. Yet advertising material put out by the NGS has made quite similar claims concerning the Robinson projection, which is introduced with the claim that "because it comes closest of all flat maps to rendering the round surface of the earth without distortion, this Robinson projection is now the National Geographic standard for reference purposes".(f.17) Such a claim to accuracy made on behalf of the Robinson projection is just as mistaken as that made on behalf of the Peters, but it has never been criticized by those cartographers who have often been quick to debunk Peters's claims and mark him down as a publicist. Is marketing only bad when it is done for a competing product?

The discipline of cartography, I argue, is situated so tightly within the Enlightenment trappings of the past that the role of a map is circumscribed as an objective recording of the landscape. The controversy that ensued over the projection can most easily be explained by seeing academic cartography in this context. To read the cartographic reaction to Peters is to see a scientific discipline that has bought into all the notions of progress and rationality that can be found surrounding James Gall over 140 years ago.

When I speak of the external agenda of the map, I am referring to the ideology of the map. There are two places where issues circulate around the map. In one, we find questions of design. Who is the map for? What data are to be shown? What has become, historically, the accepted way of showing that data (e.g., a fundamental cartographic question is: whether the data are qualitative or quantitative). Is colour or monochrome preferable?... and so on. Much good work has been done in this area, and for most of these questions we can, as cartographers, suggest plausible answers. This is the internal agenda of cartography.

However, these questions do not arise out of nothing; they are prompted by the particular system of methodology and the set of beliefs that cartographers adhere to. In other words, they are not context-free. It is the surrounding context for these questions that I am labelling the external agenda, the ideology of cartography (see Figure 5). Change the answers to the ideological questions and you change the questions asked in the internal agenda. This will mean that the purpose of the map, its users, and so on, will change, too. The 'surrounding context' can be read as the society in which a cartographer is embedded. An important implication of this statement is that powerful insights into cartographic activity can be had if the social and political context in which that activity is performed is examined.

To speak of the necessity of a social theory for cartography will strike some as unnecessary or irrelevant. Yet without it, we will end up misunderstanding the Peters world map, or dodging the kinds of questions Livingstone (1992) set out to ask of geography:

[W]hat role ... did geography play in past society? Was it used for political, or religious, or economic purposes by particular groups? Who benefited from the latest theory, and who lost out?... For accepting or rejecting any scientific theory is always and irreducibly a social act, by a specific social group, in particular circumstances. (Livingstone, 1992, p.2, emphasis added).

One of Livingstone's answers to these questions is to show how debate on the role of climate by early-twentieth-century geographers was influenced by their imperial and moral agendas. On the face of it, the debate was about whether or not climate was deterministic, but in fact it was part of the moral judgment: that non-European races were inferior to European ones. Hence, it was a justification of imperial strategies. As part of this imperial impulse, several geographers such as Ellsworth Huntington and Griffith Taylor constructed maps to support their arguments that racial character was spatially referenced. For example, Huntington's maps of the distribution of genius, health, civilization, and so on, were correlated with charts of what he called "climatic energy," that led him to the conclusion that Northern Europe was the most preferable area in which to live. Behind the scenes, however, Huntington had had the assistance of over fifty scholars in compiling his cartography of race, and the seeming simplicity of his argument is rather exposed as a "cartographic construction" or "rhetorical devices by which he could legitimate what were even in his own time profoundly contested judgments about the moral economy of climate" (Livingstone, 1992, p. 227).

However we label it--the external agenda (Harley, 1988b), rhetoric and interests (Wood, 1992), or ideology (Eagleton, 1991)--it is of vital importance in setting the kinds of questions we ask, and perhaps even more important in deciding the kinds of answers we find acceptable. For example, it has been the external agenda of research, or more precisely of science, that has determined that proof is a legitimate way of trying to understand the world. Thus, an experiment that attempts to prove or disprove a hypothesis is considered more valuable than one in which no such attempt is made, even though the latter may be just as thoughtful and useful, or the experiment involving proof may be narrow and unimportant. Put another way, the hard, or physical, sciences are deemed to be more important than the soft, or social, sciences. This is especially noticeable in times of recession, when the disparity between the hard and soft sciences is reflected in the funding each attracts. Therefore, we need to know in what context our work as academics is taking place--a context governed in the external agenda. The Peters world map, for instance, displays issues of "subliminal geometry" (Harley, 1988a)--structures of the map such as graticule, centre and projection that might possibly affect our world view. Both the map's centre and the choice of projection will affect the shape, size, and location on the map of the world's countries, and the question is: will that affect our world view or not? It is interesting that, despite the large number of available projections (over two hundred have been named) and the infinity of map centre locations, the same few projections and centres (i.e., those that are Eurocentric) keep reappearing. For some, this is a technical issue: the "landmass of the earth itself is Euro-centric" (Porter and Voxland, 1986, p. 27), while for others it is an historical injustice. Maps have to be centred and projected somewhere, but the choice itself is not just an internal one, because the kind of map that seems acceptable is affected by the political, social and technological context in which that choice is made. The Peters world map has standard parallels (lines of zero distortion) in the mid-latitudes, and depicts Europe near the middle of the map--a less-than-radical change from the Mercator he criticizes so much. But by explicitly acknowledging the external agenda, the Peters world map helps us come to a fuller understanding of maps and map-making--an understanding, it is argued, that must encompass both the internal and external agendas, and not separate them as unrelated questions.

The Peters world map thus emerges from the controversy by letting us as cartographers re-evaluate these notions and their relevance today in the face of contesting alternatives. We can, of course, legitimately question whether Peters was effective in promoting his ideology. What is no longer possible is to refuse to acknowledge that Peters is legitimate in having an ideological agenda. It has been this very refusal by the majority of cartographers that has given rise to the misunderstandings engendered by the two sides. The only way the sides could ever meet is by acknowledging the legitimacy of both agendas--the technical and the ideological. As Snyder points out, Peters and his followers "have accomplished a feat that most cartographers only dream of achieving. Professional map-makers have been wringing their hands for decades about the misuse of the Mercator Projection" (1988, p. 192) and yet it is still widely misused. "If they do not take advantage of the platform provided by this controversy, then they are

assenting to the Gall-Peters in much the same way that the nonvoter assents to those holding political office" (1988, p. 192). Snyder's conclusion is that even if cartographers dislike the Peters world map, it is "challenging them to offer better ones" (p. 192). The defining moment of the controversy has both illuminated the practice of cartography and given it a chance to redefine itself.

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Endnotes

Footnotes:

(f.1) Note that the use of the word 'encyclopedic' has a specific meaning; it refers to the mind-set of Enlightenment writers such as Diderot and D'Alembert, whose encyclopedia (published in 1751) attempted to incorporate all knowledge within a materialist system; a "grand Baconian vision of material progress through the enlargement of science" (Livingstone, 1992, p. 119). Later, it similarly refers to the editors of the Ninth Edition of The Encyclopaedia Britannica (published in 1880) who took a progressivist, rationalist, "architectonic" stance (see also Curry, 1992, who defines architectonic as "a desire to create an ordered, hierarchical system" (p. 97)). That is, the editors believed that science rationally resolved problems by accruing enough data. The term 'encyclopedic' is due to MacIntyre (1990).

(f.2) The Enlightenment was by no means a unified endeavour (Porter, 1990). It did raise important questions about the nature of knowledge and mankind; prompted noble measures of reform, such as the abolition of serfdom in the Austrian Empire by Joseph II; and perhaps, most lastingly, made a break with the authority of the Church. This "thus decisively launched the secularization of European thought" (Porter, 1990, p. 72). But if society was changing, so was science, and it is the tacit acceptance of positivism as the encapsulation of reason and rationality that is challenged here, or, more precisely, the credos of universalism and exclusivity.

(f.3) Katz and Kirby (1991) use the Antarctic expedition of Scott to illustrate a modernist relationship with nature; dependent on technology rather than the land (Scott perished, while his Norwegian competitor Amundsen utilized huskies, Eskimo clothing, and wooden skis). Although Scott's technology did not serve him well, it is illustrative, they

argue, of "the modernist project to control nature through technology" (p. 261). However, it is Scott who is remembered as the hero, while Amundsen seems to belong to "a disappearing age" (p. 261). These trips took place well after the eighteenth century's Age of Reason (1911), but still exemplify the Enlightenment's project of rationality and the division of nature from humanity.

(f.4) Internal evidence (the author refers to himself as the great-grandson of James Gall senior) suggests this pamphlet of seven pages was written by a descendent of the Gall family for the 150th anniversary of the company in 1960. No publication details are given, except for the printer (Neill and Co. Ltd., Edinburgh).

(f.5) There is also an unpublished manuscript on file at the Royal Geographical Society, London, dated September, 1855. In it, Gall makes many of the same points he made in his later work (e.g., Gall, 1871, 1885) concerning the disadvantages of the Mercator projection, but he also neatly combines his musical and cartographic interests by comparing the desirability of distributing error "over all the notes of the scale, the same principle would direct us to distribute the error of representation of the sphere in such a way that it would not be offensively incorrect in any one particular" (Gall, 1855). This manuscript bears the same title as his BAAS paper, also delivered in September of 1855 (Gall, 1856), and is therefore probably the full version of that report (the BAAS published only a half-page summary).

(f.6) Gall actually gave two talks at this meeting; the other was on the best way to fire a gun (he suggested that the projectile be rifled instead of the gun, i.e., the spin of the shot itself--which permits greater accuracy over long distances--should be imparted not in the barrel but afterwards, with a kind of "fire-wheel" behind the gun). In this way "every large gun could be used as a rifle cannon without loss of power" (BAAS, 1856, p.206, original emphasis). In this interest, Gall shows how men of education at the time supported and wanted to improve British imperial excursions, which were at their height.

(f.7) After 1873, Gall "devoted himself to evangelical work" (Baptie, 1894/1972, p. 59), so it is unlikely that he had much opportunity to pursue his cartographic interests after that.

(f.8) It is a slim volume, about four inches square, with facing pages of, on the left, a short textual description of a constellation, and, on the right, an illustration. Given its size, it would appear to be a kind of pocket guide. Gall begins by asking "[i]s it not strange that the constellations should be so little known even to men of education and refinement?" (Gall, 1866, p. 5), and we are persuaded that "surely our evening walks would partake more of intellectual and refined enjoyment, if we could hold converse with these silent but glorious witnesses of their Creator's power,

'For ever singing, as they shine, The hand that made us is divine?'"(p. 6).

This encapsulates the two themes of astronomy and gentlemanly scholarship in one go. The edition quoted is apparently a reprint from 1872-1875, and eventually reached at least twenty-seven editions by the 1960s.

(f.9) The president of the British Association for the Advancement of Science (BAAS) for 1841, and renowned Cambridge Professor, the Rev. William Whewell, often stressed that only in one science, physical astronomy, had the requisite qualities of observation and theory achieved sufficient status to be called science, and its practitioners true "scientists" (a word he invented when the BAAS decided not to call themselves philosophers, see Morrell and Thackray, 1981, p. 20).

(f.10) There were twenty that fit Morrell and Thackray's criteria; a profile is given on page 24 of their book. Some

points of interest from this table: eighteen were Anglican, nine were ordained, six actually held ecclesiastical positions, and ten received government patronage--all sure signs of eminence and prominence.

(f.11) For example, Robinson notes in an aside that this was "a subject likely to have been much in favor at that time in Germany" (Robinson, 1985, p.110). That is, Berlin during the war would have been an easy place for say, Goebbels (as propaganda chief), to have known about, and perhaps encouraged, a doctorate in propaganda. This is merely speculation on Robinson's part, however, and he provides no such evidence.

(f.12) The first person to give this quotation directly was Loxton (1985), although the history was in the same year noted as being "controversial" by Robinson (1985). More recently, the quotation appeared in a review of Peters's latest book, published in the UK by Longman's (*The Economist*, 1989). Monmonier (1995) observes that this incident has been mentioned "perhaps a bit too pointedly" (p. 26).

(f.13) This point appeared in an interview with Peters by Peter Vujakovic (1989c) that took place on March 15, 1989, when Peters visited London on the occasion of the publication of the Peters Atlas.

(f.14) Many of the details in this paragraph are derived from Snyder, 1988 and 1992.

(f.15) It might be easier to understand how the confusion happened, given that both publications in question are called *The Bulletin*, and that, despite Snyder, it is not clear that the article is only a reprint. No explanatory matter is used to preface the article (it just begins with the title, which is "Peters Projection--to Each Country its Due on the World Map"), and actually seems to be an interview with Peters, whose words are enclosed in quotationmarks. As an indirect footnote to this, the American Cartographic Association (ACA), which is a member of the ACSM, recently passed its own resolution calling for the complete avoidance and condemnation of world projections that are rectangular in shape (Robinson, 1990). Both the Mercator and the Peters world map projections are rectangular. Several North American cartographic associations, including the National Geographic Society, also endorsed this resolution; however, as Robinson notes (p. 103), NACIS declined to do so. According to officers of NACIS at the time, Robinson's statement was felt to go too far.

(f.16) A point pertinent to the current argument in this article is that there are two main forms in which the projection is used. First, it is used as a base map in simplified form (e.g., without the graticule) for thematic maps, such as location of agency projects. Second, it is used as a logo, for symbolic reasons. For example, a British aid agency, Action Aid, use it on the masthead of its newspaper (Bain, 1984, p.343). Vujakovic surveyed forty-two major national non-government organizations (NGOs) such as Oxfam and Christian Aid; twenty-five of thirtysix which used maps in their own publications have the projection as their main map. It is interesting that the main reason given by this 'adopter' group is that it is an equal-area projection (48%). This suggests that Peters's arguments have at least partially penetrated major aid agencies, especially when it is realized that it was also used because "it is distinctive and therefore provokes reaction and thought" (36%), "it eliminates a 'Eurocentric' world view" (32%), and "it provides a better representation of the relative importance of the Third World countries" (24%). Cited as a disadvantage was its distortion (32%); so the NGOs are apparently not unaware of its faults.

(f.17) The claims for the recently published Oxford Hammond Atlas of the World are similar, in that it says of its projection that it "produces the most precise maps of the continents ever seen" (Hammond Inc., 1993a, back cover), elaborated into "the most accurate, clear, and stunningly beautiful maps the world has ever seen" in the advertising copy (Hammond Inc., 1993b). As I have pointed out previously (Crampton, 1993a), this claim is, in effect, disputed by The National Geographic, which advertises the accuracy of the Robinson projection by claiming that it "comes closest to rendering the round surface of the earth without distortion [and is therefore] the National Geographic

standard for reference purposes." A similar view has been quoted by Dent, who reproduces a newspaper article quoting the NGS president Gilbert Grosvenor as saying the "Robinson Projection more accurately portrays round Earth on a flat surface [than the replaced Van der Grinten projection]" (Dent, 1993, p. 59). These claims contest the same ground (accuracy, appropriateness) claimed by the Peters world map, while Edney (1993b) uses the Hammond claims to support his description of cartography's progressivist past.

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