

CHAPTER 2

Inventing Anglo-American Economic Geography, 1889-1960

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The American inventor Thomas Edison (1847-1931) said that his genius consisted of "1 per cent inspiration, and 99 per cent perspiration." In this chapter I make a similar argument about the invention of economic geography. While there were inspirational moments during its history, mostly the story of economic geography is about hard work, about the large number of specific concrete practical activities required to define and maintain an economic geographical order. Such organization was not instant, but occurred hesitantly, a consequence of particular human practices and accomplishments within specific geographical and historical settings. That is why "inventing" is in the

chapter title. It signals that economic geography is contingent upon conscious acts of human creativity and effort rather than existing since time immemorial.

The idea that academic disciplines are human inventions, and in some cases very recent human inventions - economic geography, for example, was invented somewhere between the time of the first telegraph and the first radio - might seem disconcerting. This is because one connotation of the word invent is to make something up, to fictionalize, and, at worse, to lie. Under this interpretation to invent is to tell stories about a world that doesn't exist. In contrast, from its inception economic geography was (and is) about something real and substantial.

However, there is another connotation to inventing that better fits the aim of the chapter, and takes us back to Thomas Edison. Edison's inventions such as the ticker tape machine (1870), the phonograph (1878), and the incandescent lightbulb (1879) were "made up" in that they did not exist before he had them as ideas. But once existed they produced definitive material effects, altering human practices and beliefs. Humans could do things that they could never do before: react to Wall Street's surges and slumps as they occurred, hear music originally played sometimes half a world away, and light up whole cities.

Inventions in Edison's sense change the world, and give humans a different relationship to it.

My argument is that this second interpretation of inventing is useful to understand the history of economic geography. Once economic geography was invented, and later reinvented, the world was altered. After economic geography existed peoples' beliefs and actions were different, not only geographers, but a variety of people.

There is one more parallel to draw. Inventing economic geography and the lightbulb are context-dependent; that is, there is something about the peculiar combination of circumstances in which those inventions occurred that made them possible. For example, for Edison to invent the incandescent lightbulb required knowledge about electricity and its properties, machines and specialized equipment that could generate electricity and transmit it across long distances, and a research laboratory containing instruments, materials, and trained technicians and scientists capable of undertaking such a project. These contextual factors made the incandescent lightbulb possible, entering into its very construction, and shaping its form and capacities.

The same holds for economic geography. The discipline arose because of a set of contextual factors, and as those factors changed so did economic geography. Further, those factors, like the relationship between electricity and the lightbulb, entered into economic geography's very constitution, shaping the questions it asked, the methods and tools it used, and the range of answers it deemed acceptable. For sure the discipline had its own geniuses, people who were brilliant in thinking up new ideas, but their creativity was always, like Edison's, informed and tempered by a wider context.

The chapter is divided into three main sections. The first describes the beginnings of the institutionalization of Anglo-American economic geography as a discipline in the late nineteenth and early twentieth centuries. Critical here was the presence of colonialism and the growth of global commercial trade. The second discusses the interval between the first and second world wars (1918-1939/41) when a regional approach to the discipline emerged. The final section focuses on the immediate post-war period which was the setting for the so-called "quantitative revolution" and "spatial science".

In a chapter as short as this it is not possible to cover everything. Instead, the chapter is organized around a set of vignettes marking distinct periods in economic geography's

invention and reinvention. It is a history, and not the history. I should especially stress that the essay is limited to English-speaking, Anglo-North American economic geography, and to the voices of men. This is partly because of limitations of space, partly because of my own circumscribed abilities and biases, partly because of the kind of written sources that are available, and partly because of the very nature of economic geography itself. For good or bad, economic geography was historically a masculinist discipline, and linked to the European intellectual sensibility of the Enlightenment tradition (on both characteristics see Gibson-Graham's chapter in the volume). But to define the history of economic geography thus is not to argue for continuation in its old form. Indeed, the chapters that follow envisage something quite different.

Invention, institutionalization and imperialism

It is very difficult to provide an exact date for the invention of economic geography. Possible contenders include: 1925 when the journal Economic Geography was first published; 1893 when economic geography courses were first taught at Cornell University and the University of Pennsylvania; 1882 when the German geographer Götz distinguished between commercial and economic geography; and 1826 when The isolated state, for some the first classic treatise in economic geography, was written and privately published by the German landowner and farmer, Johann von Thünen (1783 - 1850). These dates at least narrow the origins of economic geography to the nineteenth

and early twentieth centuries. This period was important for the emergence of economic geography for two reasons.

The first is that this was an era when a number of academic disciplines, especially in the social sciences, were institutionalized within Western European and North American universities. Economic geography was one of those new disciplines (for other examples see, Ross 1991). These disciplines, such as sociology, or psychology, or economic geography, were defined by novel forms of representation which I will term "discourses". Discourse is a difficult word to define, but I use it to mean a network of concepts, statements, and practices that produce a distinct body of knowledge. A disciplinary discourse, for example, would include specialized vocabularies, conceptual and theoretical frameworks, diagrams, variables, and even tables of figures. The important point is that such discourses are crucial to creating - inventing - the world that is represented; that is, rather than simply mirroring a world that is out there, disciplinary discourses help to construct it. For example, up until at least the 17th century, if not later, the idea of the economy did not exist as such. Of course, humans have performed what we now call economic acts since Adam and Eve laboured in the Garden of Eden. But it was only about 300 years ago that the economic was recognised as conceptually distinct. Partly allowing the economy to become visible - to be invented - were a novel set of practices derived from the emerging academic disciplinary discourse of economics (which I will call "discursive practices"), and composed of, for example, striking metaphors (Adam Smith's "invisible hand"), new concepts (Ricardo's comparative advantage), persuasive diagrams (Quesnay's Tableau économique), compelling equations

(Say's Law), and meticulously calculated figures (William Petty's political arithmetic). Note that using the term discourse is not to deny the seriousness or materiality of the economic. The new economic world that was invented quickly affected people's most heartfelt beliefs and their most material of actions.

In a similar fashion, albeit slightly later, economic geography was invented. Its discourse was composed of: new terms like "regions of production" (Chisholm, 1889) or "north-south axis" (Smith, 1913); new typologies and schemes of categorization that ordered the world, for example, linking global climate regimes and agricultural crops (Chisholm, 1889: 57-153); and new maps and diagrams that made visible economic geographical connections, for example, between trade routes and modes of transportation (Smith, 1913). The result was the creation of new bits of reality that previously did not exist like "commercial space" or "transactional centres", which, in turn, affected how people saw their position within the world, producing new beliefs and behaviours.

The second reason for the particular timing of economic geography is bound up with its relationship to colonialism, and especially commercial expansion. There is now much written about the relation between the emergence of academic geography and the rise of especially nineteenth-century Western European imperialism (Hudson, 1977; Peet, 1985; Livingstone, 1992). In particular, a link is often made between the environmental determinism that a number of early geographers espoused at the time, and the justification of imperialism. Environmental determinism is the idea that the natural environment determines everything about a given people, for example, that those living

in tropical climates will be less energetic than those living in temperate ones (Livingstone 1992: ch. 7). Such a thesis, in turn, was used as a justification for colonialism. If a people could not fully develop economically because of, say, the prevailing climatic regime in which they lived, it was then legitimate for Europeans to intervene and show them how; indeed, this was "the White man's burden".

While an important line of argument, these links between geography and environmental determinism are couched at the level of geography as a whole, and seem a bit too neat and mechanical (Livingstone's 1992 work with its emphasis on "situated messiness" is an exception): if imperialism, then environmental determinism. In contrast, I will concentrate on only economic geography, and move away from such a tidy relationship. As we know even from Edison and his lightbulb, inventing is messy and difficult. The same goes, I will argue, for economic geography.

In focussing on only economic geography, and its unkempt beginning, I start with two figures: George Chisholm (1850 - 1930) in Britain, and J. Russell Smith (1874 - 1966) in the United States. Before their writing there were odd facts about commerce and geography, dribs and drabs that didn't quite fit; afterwards there was a new discipline.

George G. Chisholm

The intellectual life of George G. Chisholm, author of the first English language economic geography textbook, Handbook of commercial geography (1889), personifies

those unkempt beginnings. Born in Scotland and attending Edinburgh University, he later moved to London, making his living primarily from writing and editing geographical textbooks, gazetteers, and atlases (Wise 1975; MacLean 1988).

Chisholm's Handbook contains everything anyone might want to know about world commodity production and the geographical conditions for trade. While Chisholm (1889: iii-iv) claims in the Preface "to import an intellectual interest [to his inquiry] ... and not to encumber the book with a multitude of minute facts", that interest is difficult to find, whereas minute facts litter every page. The Handbook contains neither an explicit theoretical statement nor organizational justification. His focus is the facts (especially evident in his very long statistical appendix). As he once said, "If ... there is some drudgery in the learning of geography, I see no harm in it" (quoted in MacLean 1988: 25).

In 1908 Chisholm left London to become a lecturer in Geography at Edinburgh (the first such position in Scotland), and it was there that he first wrote programmatic statements for the new discipline of economic geography:

I would say then that it is the function of geography with respect to any class of phenomena that have a local distribution to explain that distribution in so far as it can be explained by variations connected with place in the operation of causes whose operation varies according to locality or according to the relation of one locality to another (Chisholm (1908: 568-9).

In so far as this statement is understandable it points to the importance of local, place-based factors and their interrelationship in determining the geography of economic activities. There is certainly no indication here that Chisholm is some lackey to imperialism mouthing environmental determinism. That said, the context of imperialism in which Chisholm did his inventing clearly influenced his work, and his conception of economic geography. Those connections were complex, however.

First, and most directly, the Handbook was a celebration of imperial commerce, the technology that made it possible, and a global trading system with Britain at its center. The late nineteenth century when Chisholm wrote the Handbook was a period in which Britain was the workshop of the world, "heavily dependent upon international trade and at the hub of a world-wide empire" (MacLean 1988: 21). In part this was made possible by "improvements in the means of transport and communication" (Chisholm 1889: 47), but also in part because of free trade and Britain's military might. Chisholm was not only extolling the economic benefits of trade in his volume, though, but also economic geography. For him trade is primarily geographical. Chapter 1 begins: "The great geographical fact on which commerce depends is that different parts of the world yield different products, or furnish products under unequally favorable conditions" (Chisholm 1889: 1). In this sense, to acclaim trade is simultaneously to acclaim "the great geographical fact" of commercial or economic geography.

A second connection is that Chisholm's book through its use of maps, figures, and tables of numbers, made visible, and therefore knowable, the complex filaments of the imperial project. In this sense, Chisholm's book constructed imperialism as well as representing it. This might seem a strange claim to make. I am not suggesting that Chisholm made up imperialism, but I am saying that without his work and other similar works people could not have known imperialism as such. Imperialism is so large and complex that it only becomes knowable when it is reduced to the printed page which is precisely what Chisholm's maps, figures and tables accomplish. This also speaks to the hard work and mundane quality of the effort required to invent (and celebrated by Edison's aphorism). One can hardly imagine a more tedious and time consuming task than Chisholm assembling massive amounts of data in tabular form, searching down every last fact, and constructing detailed maps. But these mundane and meticulous acts contributed to the reproduction of imperialism, and helped to invent the new discipline of economic geography.

A final connection between imperialism and Chisholm's work is around education. Chisholm begins his Preface by saying that he wants to teach "those entering on commercial life" (p. iii); that is, to make them better prepared and competitive in their business activities by furnishing them with the right knowledge. In carrying out that task, Chisholm was prompted and guided by two contextual factors. The first was that during the late nineteenth century Britain was facing stiff commercial competition from Germany and its empire. Chisholm believed Germany's competitiveness stemmed directly from the superior educational prowess of its business class who among other

things were steeped in economic geography. The second was a report published in 1885 by a British Royal Commission headed by Scott Keltie documenting the poor state of geographical education in Britain (a response in part to the 1870 Education Acts). As an academic field, however, geography lacked qualified teachers, suitable textbooks, and even a curriculum (MacLean 1988: 23).

Chisholm's book met both needs. It provided the British business class with commercial geographical information, and British schools with a curricular template, a source of class-room information, and something to be displayed both to students and to school governors and inspectors. Chisholm, however, was also speaking to an emerging community of academic geographers. His work became part of the broader process of institutionalizing geography as a discipline, especially after his appointment at Edinburgh University. Through Chisholm's role as an educator, economic geography as a newly invented discipline diffused, taking on efficacy: economic geography began changing the world.

Chisholm's book was intimately connected to his life and times. The colonial project was certainly helped on its way by Chisholm's writings, but it wasn't there working behind his back ensuring that he wrote only the right words or drew only the right maps. In fact, later in his life Chisholm (1921: 186) made a plea against the exploitation of colonial labour, which indicates again the untidy character of invention. Imperialism could not simply call forth actors such as Chisholm to provide instant legitimation. It was always more complicated.

By the time Chisholm died in 1930, the legitimacy of economic geographical discourse, and the object it constituted, were established. His work in part set the economic geographical die, stamped, as we've seen, by such characteristics as a wariness of theory, a concern with empirical detail, a celebration of numbers, a predilection for geographical categorization made visible by the map, and a tracing of relations among places through the media of various kinds of economic flows especially that of the commodity. If none of this seems exceptional it is because we are the heirs of Chisholm's more than century old legacy. At the time, though, he was making things up - inventing - as he went along.

J. Russell Smith

On the other side of the Atlantic, the process of invention was slightly different. The main impetus came from economics, and in particular the dissatisfaction of American economists with the discipline's abstractness (Fellmann 1986). As a reaction, some turned to the German Historical school that emphasized context and concrete detail. As the economist Edward Van Dyke Robinson explained at the time (1909: 249, and quoted in Fellmann 1986: 316): "After the [German] Historical School of economists had introduced the idea of relativity as to time and place, the necessity was apparent not only for a historical but also for a regional treatment for economic phenomena -- in other words for economic history and economic geography."

Consequently, in the United States economic geography was initially taught by economists or those in business schools. An early site was the Wharton School at the University of Pennsylvania. In 1903 it hired one of its doctoral students, a transportation economist, J. Russell Smith, who three years later founded within the School the Department of Geography and Industry. In 1913 Smith cemented both his own reputation as well as US economic geography by publishing Industrial and commercial geography. It was both a new and improved as well as an American version of Chisholm's Handbook (Starkey 1967: 200)

Divided into two sections that correspond to the terms of its title, the first (and longest) part of Industrial and commercial geography discusses the production of particular resources and manufactured goods, and the second part discusses world trade.

Throughout there is a dynamism and movement absent in Chisholm's work, and which is a product of Smith's focus on technological changes around transportation and communications. In particular, such changes for Smith facilitated a "world [commodity] market" (Smith 1913: 16) defined by a distinct geography of control and production.

Control is located in one "mere corner of the world" (Smith 1913: 874), i.e., N.W. Europe and the N.E. seaboard of the US, because it has "has capital to spare" (Smith 1913: 874), and because of its "transactional" role as a "place where bargains are made" (Smith 1913: 867). In contrast, the rest of the world is defined by its role as a producer.

The discourse that emerges from Smith's book is similar to that of Chisholm's. Again there is a focus on empirical detail, the shunning of theory (although environmental

determinism appears in the introductory chapter to Smith's book, but dropped in later editions), and a penchant for geographical categorization. Smith is perhaps even more emphatic than Chisholm in emphasizing exchange and trade. For J. Russell Smith exchange and trade are irresistible impulses. Whenever one place has a surplus of one good, and another place a surplus of a different good, trade naturally unfolds between them. In addition, Smith joins an emphasis on trade with a stress on technology. With such innovations as the steamboat, railway, telegraph and telephone, trade need no longer be locally constrained but global. In this sense Smith's book reads as a primer on globalization, albeit written at the beginning of the twentieth century and not at its end.

As with Chisholm's Handbook, the sources of success of Smith's Industrial and commercial geography are multiple. There is the role of the Historical school which gives rise to the very idea of economic geography, and, in turn, to economic and commercial geography courses that had never existed before. Moreover, by a happy coincidence, this development occurred just as geography itself was becoming institutionalized. When the influence of the Historical school began to wane by the 1910s as economics became more analytical and less empirical, and as a result economic geography courses were dropped by Departments of Economics, they were picked up by newly-formed geography departments such as Smith's (Fellmann 1986: 319).

There is also the peculiar conjuncture of Smith's own interests. By focussing on transportation and communications technology Smith could simultaneously celebrate human creativity, the power of the machine, trade and exchange, and the importance of

geography, while at the same time not giving the discipline away to physical geography (which was the inclination of perhaps the most famous US geographer at the time, William Morris Davies at Harvard). Smith could sustain such a position in part because of the compelling narrative he used to structure his book that joined the benefits of exchange with the benefits of technological innovation. It was a story that resonated perfectly with the free-enterprise and machine-age sentiments of an early twentieth-century America beginning to engage in global trade.

Finally, as with Chisholm, there is Smith's role as an educator. His influence was not confined to the students he taught while at Wharton (and later Columbia University in New York from 1919 onwards). He was, like Chisholm, a dry lecturer, and exacerbated by "a slight lisp and a low, monotonous way of speaking" (Rowley 1964: 87). But he shone as a writer. His book was enormously successful garnering compliments by geographers, and, perhaps even more importantly, by university administrators who decided the fate of geography departments (Rowley 1964: 50-51). Like Chisholm's Handbook, Smith's volume was more than just a student text to be read to pass final exams. It became an active component in the very invention of economic geography as a discipline.

By focussing on Chisholm and Smith I've delineated some of the elements of the newly invented discipline of economic geography and its world. The discipline was concerned with empirical detail, global geographical categorization based upon commodity specialization, and the spatial patterns and conditions of commercial trade. Economic

geography did not have to turn out in the way it did, for example, it could have taken on an abstract theoretical bent (which was the trajectory of economics). That it did not do so goes to the importance of historical and geographical context. That context was not mere background atmospherics, but entered in the very body of the discipline's knowledge. The context of commercial expansionism and imperial control made a difference. But as I've also stressed, early economic geographers were not the mere dupes of that context: there was individual inspiration, along with perspiration.

Regions, differentiation and Richard Hartshorne

Within fifteen years or so of Smith's book being published, economic geography began to change. There are again parallels with what happens to inventions. Often they undergo further alteration, sometimes taking forms that are barely recognizable compared to their original incarnation. Contrast, for example, early computers that took up the space of many rooms to the present lap-top. These kinds of developments or reinventions, whether it be computers or economic geography, require much labour and reorganization.

In the case of economic geography it became noticeably different by the 1930s as focus shifted from general commercial relations of a global system to the geography of narrowly bounded, unique regions especially those close to home. In part, this move to the region stemmed from a long standing debate in the economic geographical literature.

Smith's book was structured for the most part thematically, around commodities, trade and transportation, and not regionally. For some American economic geographers, such as Ray Whitbeck, this was a mistake. As he argued in his critical review of Smith's book, there is "a distinction between a text book of commerce and industry and one on commercial and industrial geography" (Whitbeck 1914: 540). For Whitbeck (1915-16: 197) the emphasis should be geographical: "the unit should be the country and not the commodity."

From the end of the First World War in 1918, Whitbeck's position became increasingly popular particularly in US economic geography (which is the focus of this section). The result was a regional perspective that made the region, and its unique features, the focus of inquiry. That perspective is readily disclosed in the various textbooks that were published from the mid-1920s onwards. Ray Whitbeck's own Economic geography co-written with his University of Wisconsin colleague, Vernor Finch, is typical (and first published in 1924). Justifying economic geography on the grounds that it provides "a kind of knowledge that educated people need and use", the key organizing idea is "areal differences", the interpretation of which "requires the reasoned association of facts of many kinds" (Whitbeck and Finch, 1935: v). Those facts are then neatly ordered under an identical fourfold typology for each of the regions investigated: agriculture, minerals, manufacture, and commercial trade, transportation and communications.

Or another example is Clarence Fielden Jones's (1935) textbook Economic Geography which begins: "Everyone likes to travel. Most of us wish to visit distant lands" (quoted

in Berry, Conkling and Ray 1987: 27). The eight-fold typology used by Fielden Jones to organize the facts taken from his travels is more finely variegated than Whitbeck's and Finch's, but it performs the same role: a typological grid for sorting observations that can then be photographed, mapped, tabulated, or most likely, merely listed under the appropriate classificatory heading. By comparing the facts of the different regions by using the same typological grid, geographical differences are immediately seen, and areal differentiation shines by its own light.

More broadly, this regionalist perspective represented a shift in the economic geographical discourse, changing the object of enquiry. Let me briefly explore that discourse by briefly discussing the work of Richard Hartshorne (1899-1992), an American geographer, who perhaps more than any other geographer is associated with the regionalist perspective. Not that Hartshorne was the first to conceive of regionalism, but he systematically codified it, and provided an intellectually rigorous justification. In so doing he gave economic geography a critical role.

In the 1920s Hartshorne carried out work in economic geography, but he is best known for his writings on the history and philosophy of the discipline, and, in particular, the book, The Nature of Geography (1939), that drew upon the German geographer Alfred Hettner (1859-1941). One purpose of that book was to define a geographical unit that could be used as a basis to organize and integrate the often scattered and multifarious pieces of information collected by geographers. Hartshorne's answer: the region. It

allowed geographers to integrate otherwise disparate geographical facts, rendering the complexity of the world comprehensible.

But how should the region be defined? Regions based on watersheds, for example, would be quite different than regions based upon economic specialty. For Hartshorne the economic ruled supreme. He thought the activities of keeping "body and soul together" (Hartshorne 1939: 334) are the most central to human life, and should be used to delineate the region. More specifically, within the wider set of economic activities that occur he thought those around agriculture, and the family farm in particular, were especially important for regional delimitation.

Hartshorne, therefore, justifies his regionalist perspective on the basis of economic geography: "there is no boundary between economic and regional geography" (Hartshorne 1939: 408). For him the world is made up of a patchwork quilt of economically-defined regions, where each region is a closely defined complex of interconnected elements including, for example, land and plants, buildings and livestock, tools and production methods, as well as various invisible components like prices and markets, and practical and abstract knowledge. Examples might include: the American corn belt, the Po plain in Italy, or the Vale of Evesham in southern England. In each case the complex interaction among the different elements within a region is critical, producing a unique regional entity.

Let me note some of the principal differences between this regionalist economic geographical discourse and the older one of Chisholm and Smith. It will help clarify the nature of the economic geographical reinvention that occurred.

First, regionalism emphasizes the geographically unique. While the same type of elements are found in different economic regions, how they are combined together and relate one to another "occurs but once on the earth" (Hartshorne 1939: 393) For Hartshorne two related implications follow. That no law-like statements can be made about regions, implying that economic geography cannot be a predictive science (this is especially important given that from the mid-1950s onwards economic geography makes strenuous bids to become exactly a predictive science). And that a regional approach, or what amounts to the same thing, an economic geographical approach, must be descriptive. If economic geographers cannot invoke explanatory laws, they must be "concerned with the description and interpretation of unique cases...." (Hartshorne 1939: 449). In contrast, Chisholm and Smith, while recognizing the importance of geographical difference, and relying heavily on description, are at pains to emphasize the wider geographical and economic system that revolves around world production and trade, and that connects places and regions together. This is missing in much of the regionalist economic geography. The region is interesting in and of itself.

Second, the regional uniqueness emphasized by Hartshorne provides justification for the rapid spread of regional typologies that typified economic geography. If a region is defined by its combination of different economic elements, then to show its uniqueness

we must classify those elements, and then using the typologies constructed demonstrate that those elements appear in different mixtures in different places. In contrast, in Chisholm's and Smith's works, there is less concern with typologies as such. Places are categorized, but only by the commodities they produce and trade with the purpose of emphasizing geographical connectivity: the global system comes first, its constituent regions defined by commodity production second.

Lastly, for Hartshorne the complexity of the region requires sustained, on-the-ground field research. Geographers must muddy their boots if they are to understand the world. Again, in contrast, neither Chisholm' nor Smith's work required them to be physically present; in fact, given the global ambitions of their project, it would be impossible for them to do so. Collecting and organizing numbers, and drawing maps based upon them was sufficient. Of course, they still went into the field -- Chisholm was an especially ardent field tripper -- but it was not an integral component of their enterprise.

The exact reasons for economic geography's regionalist reinvention are difficult to locate. A number of causes seem plausible. There is a changing historical and geographical context. Both the slowing of colonialism, and the effects of the 1930s Depression on world trade and commerce, rendered Chisholm's and Smith's projects less pressing. There is Hartshorne's intellectual engagement with German geography and in particular with Hettner's. (In 1938-39 Hartshorne spent a sabbatical year in Austria writing The Nature of Geography; Hartshorne, 1979.) There are also internal sociological reasons, of which the most cited is the embarrassment caused by the discipline's earlier affair with

environmental determinism. A focus on regional study represented if "not greener pastures" at least "smaller safer pastures" (Mikesell 1974: 1). But also the discipline of geography itself was become much more professionalized and institutionalized within a university setting. As it did so the stakes became higher, with individual academic reputations hinging on the successful promulgation of new ideas and discourses such as the regional one.

Whatever the reasons, external or internal, the upshot was quite a different economic geography from what went before with such emphases as field work and regional boundary making, the construction of new typologies, and a distinctive view of the purpose of geography. Furthermore, regionalist economic geography remained intact for at least twenty years after The Nature of Geography was published. Partly this was because of Hartshorne's status and power within American geography, but it was also a legacy of his war-time activities in US military intelligence in the Office of Strategic Services (forerunner of the Central Intelligence Agency) which involved him supervising a large number of geographers. According to Butzer (1989: 50), the close-knit relationships forged during that period "crystallized into a coherent paradigm, reinforced by close proximity and strong personal ties, and that endured for many years as an elite club". From the mid-1950s onwards, however, that club began to be criticized in large part from a younger generation who were never members.

The quantitative revolution and spatial science

That younger generation, at least in the United States, initially gathered at two principal sites: the University of Iowa, Iowa City, and the University of Washington, Seattle. It was from Iowa that the first openly opposed voice to Hartshorne was heard. In 1953 Fred K. Schaefer (1953), a political refugee from Nazi Germany and an inaugural member of the Department of Geography at Iowa, published in the flagship periodical, Annals, Association of American Geographers, "Exceptionalism in geography." It was both a repudiation of Hartshorne's position, and a call for a scientific approach to geography based upon the search for geographical laws (the ultimate form of a scientific generalization). Unfortunately, Schaefer died in June, 1953, before his article even appeared in print, and so he was never able to elaborate his argument, nor defend himself from Hartshorne's (1955) subsequent attack. But the article became a rallying point for the younger generation of economic geographers who were intent to reinvent the discipline as a science, or "spatial science" as it was later dubbed.

To do so required the techniques, logic and vocabulary of scientific practice; that is, a new disciplinary discourse was needed, and consequently a new object of inquiry. Here a colleague of Schaefer's at Iowa, his boss, Harold McCarty, played a critical role. While suspicious of Schaefer's grand philosophizing, and rankled by his combativeness, McCarty concurred with Schaefer that economic geography should move away from regionalism and become more scientific. In 1940 McCarty had published The geographic basis of American economic life, on the surface a conventional regional account of US

economic geography. Its intellectual point of departure was fundamentally different from Hartshorne's, however. Regions were McCarty's unit of analysis neither because of the authority of Hettner, nor because they were convenient integrative units, but because market forces made economic geographical reality that way (McCarty 1940: 19). There is a hard, economic conceptual logic driving McCarty's analysis based upon market forces which was new to the discipline, and represented by economic theory. As he put it: "Economic geography derives its concepts largely from the field of economics and its method largely from the field of geography" (McCarty 1940: xiii).

McCarty's use of that word method is very broad because the specific technical methods he later employed came not from geography per se, but from statistics. In particular, he pioneered within economic geography the use of the statistical techniques of regression and correlation analysis (McCarty et al. 1956), conceiving the very discipline in their image (Barnes 1998b). Such practices marked Iowa as one of the first quantitative economic geography departments in the US.

At the other "center of calculation" in US economic geography, the University of Washington, the two pivotal faculty members were Edward Ullman, and perhaps more importantly, William Garrison. Garrison had joined the department in 1950, following a Ph.D. at Northwestern University, and before that war time service in the US Airforce where he took courses in statistics and mathematics as part of his training as a meteorologist (an experience common to other pioneering quantifiers).

Statistics and mathematics were to define the programme at Washington. Garrison gave the first advanced course in statistics in a US geography department in 1954. It was not only numbers but machines that were important. There were the large, cumbersome electrical mechanized Friden calculators, but more significant was the even larger, more cumbersome, computer. In an early advertisement for the department, Donald Hudson (1955), boasted about the departmental use of an IBM 604 digital computer, also a national first. The programming technique of so-called "plug wiring" involving plugging wires into a circuit board was crude and inefficient, but it helped define and consolidate the new vision of the discipline as based on science and the latest technology.

Even at this point we begin to see the shape of a different kind of economic geography emerging. It was radically different from Hartshorne's field-based, typological, descriptive one centered on the region, and sometimes only on the farm. Instead, the new economic geography was primarily undertaken at a desk and involved calculators, computers, graphs, numbers and spread sheets; it employed an increasingly abstract, theoretical vocabulary taken primarily from economics; it concerned itself with finding causes and explanations, and not simply with classification; and it was not content with written descriptions of the unique, but focussed on the conceptual and numerical analysis of the general. Economic geography was becoming a fully fledged social science stressing the social over the natural, and scientific analysis over "mere" description. More generally, as economic geographical discourse was reinvented an entirely different economic geographical world was emerging defined by abstract space, geometrical axioms, Greek symbols, and regression lines.

But it was hard work, and often contested. This can be seen in Britain where a similar process unfolded, albeit slightly later. There "the revolution" was associated especially with Peter Haggett who was at Cambridge and later Bristol University, and Richard Chorley, a physical geographer at Cambridge. They were given the moniker the "terrible twins" because of their role in introducing a scientific approach to the discipline. In Haggett's (1965) case that approach was partly worked out within the context of economic geography. He argued that through a process of abstraction economic geographers should construct an ideal simplification of reality - a model - and then using statistical methods test it against the real world. Examples of modelling are found in Paul Plummer's chapter that follows this one, and it is now a well-known strategy. But at the time it was seriously opposed by those holding on to regionalism. No wonder. It presaged an entirely different kind economic geographical practices (see Chorley's 1995 hilarious account of Haggett being told off by his Head for showing a regression coefficient).

Another movement that reinforced economic geography's trajectory towards spatial science during the 1950s was regional science. Child of the energetic and ambitious American economist, Walter Isard, regional science was born in Detroit in December, 1954, when the first meeting of the Regional Science Association was convened. Isard's (1956: 25) wider purpose was to add spatial relationships to the hitherto "wonderland of no dimensions" that constituted the economist's world. The strength of his theoretical treatise, Location and space economy (1956) (immediately used by Garrison at

Washington for his economic geography seminar), was such that by 1958 Isard established the first Department of Regional Science, perhaps appropriately at the University of Pennsylvania, Russell Smith's alma mater. Certainly, during these early years there was theoretical, personnel and institutional cross-pollination between regional science and the new economic geography which benefitted both. But it was always a relationship pregnant with potential conflict because the two projects claimed the same academic turf. Isard's attitude that economic geographers were simply the hewers and bearers of data for regional scientist theoreticians didn't help, despite the fact that it was close to McCarty's original view.

By 1960 these different elements - the new economic geography in the US and the UK, and regional science - had come together to form a coherent network. It was characterized by a specific set of geographical nodes such as Iowa City, Seattle, Philadelphia, and Cambridge (UK), and connected by: the circulation of paper - early on graduate students at Washington initiated their own Discussion Paper series and sent it to kindred souls around the world; flows of money - especially important in the US were grants from the Office of Naval Research that favoured the large-scale, collaborative and practical projects pursued by the new economic geographers (Pruitt, 1979); and the movement of people - visitors were brought in sometimes from far afield, and as graduate students obtained their Ph.D.'s they were often hired by like-minded departments. There was no single organizing force to the network, but it quickly enrolled new people and things into its organization, defining both a new discipline and new relations within the world.

But why did this reinvention of economic geography happen when it did? The post-war years were a period of massive expansion of higher education both in North America and Britain. In part, this occurred because of wider structural changes in economy and society turning on the rise of managerial Fordism and a Keynesian-welfare state. The result was a changed mind-set that stressed higher education, and a material affluence that allowed for appropriate funding (Scott, forthcoming). In addition, the 1950s was a period of optimism around science and technology, and an accompanying instrumental, "can do" attitude. All problems could be solved by applying scientific principles, using appropriate technology. This was certainly the case with the new economic geographers. Much of the early work was about using mathematics and computer-generated results to devise practical solutions to problems around transportation, or urban planning, or devising optimal solutions for the location of firms, shops and residents.

Given its scientific aspirations it may seem odd to claim that spatial science is an invention. After all, scientific knowledge is supposedly impeccable. My argument, however, is that the invented nature of spatial science is evident in its social and institutional origins which were hesitant, complex and messy. Spatial science did not arise in one blinding moment, with people suddenly seeing the light of scientific truth. Rather, it was a result of some economic geographers making use of hitherto unused vocabularies: in the idiom of statistics and mathematics, in the axioms of Euclidean geometry, in the abstruse language of economic theory, and in the "if, then" statements of computer programming. One shouldn't underestimate the difficulty of this process. It

required perseverance, command of difficult corpuses of knowledge, and many late nights. It required much perspiration. The results were new pieces of reality, and a new object of inquiry. That object of inquiry, however, was not (at last) the "real" economic geography because, as should already be clear, there is no such thing. What is taken to be real is contingent upon the prevailing disciplinary discourse, and as the latter changes so does the former.

Conclusion

The purposes of this chapter were twofold. First, to present briefly some of the leading approaches and personalities within the history of Anglo-American economic geography, 1889-1960. Trying to fit seventy-one years of history in a short chapter necessarily results in both substantive and interpretive omissions. Substantively much is missing including, for example, the influence of non-Anglo-American intellectual traditions such as the German location school (Barnes, 1998a), or dissenting voices (Hepple, 1999), or legions of unnamed economic geographers who carried out bread-and-butter empirical research. Interpretively I made nothing of the fact that my history was only of "great men" living in metropolitan powers. From feminist and postcolonial perspectives a very different historical narrative could have been written about those who were excluded. That said, I hope my history conveys a sense of flux and contingency as the discipline is invented and reinvented.

This goes to my second purpose which is to make a methodological argument about economic geography by using the metaphor of invention. As a metaphor "invention" is useful precisely because it is unsettling. Whether you accept it or not, the metaphor makes you pause and think about the kind of entity that is economic geography. My argument is that the inventiveness of economic geography is in the detailed practices of its disciplinary discourses: drawing maps, making tables, interviewing informants, or staring at a computer monitor. Those discursive practices may not seem like much when we do them, but they are central for defining a particular object of inquiry, and hence delineating the nature of the discipline. For example, when I was an undergraduate student in the mid-to-late 1970s, learning statistics, punching computer cards, and formally deriving abstract models formed the basis of my study; it was what you had to do to be an economic geographer. Now, few if any of these discursive practices are required of students, but other practices are, such as learning qualitative research methods, knowing the lexicon of political economy, and reading exotic social theory written by Parisian intellectuals. Economic geography, as a result, is quite different. But that difference, and indeed the enormous changes occurring in economic geography since spatial science and reflected in the following chapters, are not to be bemoaned, but celebrated. Thomas Edison never thought he had made the perfect invention, and neither should we.

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