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Running Head Right-hand: The “theoretical-quantitative” geography

Running Head Left-hand: Olivier Orain

7

A Social History of Quantitative Geography in France from the 1970s to the 1990s

An overview of the blossoming of a multifaceted tradition

Olivier Orain

There is a massive gap between what the French “géographie théorique et quantitative” (TQG) means in Francophone countries and its blurry shape, provincial aura, and little notoriety abroad. It is of course very unspecific, as French, like German geography, stopped meaning anything in globalized geography for many decades. “French Theory” is by far more suggestive. However, in French context, “theoretical-quantitative” geography or “spatial analysis” – as it is alternatively called – played a role quite similar to its American counterpart and remain strong and influential 50 years after its rise during the 1970s. The main goal of this presentation is to provide an overview on the development of the French version of a more global movement, underpinning its peculiarities and its conformities. More specifically, this is an interesting example of what Jean-Marc Besse (2016) calls a “phase discrepancy” between two contemporary fields separated by language and, in some ways, cultural differences. Far from interpreting such a discrepancy in terms of lateness, my aim is to show how French geographers appropriated 15 years of anglophone debates and elaborations, mixed them with singularities from their inherited tradition and constructed a rather singular “quantitative” geography. At this point, the “quantitative” adjective attribute should be specified. Its mundane use isn’t sufficient, because the recourse to and the measurement of quantities were already a systematic feature of geography. So I favor a sense that focuses on a distinctive act encompassing a methodology or a style of reasoning where

the recourse to statistics or any other mathematical operations is the main way to show or explain something. And it obviously requires looking for the labels used to emphasize such a distinctive approach.

Indeed, it is slightly difficult to isolate a specific label that one could regard as the most generic and socially significant. Various players in the field used many different labels with different meanings, like “new geography,” “theoretical and quantitative” geography, “spatial analysis,” etc. (Cuyala 2014, 176–187). On the French scene, “quantitative geography” had been the initial label that its first promoters and opponents used to qualify such a promise (or threat), but it quickly shifted to “theoretical and quantitative,” as many early promoters emphasized the intrinsic “theoretical” demand of such an approach, so this contribution is entitled accordingly. I’ll consider all of them as congruent landmarks of a social movement that wished to initiate a radical change in geographical methodology (or epistemology), aiming to induce a shift based on explanation or the search for general laws, models, or patterns. Thomas Kuhn’s theory of paradigms and scientific revolutions is often mobilized to summarize and reinterpret such a view (Drain 2009).

The literature on this topic is scarce, mixing actors’ early contributions (e.g., Brunel 1976; Claval 1977; Pumain et al. 1983) or more recent ones (Claval 1998; Pumain and Robic 2002; Cauvin 2007), a PhD (Cuyala 2014), and the author’s own work (Drain 2001, 2009, 2015, 2016). The choice of a social and epistemological approach is deliberate, first because this movement was mostly supported by groups imbued with a collective spirit partly inherited from the events of May–June 68; and, second, in order to avoid an intellectualist rendition adding ideas and theories one after the other, out of social and cultural contexts. Basically, the chronology and the characteristics of such a movement are incomprehensible when deprived of their historical backgrounds. First, I will explain why a “scientific revolution” occurred in the 1970s, when different trends became explosive. Then I will analyze these “revolutionary” 1970s, keeping in mind that the actors remained a minority and that nothing like a replacement of the

Vidalian paradigm occurred. Lastly, I will explore the climax (1981–1996) when “spatial analysis” seemed to take a leadership over the whole of French geography.

The conditions of a dramatic divide

Until 1968, French geography remained socially and intellectually cohesive.² The postwar decades had showed a dramatic increase of student and scholar numbers, the former multiplying by seven between 1949 and 1967 to respond to teaching needs (Soule 2011). After the creation of a specialized university geographical curriculum during the Second World War, recruiting progressively shifted. Both academic and student bodies evolved toward a humble socioeconomic profile. Meanwhile, this population had followed high school scientific curricula more than the average in human sciences. The relationships between scholars and their pupils were less formal and closer than in traditional humanities, often metaphorized as those of a family. But, as in a family, there was also a paternalistic and authoritative dimension in these relationships. The student projects were closely bordered and watched by an academic community that had rigid, if not always self-justified, values. “This is not geography” was the main sentence that castigated attempts deemed too theoretical, speculative, and far away from “realities” (Robic et al. 2008; Orain 2009, 2015).

At the top of the disciplinary system was the prestigious Sorbonne, but geography was a more decentralized discipline than any other in humanity faculties and many provincial professors shone almost as much, thanks to a regional or national influence. The national so-called “school” had its prestigious journal, *Annales de Géographie*, and its national boards, every group gathering almost the same people. One generation, born in the beginning of the 20th century, reigned from the postwar period to the end of the 1960s. They were mostly men, politically (more or less) progressive; many were communists or Gaullists. Epistemologically, shortly, they reproduced unchanged and unquestioned old formulas, but allowed for a large expansion of new themes and objects, as far as it remained within due orthodoxy.

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Geomorphology remained the varsity team where one could prove their scientific skills, and also the main subfield for scientific innovations and controversies (Orain 2015; Bataillon 2020).

If scrutinized in details, this picture would show nuances, like outcast figures and temporary attempts to change the way geography was taught, practiced, or thought. But the main tendency was to thematically expand the discipline, not to reform it. Nevertheless, the rise of state planning during the 1960s and the subsequent rise of a transdisciplinary scene related to it confronted geographers with a full range of specialists they weren't used to speaking with: engineers, planners, economists, sociologists, etc. (Orain 2009, chap. 4–5). Among those professions, the rationale was very different: statistics, mathematical reasoning, and search for laws, were commonplace. Among the French elites involved in the management of state policies, the latter was ideologically and operationally dominant (Bezes et al. 2005). Out of a few personalities eager to reform geography to fit the new scientific climate, the main mood among the profession was to castigate such a “technocratic” view and to promote, in their terms, the wisdom of the one and only science that is “synthetic” first. The disciplinary literature, even in its reformist mode, is filled with numerous reassessments about the unique nature of geography as a crossroad of many scientific fields (Orain 2009, chap. 4–5). So it isn't surprising to see that French geography avoided the contemporary “quantitative” movement at its climax. Benefiting the growing wave of students and being able to offer them new jobs and opportunities, the scholars had an optimistic view on their discipline. They didn't notice growing signs of puzzlement and reluctance among Student Unions (Orain 2015), especially about the way pupils were used for applied geography surveys and “contracts” with no legal ground, in particular where it was broadly developed, like Strasbourg, Rennes, and Paris universities (Gaudin 2015; Usselman 2020; Orain 2015).

Nonetheless, “modernism” was a key attitude in this era, and statistics being a noticeable part of it, they started to be taught or used in the 1950s and 1960s, but sporadically, under some physical geographers' impetus, such as the climatologist Charles-Pierre Péguy (1915–2005). Generally, the main difficulty was that numbers were considered as values *per se* and symbols of

magnitude in a description or a basic comparison. Pierre George (1909–2006) wrote a milestone article about the “myths of numbers” (1963) that is at the same time a very stimulating critique of such an attitude and the most consistent expression of a geographical reluctance to introduce mathematicized reasoning in the discipline. In the late 1960s, counting was everywhere as a gesture that gave a significant result out of a collective or individual survey, but the raw results seemed sufficient as they were a basis for charts and thematic cartography. They were scarcely a basis for the explanation of something, as explanations were local and seldom the main discursive scheme operating through a text or a speech.

Monolithic in its scientific features, demographically growing but mildly discredited by other social scientists, the French geography encountered a major social crisis at the end of the 1960s, during the May–June 68 Crisis (Damamme et al. 2008; Gobile 2008), like almost every sector of French society. It typically (Bourdieu 1990) opposed students and junior faculty members to the professorial body. May–June 68 protesters demanded a radical shift in French politics and society, but their disciplinary goals were reformist, unquestioning the cult of fieldwork and the axiology inherited from previous generations (Orain 2015). Nonetheless, the May–June 68 events showed quickly rising tensions between individuals or groups, and many despised teachers encountered stigma, caricatures, and ruckus, in a moment of generalized criticism and ideological critique. Every latent social contradiction became visible and problematic in the crisis dynamics (Dobry 2009, 1980; Gobile 2008). It initiated a big divide in what was previously a rather cohesive community.

Many scholars shifted their political views and became very hostile against the Left. On the other side, as a revolution, May–June 68 failed to change French politics, even if the Gaullist power conceded socioeconomic improvements and a major reform of University system (“the Faure law,” Foucet and Valence 2016). Following Pollak (1989) and Damamme et al. (2008), it is suggestive to interpret the changes that occurred in many parts of French society as the result of a reconversion of revolutionary initiatives at local and occupational scales, the protesters’ sense of failure being conjured into more modest and proxemic initiatives. In that respect, French

geography engaged in its particular “revolution.” It involved either a new epistemological frame – the rise of a “theoretical-quantitative” movement seen as a way to replace an exhausted tradition – or a political critique against pointlessness, dull vacuity, and apolitical claims of the tradition.

The rise of a “revolutionary” movement (1970–1984): la “nouvelle géographie”

In the case of French geography, the “practical subversion” mood found a breach and a motive in the exhaustion of research formulas that the new generations had been bidden to use. A significant part of the newcomers in the field broke away from the community’s tradition and social rituals. “New Geographers” were born at the end of the 1930s or belonged to the “baby boomers” (born between 1942–43 and 1950). They were numerous and socially diverging from the previous generations: coming from humbler backgrounds, having often followed “math’élémentaire” (i.e. scientific) curriculum while in high school, as geography allowed a scholarship without Latin in the universities. They were more sensitive to “positivistic” values and had read the French philosophers of science like Bachelard, Canguilhem, and Althusser while in their senior year of high school. They were interested to and aware of statistics and mathematical reasoning. Before and after May–June 68, they had been massively recruited as assistants in the growing universities. Later, they expressed retrospectively the lack of enthusiasm they felt while starting a doctorate in the 1960s and finding “old receipts” dull and not methodologically controlled (Chamussy 1978; Le Berre 1988).

In the years following May–June 68, a formative offer in statistics, remote sensing analysis, and computational languages developed in Scientific institutions like Maison des sciences de l’homme, ORSTOM (Ultramarine Agency for Scientific and Technical Research), and CNRS (National Centre for Scientific Research). A significant minority of the newcomers showed a big interest for such training courses where elders didn’t show up (Cuyala 2014). So

they started early to socialize in a time where social stratification, enhanced by the recent political crisis, was sharp. In the French geographical landscape, it didn't develop in the universities where the seniors were still influential, charismatic enough, supposedly progressive, or very hostile. It produced a spatial differentiation of the reception of the new techniques: strong in East and Southeast of the country, where there was a relative lack of prominent professors; strong but in minority in Paris; influential in isolated and new university centers like Rouen and Reims; weak out of those social configurations.

Newcomers converted to such “new” techniques created affinity groups – like Groupe Dupont (1971), Groupe d'action géographique” (GAG 1971–1972), and The Unicorn (mid-1970s) – related to the expansion of a new methodology. The latter one was a feminine group, which emphasized the significant role and demographic weight of women in the movement: as a non-mainstream, not socially valorizing, part of geography, quantitative techniques attracted a relatively strong inflow of young women (Pumain and Robic 2003; Ginsburger 2017). If mathematics didn't imply any political meaning *per se*, May–June 68 projected shadow gave almost immediately a critical tone to such an initially reformist movement. Those groups were self-organized, autonomous from the mainstream and from the national discipline leaders. They offered an opportunity to remain “apart from the system” to the new generations and to operate what Boris Gobille calls a “symbolic dissidence” (Gobille 2008) from the “catholic” society. For a decade, a political, epistemological, and social divide remained between the (scientific) revolutionaries and the geographical clergy, even if social relationships kept working episodically at a local level and with “modernist” leaders.

Meanwhile, the most reformist part of the senior body started to promote an acculturation of the French geography to the “novelties” coming from the USA and England. In the early 1970s, Philippe Pinchemel (1923–2008) initiated the translation of Brian Berry's *Geography of Central Markets and Retail Centers* (1971) and Peter Haggett's *Locational Analysis in Human Geography* (1975). The main way to promote a new methodology and to appropriate the Anglophone “model” remained the auctorial mediation through conferences, articles, and books.

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In the late 1960s, Paul Claval (b. 1932) developed a specialized anglophone library in Besançon University where he invited many junior geographers. Lecturers who had been working in Canada or the USA in the 1960s, like Bernard Marchand (b. 1934), Sylvie Rimbart (b. 1927), Henri Reymond (1930–2018), and Jean-Bernard Racine (b. 1940), there converted to the “quantitative” techniques, became the prominent publicists of the American “quantitative techniques.” The former taught a “quantitative geography” certificate at Paris University in 1969 and gave a lecture in 1970 in a national disciplinary gathering, followed by many newcomers, who became legendary for the movement (Marchand 1972). Many actors later narrated how this speech bedazzled them and accelerated their conversion to the new tools and ways of thinking (Chamussy 1978; Le Berre 1988). Racine & Reymond wrote a handbook, *L'Analyse quantitative en géographie* (1973) that quickly became a milestone, even if the readers retained mainly the theoretical dimension of the book. S. Rimbart played a seminal role in the diffusion of quantitative methods in cartography by her collaborative work with Colette Cauvin (b. 1944). François Durand-Dastès (1931-2021) had been another early promoter, especially for modeling approaches. Famous or not, some Anglophone geographers have been invited in France through personal contacts, like Peter Haggett, Peter Gould, Wanda Herzog, and a few others.

In 1970, Roger Brunet (b. 1931), already a prominent modernist figure, author of a notorious state doctorate and a no-less notorious secondary thesis about discontinuity phenomena in geography (1965) started to work on the launching of a new scientific journal. He and other modernists became convinced that *Annals of Geography* weren't able to host such an *aggiornamento* (update). He wrote an editorial, read and slightly revised by his peers, and gathered material for a prototype. The first issue of *L'Espace géographique* came in 1972 as an academic journal, with a publisher specialized in medicine (Doin). The first year provided many articles about the then-called “crisis” of French geography, about quantitative initiation or methodology discussions, topics that were avoided by mainstream journals. Brunet was a reformist, with a socialist sensibility. The first editorial was more concerned with epistemological debates and self-reflexivity geographers should develop than by the

“quantitative” aspect *per se*. The journal hosted in the following years many new developments and debates about Marxism, semiology, perceptual or phenomenological geography (the so-called “lived space” promoted by Armand Frémont [1933–2019]), physically integrated landscapes advocated by Toulousian geographer Georges Bertrand, etc. Nonetheless, *L'Espace géographique* quickly became the counter-mainstream journal and the voice of the then French “New Geography” in its diverse foci and tendencies. Many other groups developed during the 1970s with a more radical tone and various political critiques against French society or practiced geography. “New Geography” had been a very diverse movement.

The political climate in the community deteriorated quickly. Jean Bastié (1919–2018), a former Communist and Pierre George’s student, traumatized by May–June 68, rallied all the most conservative scholars into the Syndicat autonome (Autonomous Trade-Union) and initiated a witch hunt against anything “leftist” in the discipline, stopping careers, rebuking grants to any “suspect” project, etc. (Burgeat et al. 1986). The climate became tenser than it already was. In 1972, the liberal Prime Minister Jacques Chaban-Delmas was replaced by Pierre Messmer, a more authoritarian and conservative figure. He stopped the “New Society” project promoted by his predecessor that tried to respond to social attempts expressed in May–June 1968 and initiated a drastic retraction of public credits in the University system. After 1973, the oil shock and pending economic crisis aggravated the general situation. So the climate became heavy and criticism developed among new geographers and their opponents. In 1975, a group of students at the École normale supérieure de l’enseignement technique (ENSET) in Cachan launched a fanzine called *EspacesTemps*, devoted to a radical critique of history and geography. Mixing an ideological and an epistemological critique inspired by Althusser, the mimeographed pamphlet had a radical tone. A few other radical fanzines showed up in the following years, like *Attila* (1976) and *Espaces & Luttes* (social struggles) (1978), but they remained ephemeral (Drain 2009, 2015).

In 1976, Yves Lacoste (b. 1929) launched *Hérodote*, another critical journal published with the more substantial support of left-wing librarian and publisher François Maspéro (Hepple

2000). He was already a notorious geographer, author of famous books on underdevelopment geography and senior lecturer at countercultural university of Vincennes (Soulé 2012). In 1976, Lacoste also wrote a lampoon whose main argument was political, denouncing academic geography as a boring veil occulting the true one, practiced by armies and their general staffs, with a hint of conspiracy theory (Lacoste 1976). The same year, the Groupe Dupont and a few “Swiss” professors organized the first symposium called Géopoint in Geneva, hosted by Claude Raffestin (born in 1936) and J. B. Racine. It gathered more than 100 “new” geographers from France, Belgium, and Switzerland with a very “May–June 68” functioning style, with an equalization of every attendant and a passionate debating atmosphere (Orain 2009, chap. 6). “Quantitative” geography was the main positive reference and its new practitioners and converts were a majority among the attendance. The Géopoint symposia continued every two years with their various mix of “positivistic” and “Marxist” aims as already theorized by H. Reymond in his 1976 contribution (Reymond 1976). It became a perennial gathering until 2018 with significant evolutions from the 1980s.

The years 1976–1978 remain as the climax of a polemic time, between Mandarins (like P. George, M. Le Lannou [1906–1992], or Numa Broc [1934–2017]) and Young Turks (like Jacques Lévy [b. 1951]) or between leftist groups (Robic 1998). In an attempt to provide a more consensual manifesto, four Groupe Dupont members wrote, “Espace, que de brouillons comment-on en ton nom!” (Chamussy et al. 1977) in the first issue of another fanzine called *Les Brouillons Dupont*, in 1977, but it remained unseen and by large ignored by mainstream geography at the time. This text reflects with sound clarity and a quieted tone where the “theoretical-quantitative” movement was conceptually and epistemologically in the late 1970s.

New geography produced schematically three main critiques against what had done the “old” “traditional” one (Orain 2009, chap. 6). They were modulated and diversely combined by the various groups and individuals that endorsed the “scientific revolution” during those critical years. They shared the idea that geography was a political inquiry, even if traditional scholars claimed the neutrality of it. They advocated the clarification of implicit ideological motives and

political aim. They called for a discipline useful for people. The second point was about realism and constructs: following Raffestin's seminal conference in Géopoint 76 (Raffestin, 1976). Reader of a wide culture, familiar with epistemology, semiology, and social sciences, he provided then a preliminary critique of geographical realism with nominalist and linguistic arguments inspired by Greimas and Prieto. He displayed the idea that geography scrutinizes reality through language and "constructs," nothing being done *per se*. His ideas on such a question had got a large response during the two first Géopoint symposia. But the most important point for the "quantitative" attendance was that the classical geography was "prescientific" (in Bachelardian acceptation) or wasn't scientific at all. Most of them shared a normative vision of science as the search for laws with a rigorous methodology and mathematized techniques.

Their views on the latter made reference to the Anglophone classics, like Haggitt (1965) or Abler et al. (1971). But as practitioners, they learned techniques that were available in training or summer courses and self-teaching seminars (Cauvin 2007; Cayala 2014). It favored an early emphasis on Multivariate statistics in the form it took in France under Jean-Paul Benzécri's reference and Claude Deniau's (b. 1940) supervision: Correspondence analysis and Hierarchical cluster analysis. Something like an alliance developed between quantitative geographers and mathematicians eager to offer mathematized techniques for social sciences, under the Marc Barbut's (1928–2011) leadership at the École des Hautes Études en Sciences Sociales (EHESS) (see Cauvin 2007). The French "theoretical-quantitativists" progressively enlarged their skills in a broad array of techniques (e.g., topology, temporal statistics).

They were fascinated by General System Theory (GST) popularized in France by many vulgarizers (e.g., J. de Rosnay, J. L. Le Moigne, E. Morin, Y. Barel) and especially congruent with a tradition to see a "region" or an "environment" as a "combination" of various evolving factors (Drain 2001). During the 1970s, it was a general theoretical scheme rather than a basis for mathematical reasoning. One of the early doctoral dissertations in the new style defended in France, Franck Auriac's (1935–2018) *Système économique et espace. Un exemple en Languedoc*, provides a good illustration. This dense and ambitious work uses the GST in a nonquantitative,

verbal, reconstruction of the Languedocian vineyard history with a Systemic and Marxist theoretical frame (Drain 2001). However, the quantitative tools of multivariate analysis are applied to various data to interpret inductively the “spatiality” of the vineyard, with no effective applying of any “systemic” proceedings or mathematical models. The only model, implicit in such a denomination, is the gradual center-periphery one, which Auriac uses graphically to interpret the spatial organization of the vineyard and its backward effect on spatial diffusion of innovation. At such a stage, modeling wasn’t a discussed and pervasive practice, even if French theoretician-quantitativists were well aware of them (Durand-Dastès 1974), being readers of Chorley and Haggett (1965) and many other anglophone works using this range of methods. Denise Pumain’s (b. 1946) doctoral dissertation, *Contribution to the Study of Urban Growth in the French Urban System* (Pumain 1980), is probably the first one to “test” one, the Gibart’s rule of proportionate growth.⁴

In its first years, the new movement was spontaneous, multifaceted, and stratified, moved by a genuine curiosity for anything new and foreign. TQG national gatherings were organized every two years in Besançon (Cayala 2014), in turn with Géopoint symposia (more theoretically oriented). Grants allowed were tiny but sufficient, out of a bigger DGRST⁵ – the General Board for Scientific and Technical Research, the main fund then in France – contract obtained in 1974. In 1978, Rimbert, who was already a senior and had many acquaintances in Europe and North America (Cayala 2014, 2016), organized a tentative TQ European colloquium in Strasbourg that succeeded more than expected and initiated the prolongation of such gatherings every two years, becoming the European Colloquium on Theoretical and Quantitative Geography (ECTQG). In this early stage of development, the French TQG was an active but small minority and a dominated movement, far away from institutional power or wide funding, castigated by the establishment and seen as a dangerous leftist thing. The power balance changed with the François Mitterrand’s presidential election in 1981 (Robic 2006). The movement was matured enough and empowered by its inner activism. The conjunction of political change and self-structuring dynamics opened a new era.

Quantitative geography rethought as “spatial analysis”: a prosperous era (1984–1996)

After almost 25 years of right-wing governments in France, François Mitterrand won the 1981 presidential election, followed by a Landslide in legislative elections in June 1981. The Socialist scientific politics totally changed how research and universities were regulated and financed: in 1982 the ministry of research deeply reformed CNRS, making researchers civil servants with a real public status, dramatically increasing the financial support to research teams and projects, widening recruitments, reducing state-designated seats in the committees, changing most of the high administration managers. In 1984, the Savary law operated equally dramatic changes in the university system, creating a stable tenured junior status (literally “master of conferences”), terminating the state doctorate, and creating a new doctoral formula (closer to PhD), creating a global joint venture status for CNRS university teams, and reforming the National University Conference **6** in a more inclusive and democratic spirit. Academic autonomy was a pillar of those reforms, the financial effort was another. France knew at the time what is called the “second massification” of University system and socialist governments allowed the reopening of junior scholars’ large recruitments and a significant expansion of senior tenures. At another level, socialist management promoted promethean research politics that called many new initiatives.

In this climate, political decisions eventually allowed funds and status to geographical teams that were snubbed previously. The “Groupe Dupont” became a “young team” in 1982, a status endorsed and financed by CNRS. Many other tendencies showed up like “social geography” or Lacoste’s (from now on) “geopolitics” that could now apply for public recognition and grants. It was also related to a slow sociopolitical change: the first doctoral dissertation in TQG styles had been defended in the late 1970s, other progressive geographers became professors and the national boards elections progressively shifted, as the younger generations progressively took over the latter ones, relegating to a minority the “autonomous” (i.e., right-wing) lists. In the first years of socialist power, the political tensions in the

geographical community intensified before a decrease around 1984 Paris IGU international congress. In those years, Brunet, among others, played a key-role in reversing the equilibrium in geographical community. Then close to Jean-Pierre Chevènement's movement (CERES) in Socialist party, he worked in successive cabinets in the Ministry for Research and Industry (1982–1984). The exact role Brunet played in the higher administration has still to be studied through archives and he wasn't the one and only geographer in an executive position. This administrative position somewhat underpinned a prolific period of publishing that started a bit before (in 1980) and continued until the mid-1990s, giving him his specific position in the history of French geography as a spatial analysis controversial leader.

In 1980, after five silent years, he published “La Composition des modèles en analyse spatiale” (Brunet 1993). This article systematized his early authorial proposals and hosted, articulated, and reconstructed many symbolic generalizations produced by spatial theoreticians, in a very idiosyncratic way (Oran 2016). Significantly, he avoided the “TQG” label mainly endorsed in the social movement – which he wasn't strictly a part of. He offered a unified theory of “spatial analysis” using linguistic analogy and implicit structuralist motives. The central idea was that spatial organization of any geographical object is a combination of “elementary structures of space” (Levi-Straussian nod), called “chorèmes,” a neologism forged from the terminology of linguistics. Haggett's (1965) analytic interpretation of spatial human geometry (seedlings, networks, areas) and processes (interaction, diffusion, hierarchy) was discretely at the core of such a construction. In 1984, he left his function in Research ministry to build a flagship platform of projects in Montpellier, the Public Interest Group (GIP in French) RECLUS – an acronym for “Network for location and spatial units study.” This was also a publishing house and an economic contractor. He then became the “industry captain” of French geography (Lévy 1996), producing a new *Universal Geography* (UG) collection (1989–1996), launching a cartographic journal, *Mappemonde* (1986) and atlas collections, a dictionary (1991), among other activities. This structure allowed him to fund many researches in TQG and to recruit scholars. In the 1980s and 1990s, *L'Espace géographique* appeared more and more as the “spatial analysis”

tribune, even if this stereotype was incorrect and disregarding the variety of themes and tendencies published in the journal (Guérin-Pace and Saint-Julien 2012). More and more popular (or disliked) and notorious among French geographers, Brunet became in common knowledge the “pope” of TQG/spatial analysis even if it came from a slight misunderstanding. A significant part of TQG practitioners got involved in the *UG*’s 10 issues, even if many “classical” geographers had also been recruited. In the first *UG* volume, *New Worlds* (Brunet 1990), he published a general treatise “The Deciphering of the World” that is his contribution to a theory of space and geography.

Brunet isn’t the only theoretician of space that arose in France from TQG: in the late 1970s, some other thinkers developed such an attempt. Georges Nicolas (b. 1932) searched for geographical axiomatization under the auspices of the Bourbaki collective and logical positivism (Nicolas 1984). Henri Raymond developed a less totalizing but intellectually challenging attempt that remained little noticed (Raymond 1981). Pinchemel developed a more accessible and comprehensive grand theory that used more common references and languages: first through articles, then a “handbook” published his retirement year, as a testimony and an *opus maximum*, *The Face of the Earth* (Pinchemel and Pinchemel 1988). In many ways, Brunet’s and Pinchemel’s elaborations are similar and congruent, coming from the same classical matrix and aiming at a similar unified, global, perspective. For both of them, mathematical reasoning and statistics were only rational tools, not a language.

While Brunet’s and Pinchemel’s French space theory was partly idiosyncratic and deeply rooted in local cultural inherited tradition, French “quantitativists” early tried to get involved in European gatherings and activities. Those events offered many opportunities to open on new techniques, especially in modeling, computing, and data treatments. Being involved in an international network led the French attendants to distance themselves from the previous interests they had developed and to partially normalize their research styles. In the 1980s, many members of Groupe Dupont got involved in an attempt to make their systemic approach a mathematized one, first with Forrester methods and computer programming. They produced the

AMORAL model (pun intended), financed with regional funding and fiercely promoted, but with little results. In Pumain's and Durand-Dastès' trail, Lena Sanders (b. 1955) developed a dynamic modeling using differential equations (Sanders 1984). The passing from basic recurrence relations to differential calculus is an example of the growing sophistication TQG gained during the 1980s. City systems were a key topic in Pumain's school opening on a wide range of methodologies and techniques.

The movement as a whole endorsed many other techniques and invested areas like physical geography, network analysis, etc. The wide diffusion of computers in 1980s France helped to enhance the array and the speed of researches (Pumain et al. 1984). The conjunction of socialist largesse, foundation of dedicated laboratories, and specialized teaching made the movement able to stabilize in an institutionally recognized form. For a few years (1984–1993), it occupied a leading role in French geography and appeared as a wannabe new “normal” science. But its practitioners never became a majority: they remained under 10% of the geographical body, even during the huge demographic growth the movement knew between 1984 and 1999, doubling its numbers (Cayula 2014). This assessment needs a further and ultimate examination on the grounds and limits of TQG/spatial analysis ephemeral dominance.

Conclusive epilogue

In the 1980s–1990s, many new tendencies arose and the previous monolithic discipline eventually shifted into a diversified, piecemeal field structured through currents. Having started in the 1970s, TQG was the most advanced tendency in terms of structuring. It had visible leaders, a strong social network, institutional recognition, functional and ritual gatherings. In this period, laboratories and graduate teaching programs flourished in various places. From the end of the 1980s, it allowed TQG to produce new generations of practitioners, early trained and skilled, and socialized in a wide research network. At a graduate and postgraduate level, it gave an opportunity to define concrete problem solutions and to elaborate a progressive apprenticeship

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for students, donating in the same journey shared values, symbolic generalizations, metaphysics and, of course, techniques (Kuhn 1970).

Research styles were slightly different from place to place but there was a global homogeneity among French trainings. However, TQG was just a part of French geography, remaining in a heteronomous position, both locally and nationally. It recruited mostly bright but few students. Geography being a human science in French curricula, most of the students and teachers were repelled by mathematics and prone to avoid them. New currents like geopolitics, humanistic, social, environmental, or cultural geographies in some ways grew up against TQG that became the new *apparently* hegemonic tendency. Something like a backlash occurred in the end of the 1980s and produced a sharp divide in many local situations. The scientific values expressed by TQG prominent figures, their perceived “arrogance,” brought up a high level of reluctance among their colleagues in various local situations. TQG scholars failed to explain to their colleagues and student basis what was useful and significant out of quantitative frames in spatial analysis, especially a space theory.

Globally, TQG actors were solid debaters and among the brightest minds in the disciplinary landscape but appeared unable to make their way socially and cognitively acceptable for a broader audience. When right-wing parties won the 1993 legislative elections, the backlash became materially ostensive: the new disciplinary executives obtained GIP RECLUS dismantlement. The cohesive nature of TQG movement, its international openness, and the institutional resiliency of French research structures protected the movement against the shrinking processes it encountered in many other countries. Some local schools, like the one gathered around Denise Pumain, Thérèse Saint-Julien (b. 1941), and Lena Sanders, became widely influent, scattering among French and even European universities. The former is probably one of the most famous TQG authors internationally, through alliances with complex systems research and archaeologists. The provincialized status of French geography operates as a limitation, in an international field that is itself provincialized and disvalued, and, in TQG case,

competed by regional science, spatial economy, and even physics. Interdisciplinary projects became the way to bypass such a difficulty.

The attempt to provide a dialectic history, both social and cognitive, of what happened to be a minority but major movement in French context, shows how social and scientific aspects are deeply intertwined. I emphasized in turn what was peculiar or similar in such a case. French TQG has certainly been a contrasted odyssey that opened a pluralist and theoretically oriented era. They successfully operated an adjustment on international standards, the first current in France doing so. But, maybe, what could surprise a foreign reader and open a renewed interest maybe locates in what had been deeply and peculiarly French in it. The spatial theories, elaborated during the late 1970s and the 1980s, remain as a significant heritage of a creative period.

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- 1 The history of the various uses of this label(s), their temporal and individual or social variations are of great interest, but I decided to consider them as almost synonymous to simplify the presentation.
- 2 For more details and analysis about the 1945–1968 period, see [Drain \(2015\)](#).
- 3 For the few mathematicians making a bet on applied techniques for social sciences, finding welcoming groups was of crucial value as their career was at stake in terms of professional axiology. In a very platonistic and selfless community that was at the top of symbolic academic hierarchy ([Bourdieu 1984](#)), working for such “low” disciplines with down-to-earth goals was downgrading. To compensate such a marginalizing effect, they had to enroll as many converts as they could, getting symbolic reassessment and “customers” for stages, books, and other financial retributions.
- 4 This law stipulates that in an economic system every unit P_i grows during a time period under a proportional factor, noted r , common to all the units, with a marginal variation. It is expressed as $dP_i = rP_i + \varepsilon$. After many time periods, various r factors applied to ε could increase the differences between the units. Gibrat’s law is a way to explain the dynamics of differentiation in a population of cities, enterprises, or areas. In Pumain’s state doctorate, Gibrat’s law isn’t “tested” in a Popperian fashion but verified through proportionality relations between cities within census data.
- 5 General direction for scientific and technical research, created in 1958, had been a major funding tool between 1958 and the 1980s.
- 6 This institution, divided in disciplinary half-elected, half-nominated, councils had, among other tasks, to certify one candidate’s ability to become a professor. It increased its labelling process to senior lecturers (maîtres de conférences) in 1984.

7 In his PhD dissertation, S. Cuyala has calculated the balance of various affiliations through geographical directories published every five years and based on self-declarations (Cuyala 2014).