



PROJECT 10

World City Network Formation in a Space of Flows

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Introduction: a geography of globalization

Globalization is, as Michael Storper (1997a, 31) has recently pointed out, inherently geographical in nature; it represents a rescaling of the locations of human activities. This is reflected in recent textbooks on globalization which are attempting to consolidate a decade of multifarious research on the topic (e.g. Bauman, 1998; Held *et al.*, 1999). In these texts geography appears right up front as space-time compression, the mechanism which is presented as the enabling foundation of globalization. Globalization begins, therefore, as a shrinking geography but thereafter the geography tends to be conspicuous by its absence. There are discussions about 'uneven globalization' (e.g. Holm and Sorensen, 1995) which point to the relative paucity of the impact of the new technologies in poorer countries but there is relatively little concern for the particular spatial structures underpinning globalization. The shrinking geography seems curiously devoid of new geographies. But can large-scale rescaling really leave old geographies in tact and largely unaffected?

The place where we might expect to find discussion of new geographies under conditions of globalization is where erosion of state powers are discussed. However states are typically contrasted with transnational corporations and their institutional advantages and disadvantages compared. Such comparisons continue to take as their starting point the world divided into sovereign states; the spatial mosaic of state territories is the taken-for-granted geographical framework for study. Such embedded statism undermines our abilities to fully appreciate that spatial rescaling involves upheavals in spatial organisation of human activities (Taylor, 1997a). It is not that states are disappearing or even necessarily becoming less important, rather the point is that we can no longer assume that states are going to continue to be the prime geographical scale where command and power, and where identity and loyalty, routinely operate. Diverting our attention from states as institutions to the role of states as key providers of the spatial organisation of the modern world enables us to ask questions about alternative

geographies of organisation; instead of institutional comparison to corporations we can make geographical comparisons with world cities (Taylor, 2000).

This project will delineate the world city network as a new spatial organisation. Although relatively neglected in the general globalization literature, world city research has developed to provide a concrete face to globalization, to emphasise where and how globalization takes place in contrast to what Short and Kim (1999, 9) have recently dubbed the 'stratospheric level' of abstraction which is so commonly found in writings on this topic. This project on networks is necessary, however, because the world city literature itself neglects inter-city relations. For a complex mix of reasons, both theoretical and empirical, which will be explained in the next section, world city researchers have focused upon case studies of particular cities and comparative studies of limited numbers of cities at the expense of studying the network of world cities as a whole. Hence, for something as basic as the hierarchy of world cities, researchers have to fall back on the speculations of Friedmann (1986) first enunciated before globalization was an issue and based upon very limited empirical evidence (Taylor, 1997b). Inter-city relations are a massive lacuna in world city research: this research project aims to produce the first comprehensive and quantitatively rigorous description and analysis of the contemporary world city network.

The project builds upon previous research on London in the world city network (ESRC R000222050) in terms of data, techniques and methodology. This single city-centred study provided first, the insights into data collection possibilities and, second, provided materials for experimenting with going beyond one city's relations to consider the network as a whole. In addition it made clear that although single city studies can provide important data and analysis, there is something missing if comparisons cannot be made with other cities and their respective positions in the world city network. In other words, in order to understand the position of London in the world it is necessary to relate it to the positions of rivals. What was missing was the world city network itself as the essential framework in which to understand London as a world city. Hence this broader project proposal, which uses the lessons of the previous study to provide a tested methodology to create the 'skeleton' of globalization at the start of the new millennium.

Theoretical and empirical context: inter-city relations in a space of flows

Following initial formulations of world cities as 'international financial centres' (Reed, 1981) and 'command centres' of global capital (Friedmann, 1986) emphasis is now placed on these cities as special places of knowledge and learning in competitive global markets. For instance, Sassen (1991, 1994) portrays world cities as strategic places for the production of advanced producer services and Storper (1997b, chapter 9) interprets world cities as privileged sites of intense economic reflexivity. While these sophisticated treatises are important for debates about world city formation, they do not directly inform world city network formation. It is, of course, vital to have a critical understanding of the nodes of the world city network but that is only part of the story; without knowledge of

flows between nodes understanding of the network must, perforce, be partial and incomplete.

Castells' (1996, chapter 6) is the social theorist who has provided the context for studying world city network formation with his concept of a space of flows. This space has emerged out of the electronic communication revolution of the 1970s to become the 'architecture' of globalization in the 1990s. The new space exists at three main levels: the electronic communication networks which are integrating the world; the material networks through which commodities, information, labour and knowledge are circulated; and the elite networks of work, rest and play. The world city network is an example of, and arguably the most important case of, the material level of circulation. Castells follows Sassen's arguments for why economic concentration remains in an electronic informational age (strategic places) but, surprisingly, has little to say about the flows per se. In fact, Castells unintentionally illustrates what is the key constraint in studying flows in his material networks. In his one example of a world-wide material network (drawing on Michelson and Wheeler, 1994), he describes information flows (as indexed by overnight Federal Express deliveries) in terms of one origin (the USA) and nine destinations (Brussels, Canada, Hong Kong, London, Mexico City, Puerto Rico, South America, Sydney and Tokyo). I have presented the full list of nodes to show how gross is the scale of resolution in this analysis. And yet this is the best example of an empirical study of information flows which Castells could find; the situation has hardly changed since the mid-1990s. This epitomises the problem of dealing with the world city network in a space of flows: data deficiencies leading to empirical neglect. World city network formation is an area where theoretical shortcomings are closely tied to a dearth of empirical studies.

Smith and Timberlake (1995) have devised a taxonomy of inter-city flows which identifies 12 different types. However, rather than providing a framework for new research, their study only emphasises how little information there is on flows between cities: everyone of their 12 types has either no data publicly available or what is available is simply inadequate. The best available inter-city data are international airline statistics but the problems associated with these data for studying world cities are formidable (Beaverstock et al. 2000a). They depict general flows of people, not just those involved in world city formation (e.g. the resort Palma de Majorca appears at the second highest level in a hierarchy of European airports devised by Kunzmann, 1998, 49); they ignore flights within countries (e.g. Miami-Madrid appears in the statistics but not Miami-New York); and networks are dependent upon major airline hub policies (e.g. often favouring one airport per country, usually that of the capital city). Obviously air traffic between cities is important for world city network formation but the kind of information that is required (e.g. numbers of business class travellers on flights between cities) is not only currently unavailable, it is commercially highly sensitive information which will never become publicly available. Hence, we need to look in other directions for studying flows between cities which will inform world city network formation. We will need to create new data.

In the London study we followed Sassen's argument that the key distinguishing feature of contemporary world cities is the presence of clusters of advanced producer services. Hence we concentrated on service firms in London, here we continue this focus but broaden our geography. It follows that the sort of theory we should be looking to develop for world city network formation is a global location theory of services. Service firms have developed inter-city office location strategies which have resulted in clusters of firms in world cities. Going beyond Sassen, it is assumed that each firm's network of offices represents their particular intra-firm space of flows, information being directed within the firm to service their global clients (for the example of legal services, see Beaverstock *et al.*, 2000b). Therefore, by aggregating data on the office geographies of large numbers of major service firms, we can produce estimates of the inter-city relations which constitute the world city network.

In the iterative process between empirical findings and theoretical interpretation, this proposed research will be situated largely within the realm of the former. It is a theoretically-informed empirical study which builds on the earlier London work (details follow in later sections) and sets out a description and analysis of the overall global geography of advanced producer services which will provide a foundation for exploring theoretical arguments about world city network formation: offices represent the outcome of the strategies behind world city clusters of services, and are thus the pattern of the processes which a global location theory will seek to explain.

Research aims

This proposed research has five basic aims which are ordered cumulatively, after the first aim each depends upon its predecessor.

A. The data aim: to create a large scale data set of advanced producer service offices across world cities. Work on this aim produces the basic building block of the research.

B. The typology aim: to define the major dimensions of the data in a parsimonious way showing firms with similar location strategies and cities with similar mixes of firms. Work on this aim produces knowledge for grouping firms and cities as a prelude to interpreting the world city network.

C. The data conversion aim: to convert the initial data matrix into the first large scale matrix of inter-city relations covering all world cities. Work on this aim produces the basic input to network construction.

D. The network aim: to specify and analyse a network of world cities. Work on this aim will answer questions, for the first time in precise quantitative terms, about the hierarchy and geographical scopes of world cities. This is the basic output of this research and is guided by setting the following objectives: (i) to check the assumption that London, New York and Tokyo represent a trilogy of world cities at the apex of a global hierarchy; (ii) to evaluate other 'tiers' of cities which may have 'global scopes'; (iii) to identify regional

'gateway' cities; (iv) to separate out cities whose roles are limited to 'national articulation' only; (v) to investigate relations between world cities located in the same state territory (notably USA and Germany); (vi) to unravel relations between functions and hierarchy beyond the 'top level - international finance' link. Generally, the expectation is that patterns will be much more complex than past and current assumptions and speculations allow for.

E. The representation aim: to experiment with ways to describe the space of flows, as depicted by the world city network, in new projections of space. Work on this aim produces an output which will be easily interpretable for wide dissemination.

Research Methodology

The methodology used in this research is not original, the innovation is in the application. In short, it is proposed to carry out original human geography research consisting of global analyses of global data. Presentation of the methodology is by research aims.

A. The data aim. The collection methods employed derive directly from the lessons learned from the previous London study which produced global data for 69 firms in accountancy, advertising, banking/finance and law. An eclectic investigative mode of operation is employed but there is a foundation which orders the search. The chief lesson from the past research is the importance of the internet for data collection on service firms. The geographical reach of a service firm is a critical aspect of its appeal to potential clients. Thus web sites of large service firms commonly flaunt the geography of their office network.

Data collection will proceed in 4 steps:

(i) Internet web searches to produce as much information on as many major service firms as possible. The definition of 'major' will differ by service sector and will be defined in the course of the research; there will be a general starting cut-off point of dealing only with firms having offices in at least 15 different cities. In addition, firms are only included where there is comprehensive geographical coverage. As well as city locations, evidence of the importance of offices will be recorded (e.g. regional offices, numbers of practitioners, etc.). However, from experience, we know that much of the information on firm's web sites provides location data only so that further investigations are required to fill in gaps.

(ii) A search of trade journals and professional directories (both hardcopy and web-based) will provide additional information. As well as the ubiquitous ranking of firms by size which helps put our data into perspective, there can be specific information to add to a firm's web material. For instance, Law Journal Extra provides numbers of lawyers employed by US law firms in all their offices across the world.

(iii) Requests will be made to all firms from (i) and selected other firms asking for their annual reports and internal directories. Although a low response rate is expected, the information which is received will be invaluable for enhancing our data. Internal directories, in particular, are vital for information on the relative importance of offices. The additional firms will be selected to try and improve the balance between service sectors.

(iv) There will be visits to the London offices of selected firms to try and fill in any remaining gaps in the data (it is at this time that internal directories will likely be forthcoming). It is important that a London bias is not introduced at this stage. From our previous research we know that well over 95% of major service firms have branches in London so that foreign firms can be targeted in the visits. However, this stage will be coordinated with stage (iii) which will ensure non-London based major firms are included for data enhancement.

The end-result of this data collection will be to produce information for x major service firms (including other than the four sectors in the London study, notably insurance and management consultancy) across y cities (we will begin with the 263 cities used in the London study). The main problem with the data is the variation in quality among the firms: for some we will have just city presences, for others various informations on relative office importance. As with the London study we will produce two data matrices: first, basic presence/absence in a matrix of nominal measures; and second, an ordinal-level matrix where interval measures are reduced and nominal measures included. The latter data will constitute the main data matrix and be the input to the subsequent analysis although both the initial nominal matrix and possible smaller matrices including just interval data will be explored. (From experience we know that reducing interval data to ordinal data tends to 'penalise' the very largest world cities, especially London and New York.)

B. The typology aim. The main data matrix will contain a mass of information, the first task is to search for patterns in the data. The standard techniques for this exercise are the factor analytic family of multivariate analyses. From the London project I am experimenting with a small matrix of 46 major firms (with offices in 15 or more cities) across 55 world cities (see Beaverstock *et al.*, 1999) to which principal component analyses have been applied. This provisional research informs the methodology proposed here.

There are two basic analyses:

(i) R-mode analysis treats the firms as variables and the cities as cases. Hence pairs of firms are correlated to define their similarities in terms of cities they have offices in and the importance of those offices. A principal components analysis of the correlation matrix will extract the basic dimensions of similarities. In the provisional analyses, the patterns are quite complex and tend to cluster as service sector dimensions. This needs detail exploration implying as it does, no single globalization process but different global location strategies for different sectors.

(ii) Q-mode analysis treats cities as variables and firms as cases. In this analysis correlations are between cities thus showing similarities in terms of the mix and importance of firms between pairs of cities. A principal components analysis will show the main dimensions of cities in terms of their service mixes. In the provisional analyses, cities tend to cluster by regions although there are also hierarchical tendencies. There is plenty of unravelling to do here to understand city service mixes.

The end-result of this stage of the research is to produce typologies of both firms and cities which, although of great interest in their own right, will be employed also in interpreting subsequent analyses.

C. The data conversion aim. In order to create an inter-city matrix showing connections between cities the original x-firms by y-cities data matrix has to be converted into a y by y relational matrix. Again there is some provisional work deriving from the London study: this time involving just the major world cities producing 10-city by 10-city matrices (Beaverstock et al. 2000a). The proposed data conversion is informed by this preliminary small-scale work.

There are four inter-city matrices to be created:

(i) The shared presence symmetrical matrix uses the presence/absence data matrix. For each pair of cities, the number of firms located in both cities are recorded. By converting this into the proportion of the maximum possible (i.e. total of all firms in the study) this has a simple real-world interpretation: for a client with business in both cities, it shows the probability that an arbitrarily selected service firm will be able deal with the business in-house.

(ii) The shared presence asymmetrical matrix also uses the presence/absence data matrix. For each city its shared presence with every other city is expressed as a proportion of its own total of firms present in the city. The real world interpretation of this is that if a client was to contact an arbitrarily chosen firm in a given city to do work in a second city, this measure tells us the probability that the firm would have an office in that second city. This matrix is asymmetrical because whereas most offices in most cities will have sister offices in, say London, many offices in latter will not have direct in-house connections to offices in, say, Minneapolis.

(iii) The relational index symmetrical matrix uses the main data matrix thus incorporating more information. For each pair of cities the ordinal scores (relative importances) of shared firms are summed to provide an index of the intensity of relations between the cities. These will be converted to proportions of the maximum (sum of each firm's highest ordinal measure) to provide an index varying from zero to unity.

(iv) The relational index asymmetrical matrix also uses the main data matrix. In this case each city is compared in turn to each other city and the sum of its shared firms' ordinal scores are expressed as a proportion of the sum of these particular firm's highest ordinal scores. The resulting matrix is asymmetrical for the same reasons as (ii) above. This is

the main relational matrix since it both uses ordinal information and differentiates within each pair of cities in terms of relative importance of the relation by direction. For instance, a client in Minneapolis using a locally-based firm to do business in London will likely get better level of service in London compared to a client in London doing business in Minneapolis.

In addition, if there is enough data, there may experiments using only firms for which interval measurements are available.

The end-result of this stage is to produce a series of inter-city matrices as input to the final two stages of the research.

D. The network aim. This is the core of the project. In the provisional studies referred to previously we have only taken the analysis to a simple level involving connectivity diagrams showing degrees of relations. Even with a 10-city by 10-city matrix this produces very complex patterns so that we have to be more sophisticated in the treatment of the large matrices to be created in the previous stage. This means exploring the theory of directed graphs to produce structural models of relations and hierarchies (Harary et al., 1965; Shapiro, 2000).

The key feature of the relational matrices is that they define 'valued' vectors (i.e. not simple connection/no connection (0/1) scores) as is common in this type of analysis. Add to this the asymmetry (unlike distance or time vales between nodes as is common in transportation geography analyses) and there is an opportunity here to carry out some quite sophisticated analyses on some rigorous valued-directed graph data to address the objectives listed under this aim. Provisional small-scale work suggests that, for instance, the apex of the hierarchy is more a duopoly than a trinity (Tokyo being more like cities such as Frankfurt and Zurich than London and New York) and that New York has a 'shadow effect' on the importance of other US world cities (see Beaverstock et al., 2000a)

E. The representation aim. Large scale data and relational matrices will produce many intricate findings. Even the provisional analyses we have undertaken have produced complex results. In this final stage attempts will be made to find ways of presenting the basic interpretations of the previous analyses in simplified but rigorous form. To this end, various scaling or ordination techniques will be experimented with.

The methodology specifics of this final stage will be developed once the results from other stages begin to emerge. Ideally what would be the best sort of representation is a conversion of the general complexities into a series of two-dimensional graphs on which cities can be located. This will involve converting similarities between cities (correlations or relational connectivities) into 'theoretical distances' from which new cartograms can be built. In effect, such diagrams depict 'new maps' for new geographies of the space of flows. This will play a key role in disseminating the results and ideas emanating from this research to both academic and non-academic audiences.

Overall, this methodology will produce a unique set of data and analyses for the year 2000. This is intended to be a 'foundational study' in two sense. First, 2000 should be the initial 'census year' for delineating the global scope of advanced producer services and their cities; subsequent follow-up surveys and analyses (e.g. every 4 years) will provide essential information on the evolution of this important material circuit of the space of flows. Second, the results will provide a framework for other studies using other methodologies (e.g. semi-structured interviews) for understanding world city network formation and developing a global location theory of services.

Timetable

There will be some overlap between work towards achieving aims once the data becomes available. Timings are estimated from experience of the London study:

Month 1 induction of post-holder

Months 2-6 complete data aim

Month 7 complete data conversion aim

Months 7--8 complete typology aim

Months 8-12 complete network aim

Months 10-12 complete representation aim

Months 10-15 initial write-up phase

The research associate will begin work on 1-1-00 or as soon as possible thereafter.

Dissemination/Output

This project will be part of the GaWC (see Annex 2) suite of projects and therefore dissemination and output will be organised through this research institution.

First academic reactions to research papers based on the provisional data analyses has been very positive and therefore publication of articles from this project in leading international journals is expected to be a relatively smooth process. What we will be offering are genuinely unique analyses which provide fresh empirical insights into globalization and the space of flows. In addition all papers will be posted as GaWC Research Bulletins thus making them publicly available up to two years before formal hard-copy publication in journals.

GaWC is taking advantage of the fact that the 2001 Association of American Geographers conference will be held in New York to sponsor (jointly with Saskia Sassen, Chicago University) several sessions on world cities. Results from this project will be a core component of the session on world city network formation. Other presentations will be planned as the project proceeds.

This research will be used as part of a campaign to get closer and more formal co-operation with advanced producer service firms in London. Our aim is to attract some targeted sponsored research culminating in CASE studentship applications. To this end we will use the representation work for press releases to more general media (e.g. The Economist, The Financial Times, and business sections of the press) plus short articles for selected trade journals.

The final part of the timetable refers to the write-up being an initial phase, this is because I am planning a period of study leave which will be geared to converting the project's results into a major book entitled World City Network. I expect to get a contract from Polity and University of Minnesota Press (on the back of a recent highly successful book with them) to write an accessible text on a topic for which there can be no rival (this research is new and original - other texts are either comparative or else multiple-authored edited books).

ANNEX 1: References

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ANNEX 2:

The Globalization and World Cities (GaWC) Research Group and Network (<http://www.lboro.ac.uk/gawc/>)

GaWC is a research group centred in the Department of Geography, Loughborough University. It focuses upon inter-city relations with particular reference to the question of data deficiency. One of its ultimate aims is to produce a large data bank on relations

between world cities to stimulate global research beyond international (sic) relations. This project is integral to this aim.

GaWC is also important for the dissemination phase of this proposed research through its [GaWC Research Bulletins](#), an electronically-published series of papers. These are usually pre-publication journal articles: forthcoming papers in the references can be found at the web site as Research Bulletins.

Finally, although no co-applicants are listed in this application, GaWC does work as a research team and all members of the group will comment on findings and aid in interpretations as the results come in.

For **results** of this project, see GaWC Research Bulletins [43](#), [48](#), [50](#), [55](#), [56](#), [58](#), [61](#), [77](#), [88](#) and [89](#), and GaWC Practitioner Brief [4](#).

Media Coverage:

[Financial Times 20 April 2002](#), [Sky News 21 April 2002](#), Ceefax, Il Messaggero, [Galileo 27 April 2002](#), Lanci, De Standaard, Die Zeit, Multinational Monitor, ABC Science Online, New Straits Times

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