Polycentric Mega-city Regions: Exploratory Research from Western Europe

Peter J. Taylor and Kathy Pain
Loughborough University, UK

Introduction

Western Europe is the most urbanised world region in the modern world. This outcome is the result of historical processes that created geographical concentrations of cities as 'industrial belts' in North-West Europe in particular. Thus this world region has an intellectual tradition for trying to understand such urban agglomerations as northern England, RhineRuhr Germany and Randstad Netherlands. This has culminated in the Lisbon Accord by which the EU intends to renew its competitive position *vis a vis* other world regions. This has brought urban policy to the fore with specific concern for the economic dynamism of 'polycentric mega-city regions'.

The work reported below has been carried out as part of the GaWC*[1] programme of work on inter-city relations. There are three basic principles underlying this research that distinguish it from previous European research:

- *Evidential emphasis*, ideas are backed up by customised data and analysis
- *Relational emphasis*, cities are to be understood through connections with other cities
- *Process emphasis*, this means identifying agents: who is doing the connecting and why?

In practice this has meant that our research has focused upon users of cities, in particular financial, professional and creative service firms who connect cities in their everyday work (that is why major firms in advertising, finance, and management consultancy, for instance, have large office networks in cities across the world). Although not the largest transnational corporations, they are key indicators of vibrant city economies linked through the world city network.

This paper will review the research commissioned under EU INTERREG IIIB on eight such regions in North-West Europe, outline current follow-up research at the UK state scale, and attempt the task of putting such new concepts into revised materialist theory of cities as process.

1. Polycentric Mega-city Regions in North-West Europe

This is the basic project led by Peter Hall and Kathy Pain with research teams working on the Randstad Netherlands, Central Belgium, South-East England, Greater Dublin, RhineRuhr and Rhine-Main Germany, Paris Region and Northern Switzerland. GaWC provided the technical team for the quantitative network analysis. Using methodologies devised by GaWC for global urban research – an interlocking network model to derive inter-city connectivities (Taylor 2004), see Appendix A – patterns of links between cities and towns within and without each city region were measured to show different patterns of connectivity by geographical scale (local-regional, national, European, global). This was found to be indicative of both (i) different cities developing different roles and (ii) different regional structures for different scales (Taylor et al 2006a) which were then explored in over 600 face-to-face interviews with city users. The findings have profound policy implications – for a full exposition of this research, see Hall and Pain (2006).

(i) Different Cities, Different Roles

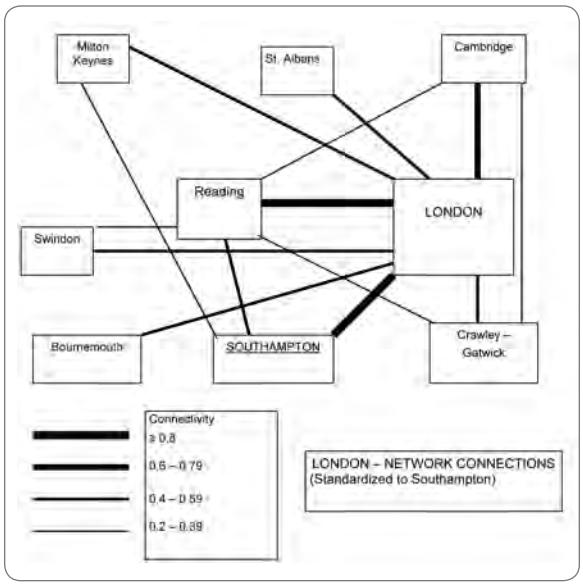
Figure 1(a)-(h) shows the First cities with the highest connectivity to the world city network in each region and the links between their proximate towns and cities. The inter-linkage between pairs of cities was calculated as a proportion of the prime First-second city link in each case (Taylor et al 2006a). Schematic mapping of all links above 0.2 indicates different patterns of inter-city links and thus regional polycentricity. RhineRuhr (d) and the Randstad (b) stand out as most polycentric when only this regional scale is considered.

But the analysis ignores differences in the global connectivity of the eight First cities, shown by interview analysis to have crucial effects on the roles of other cities. First cities most strongly connected to the world city network – London and Paris – exhibit complex *multi-sector* clustering processes which in the case of South East England extends to secondary towns and cities. This situation contrasts with that of the RhineRuhr where services provided across a large number of cities in proximity to less strongly globally connected First city Dusseldorf, instead show considerable *sectoral specialisation*. Multi-sector clustering, which is a feature of towns and cities at considerable distances from London as well as within it, is shown to be a critical spur to *service specialisation*, increasingly important in global city-user networks. In other words, in traditionally polycentric regions like RhineRuhr, users maximise agglomeration economies, such as access to skilled labour and clients, by clustering in different cities - advertising in Dusseldorf, insurance in Cologne and logistics in Dortmund/Duisburg. In contrast, London has a strong representation of services and specialisations across the sectors studied and these are made available to trans-national clients outside London through multi-sector clusters established in secondary cities and towns.

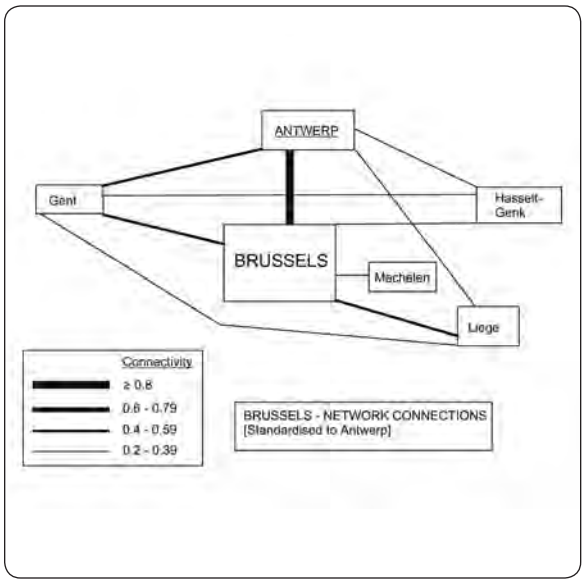
1 GaWC is the Globalisation and World Cities Study Group and Network (www.lboro.ac.uk/gawc), centred at Loughborough University, UK and with project collaboration across the world including Beijing, Ghent, Rio de Janeiro, Singapore, Virginia Tech (MI).

Figure 1. **Mega-City Region Linkages**
(Source: Hall and Pain 2006)

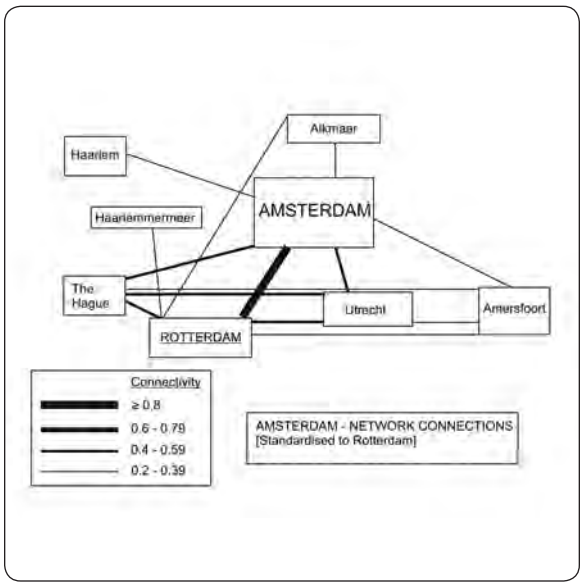
(a) SE England



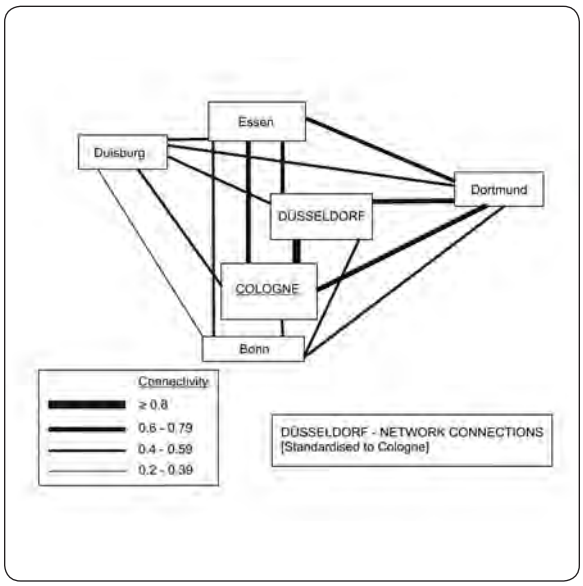
(c) Central Belgium



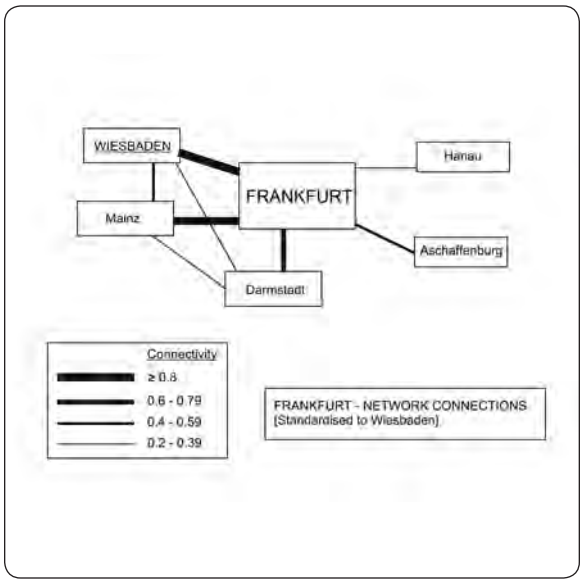
(b) The Randstad



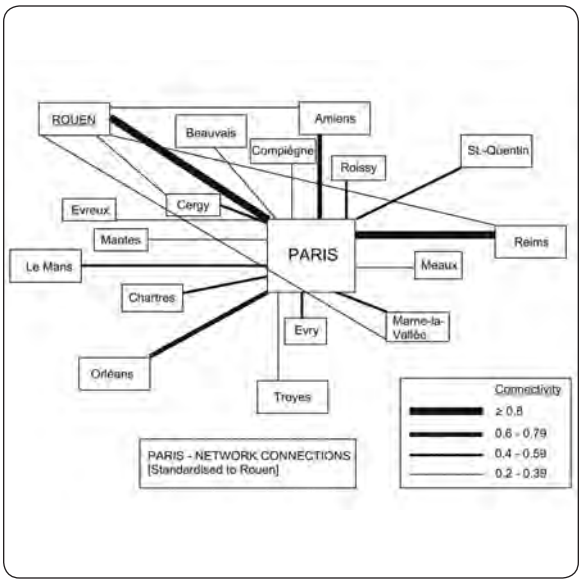
(d) RhineRuhr



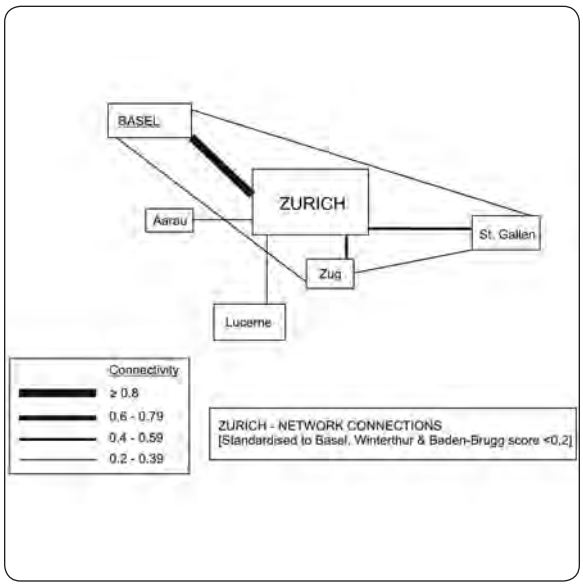
(e) Rhine-Main



(g) Paris Region



(f) N. Switzerland



(h) Greater Dublin

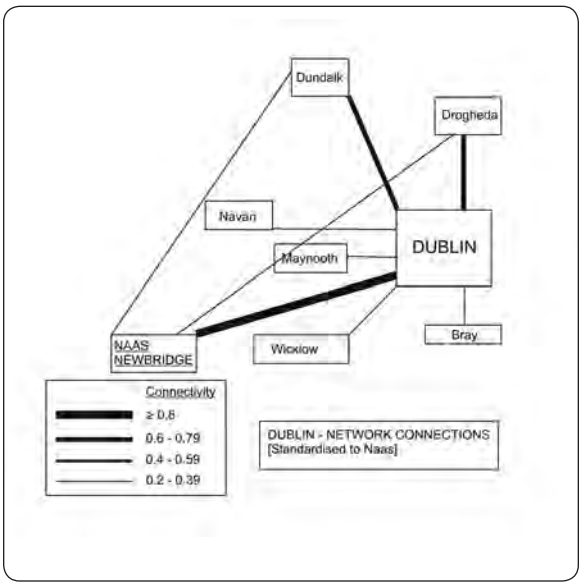


Table 1. Polycentricity for Different Geographical Scales by Mega- City Region

Mega- City Region	Regional Scale (%)	National Scale (%)	European Scale (%)	Global Scale (%)	Difference between regional and global scales
RhineRuhr	87	75	39	36	51
The Randstad	63	69	36	36	27
Central Belgium	56	56	20	19	37
Northern Switzerland	50	39	17	17	33
Paris Region	47	38	25	27	20
Greater Dublin	44	21	3	2	42
Rhine-Main	43	15	7	6	37
South East England	41	41	27	24	17

Notes: (i) Polycentricity is measured by the average % of the 5 non-leading cities, see Table 1 (b);
(ii) The Belgium national scale was conflated with the Brussels regional scale.
Source: adapted from Hall and Pain (2006)

(ii) Different Scales, Different Regional Structures

Global connectivity is thus associated with differing mega-city region structures and further quantitative analysis shows the importance of inter-city scales in interpreting polycentricity (Taylor et al 2006b).

The results (Table 1) show firstly, that office networks that are regional are also national in scope, and secondly, that office networks that are European are also global in scope. The fall in polycentricity between regional/national scales (columns 2 and 3) and European/global scales (columns 4 and 5) for all regions, indicates the existence of two distinct servicing scales also identified in interview evidence. Differences in polycentricity at the regional and global scales vary between regions (column 6) but key finding is that the fall is least for South East England and the Paris region. This indicates that the relatively high primacy that London and Paris exhibit at the regional scale is not carried forward to the global scale; here the two regions have relatively high polycentricity (they are ranked 3rd and 4th among the 8 regions). It seems that cities in the same region as London and Paris have surprisingly high global connectivities. This finding directly informs our theoretical discussion below.

Disregarding interregional differences in the global connectivity of First cities, at European/global scales, these Paris Region and South East England polycentricity rankings show that proximate cities to Paris and London are well connected into the international service economy. These regions appear *functionally multi-nodal* compared with Greater Dublin and Rhine-Main, and interview evidence further indicates that London's superior connectivity to world-wide service networks contributes to a distinctive *functionally polycentric* regional structure. In contrast, Dublin and Frankfurt are both more functionally primate even though the latter city is considered part of a polycentric region in EU spatial policy; both cities have a strong representation of international financial services but lack the more rounded global service connectivity of London and Paris.

Mega-city region inter-linkages similarly extend to cities elsewhere in the UK and the POLYNET interview analysis suggests that here too there are distinctions between services provided in the South East and in other UK city-regions. *Functional specialisation* between the strongly globally intra-linked mega-city region and other UK cities has yet to be explored in-depth through extended interview surveys, however evidence from the mega-city region suggests that this reflects different patterns of emergent demand for specialised global services across the country.

The comparative evidence on different regional structures from POLYNET indicates the scale-sensitivity of the polycentricity concept and its inadequacy when used as a *territorially framed* policy tool. That is to say, mega-city region functional polycentricity can only be evaluated, and supported, through the consideration of multi-scale, *cross-border*, service linkages.

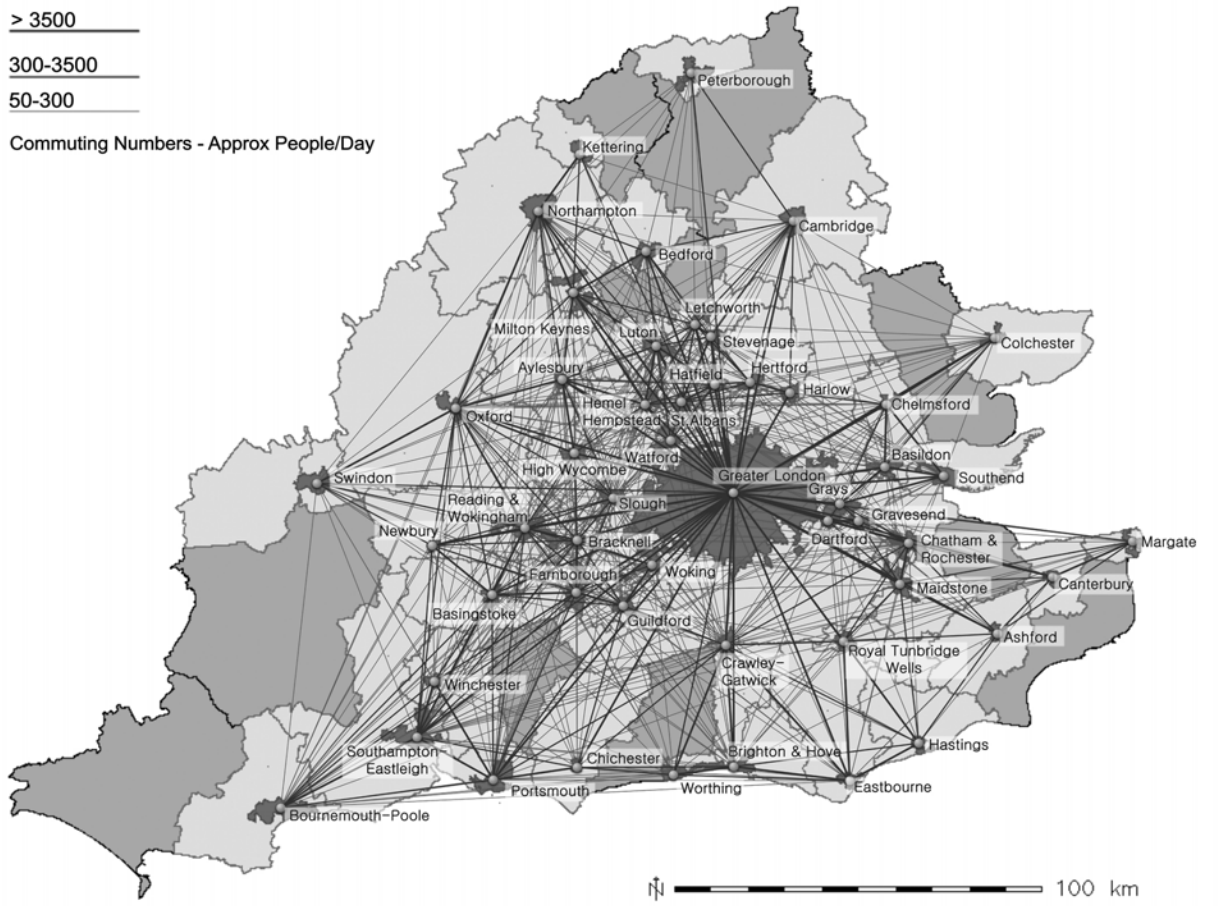
(iii) Policy Implications

The implications of the results for policy can be summarised as follows:

A concentration of specialised global connectivity/functions in First cities supports mega-city region inter-city *functional complementarity*, reflecting the basic requirement for synergistic working across cities in multi-locational user networks. Mega-city region internal and external relations are thus the result of complex processes, driven by market competition between user networks and resulting in *non-competitive* inter-linkages between cities. These inter-city relations have special significance for policy and the Lisbon Accord because they represent dynamic knowledge-based economic flows that cannot easily be replicated through deliberate policy interventions and require support through long-term planning and investment.

Policies designed to promote 'territorial cohesion' through investment in areas regarded as lacking economic development are in effect redistributive strategies at two scales - EU-wide and regional. Nonetheless, attempts to redress uneven development have so far proved largely

Figure 2. **SE England Commuting 2001 (Source: Hall and Pain 2006)**



unsuccessful. Even South East England has a residual east-west imbalance in its functional distribution (Figure 1(a)). The comment of a US London user in banking/financial services reflects a commonly expressed explanation for this:

> Businesses at the end of the day are rational entities and they will go where it makes sense for them to go. You can do anything you want and they're like squeezing a bar of soap, they'll pop up where they think the most essential.

This raises the question, how should currently ineffective policies be redirected to reflect different roles of cities and different structures of regions in globalisation?

Mega-city region processes have key infrastructure implications. Three forms of infrastructure requiring public intervention are identified as essential to sustain business development in interviews with agents connecting cities: *process* infrastructures – regulatory and legislatory – and *material* multi-modal transportation infrastructures. City users are trading in knowledge-intensive services, regarded as a 'people business' which require cities to be open to cross-border flows and require face-to-face contact in addition to virtual communications. E-technology is not leading to greater self-containment of cities but is in practice stimulating commuting and business travel as shown by commuting patterns that replicate patterns of service connectivity in South East England (Figure 2). Physical (material) infrastructures remain essential for accessibility, business efficiency, economic dynamism and environmental sustainability.

Poor interlocking between mega-city region processes and the three types of infrastructure therefore has a negative impact on inter-linkages within and between cities. A key concern identified in the study is the absence of co-ordinated management approaches in all eight regions. Because inter-city *functional relations* cross-cut administrative, institutional and jurisdictional boundaries, joined up strategies are needed to integrate myriad *fragmented* city governance interventions. Inter-organisational networking across horizontal and vertical boundaries – central to local government, public-private, economic and spatial planning – is seen in the study as a more relevant solution than changes to formal governance boundaries because service markets and inter-city relationships do not relate to borders.

Table 2. **Provisional Results Comparing Two Contrasting Polycentric Mega-City Regions**

'Greater' South East			
Place-type	City/town	National connectivity	UK rank
Global city	London	1.000	1
Enveloped places in top 50	Reading	0.285	13
	Southampton	0.262	14
	Cambridge	0.261	15
	Milton Keynes	0.210	17
	Crawley-Gatw.	0.169	19
	St Albans	0.138	24
	Oxford	0.113	27
	Maidstone	0.102	30
	Brighton	0.101	31
	Guildford	0.099	33
	Bedford	0.091	35
	Bournemouth	0.089	36
	Slough	0.075	40
	Luton	0.074	41
	Basingstoke	0.072	42
	Chelmsford	0.067	44
	Bury St Edm.	0.066	45
	Epsom	0.066	46
	H. Wycombe	0.058	49
	Bromley	0.058	50

Northern England ('Northern Way')			
Place type	City/town	National connectivity	UK rank
Major provincial cities	Manchester	0.713	2
	Leeds	0.660	4
	Newcastle	0.359	9
	Liverpool	0.300	11
	Sheffield	0.179	18
Other places in the top 50	Hull	0.079	39
	Warrington	0.059	48
Other places in the data	Preston	0.057	51
	Chester	0.047	56
	York	0.040	60
Important by-passed places not in data	Barnsley	-	-
	Blackburn	-	-
	Blackpool	-	-
	Bolton	-	-
	Bradford	-	-
	Carlisle	-	-
	Doncaster	-	-
	Huddersfield	-	-
	Middlesborough	-	-
	Sunderland	-	-
	Wigan	-	-

2. Polycentricities in the UK Urban Structure

A follow up study is currently being carried out for UK economic space. This deals with the issue of a dominant global city (London) within a medium-sized state that encompasses many long term declining cities. Policies to counteract this division include the 'core cities programme' and 'the Northern Way corridor'. The former focuses on England's leading eight provincial cities, encouraging cooperation to 'balance' London; the latter focuses on promoting the cities of northern England. But such policy initiatives have been launched with limited evidential basis – GaWC research is attempting to supply the latter (Taylor and Aranya 2006).

Two projects are underway. The first focuses upon corporate and commercial law firms that are an 'indicator sector' for identifying a vibrant city-economy (by ecological analogy with indicator species for identifying a healthy ecosystem). Traditionally one-city service firms, law has become multi-city in its organization of practice and we are analysing all 218 multi-office commercial law firms in the UK. The second project analyses 161 major firms across a range of financial, professional and creative services in 66 UK cities. In both studies connections between cities are measured and interpreted.

Confirming hints thrown up by the POLYNET research, the key initial finding is that there are quite distinct types of polycentric regions emerging based upon quite different cities processes: there is evidence of renewal through inter-city links in the North but this is not the same as the economic expansion from London taking place in South-East England. Early provisional results from the second project are shown in Table 2 comparing 'Greater South East' with northern England; the contrast is remarkable in terms of the abrupt fall off of connected places beyond the leading northern English cities. Both research projects are contributing to new theorising of the cities as process in contemporary globalisation.

3. Making Sense of Mega-city Regions as a Theory of Process

Cities are traditionally treated as places and planned accordingly (Hall 1996). However, both Jacobs (1969) and Castells (1996) interpret the city as a process (input-throughput-output), a position that is especially relevant for understanding cities under conditions of contemporary globalisation. Hence we explore the notion of mega-city region as process for drawing policy implications from our empirical findings. In fact our findings suggest that mega-city regions are expressions of two distinct spatial processes.

(i) Process A: Mega-City Region Expansion

In her classic argument of cities in economic expansion, Jacobs (1984) notes that some vibrant cities transfer their expansion to surrounding settlements to create city-regions. This process involves simultaneous diffusion of market, jobs, production, technology and capital into the larger space. These economic forces are very powerful and can leap mountains as she shows for the construction of the Tokyo city-region. More recently, Scott (2001) has extended the idea of city-region to 'global city-region', key entities in an integrating world economy.

The process we have uncovered for Paris and London in the POLYNET study, confirmed for the latter by the UK project extension, is that mega-city region expansion is polycentric despite the primacy of a single city. The new scale of expansion in this process means that the city-region is enveloping previously separate cities as well as promoting growth in settlements not previously deemed to be 'cities'. The process appears to involve diffusion of urban activities as envisaged by Jacobs but at a far larger scale. The result is that although the central city maintains its primacy at the local regional scale, at higher scales, especially the global, the new rising cities are creating a polycentric structure: this is what the figures for South East England clearly show in tables 1 and 2.

Mega-city region expansion appears to indicate that 'global cities' are generating large polycentric regions with multiple connections into the world economy. Observed for London and Paris in the European research, it is therefore expected that this process will be strongly evident in New York, Chicago and Los Angeles.

(ii) Process B: Construction of Megaregions of Proximate Cities

The other regions in the POLYNET study showed varying degrees of lesser primacy than Paris and London, and the same was true for the northern UK. From previous work on the Randstad Netherlands by Kloosterman and Lambregts (2001) we know that the major cities in this region are becoming more alike in their employment structures. Although the POLYNET study identified sectoral specialisation between the Randstad cities (banking/advertising in Amsterdam, architecture/logistics in Rotterdam, management consultancy in Utrecht-Amersfoort), 2001 data on business start-ups suggests that the overall trend is towards convergence, thus globalisation is not leading towards a functional division of labour in this mega-city region (Kloosterman and Lambregts 2001). But in the POLYNET study we did find a functional differentiation in terms of scale of connections. In particular, one leading city (eg Amsterdam, Dusseldorf) gains in relational importance as its scale of linkages increases until they are dominant for global connectivities. The result is a spatial structure tending towards the outcome for mega-city region expansion: a polycentric city-region with a primate centre.

However, this similarity of outcome is misleading because there are two distinctive processes. Process B is not a Jacobs' expansion development; large proximate cities become linked but there is no enveloping and upgrading of existing cities from a single centre. In fact, medium-sized cities are neglected, by-passed, in this process in total contrast to their upgrading in mega-city region expansion (this is the clear message of Table 2). Thus rather than creating a Jacobsean city-region, process B is about constructing megaregions of proximate cities.

This process may be thought of as a new relational way of defining Gottmann's concept of megalopolis as an urban region with holes in it (although the 'holes' identified here are urban, not rural).

(iii) Concomitant mega-city regional processes?

A key advantage of defining cities as process rather than place is that more than one process can be happening at the same time in the same place. Thus processes A and B are not exclusive in their respective operations. Thus in the North East USA process A might be strong around New York whereas process B might operating generally along the whole seaboard.

At this point it is important to bring in the matter of regional scale: the European studies reported here are at a smaller scale than the US megaregions. Urban UK (London-Aberdeen) is approximately the same scale as the Urban North East US (Washington DC-Portland ME) and yet we have treated the former as two separate regions. For comparison it might be better to combine the two UK urban zones (their boundary is fuzzy since London's city-region is enveloping some Midland's cities - mega-city region processes clearly affect an area larger than that surveyed in POLYNET on the basis of daily commuting patterns). Perhaps Jacobsean processes are more common in North East US with Boston, Philadelphia and Washington joining New York in such expansion whereas in the UK London is alone, Birmingham, Manchester and Glasgow, for instance, show no such signs (they are part of regions of proximate cities, process B).

The reason why this identification of different processes is important is because policy should be built upon process: two processes require two different policies. The main policy weakness identified in Europe has been a failure to conceptualise spatial relations in this way, hence the need to support dynamic and fluid mega-city regions has not been addressed. The Paris team see this as a key reason why the South East England mega-city region has achieved stronger functional polycentricity than Paris (Halbert 2006). A deeper understanding of the processes – A and B – operating in different regions, and their process and material infrastructure requirements, is needed. The issue of scale will also be highly relevant for the consideration of different policy agendas for emergent US megapolitan region coalescence along interstate highways in comparison to more regulated, 'compact city' regional development/urban containment in Europe.

In conclusion: this paper provides two inputs to the seminar discussion, a comparative dimension and a theoretical intervention. The latter is the key since the materialist approach adopted in the research reported highlights the need to obtain evidence for the veracity of regional concepts in the work carried on in cities: planning should not be carried out separate from the practice of current economic actors (firms) that use cities.

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Appendix A

The Interlocking Network Model

Inter-city relations are modelled as an interlocking network; cities are 'interlocked' by advanced producer service firms in their everyday tasks of providing financial, professional and creative services to their (often multinational) business clients. These services are provided through office networks and it is the inter-city office networks of service firms that are the focus of all empirical analyses. Each office network constitutes a potential set of inter-city relations (transmissions of information, knowledge, instruction, plans, ideas, etc.) for intra-firm project work (e.g. a trans-jurisdictional legal contract; a multi-national advertising campaign). It is these potentials that are aggregated and measured as inter-city connectivities. The basic data required is a 'service activity matrix' that arrays service firms against cities with cells indicating the importance of a city (office) to a firm's activities.

The figure below shows all potential connections for Law Firm 1. For instance, the total number between New York with Hong Kong is 20 (5 x 4), with Amsterdam is 10 (5 x 2), with Boston is 5 (5 x 1) and with Manchester is 10 (5 x 2). Thus this law firm contributes 45 potential links (20 + 10 + 5 + 10) to New York's connectivity. In the same manner the other five law firms contribute to New York's connectivity producing a total network connectivity of 193. Other city total connectivities are shown in the penultimate column of the table. For comparative purposes, connectivities are commonly recorded as proportions of the highest in the set of cities; these are shown in the final column. In the analyses reported, the service activities matrices are, of course, much larger; a macro for calculating city connectivities is provided on the GaWC website (www.lboro.ac.uk/gawc)

A Pedagogic Example.

City	Law firms 1	2	3	4	5	6	Total city connectivity	Proportional connectivity
New York	5	3	5	2	4	5	193	1.000
Hong Kong	4	3	2	3	2	3	165	0.855
Amsterdam	2	5	2	2	5	2	162	0.839
Boston	1	2	0	5	2	2	117	0.606
Manchester	2	0	1	1	0	0	45	0.233

Figures in the matrix are data that show the number of law partners in a firm's office in a given city (e.g. Firm 1 has 5 partners in its New York office).

Figure 3. Potential Links Between Law Firm 1 Offices