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Bridges over the Atlantic: A Network Analysis of the Introduction of the Monitorial System of Education in Early-Independent Spanish America¹

1. Of flows, relations, and networks

In recent years social network analysis has begun to make a tentative appearance in comparative historical research, especially in historical sociology. Although this approach is largely unknown in the field of comparative education, it has already proved a useful methodological tool in contributing to the explanation of similarities and commonalities between different historical processes. A distinctive trend in comparative enquiry has already shifted its focus from the mere contrasting of separate and separable entities to the study of the transmission of knowledge, models, and *imaginaires* across places, and their reception and individual appropriation.² Now, by focusing on the dynamics of processes of flow and circulation of people, ideas, objects, merchandise and capital across regions and continents, social network analysis may help to further illuminate the very communication processes that constitute that knowledge transmission: the channels through which information, people, and objects flow, and the ways in which such channels shape – or construct – whatever is being conveyed.

In broad terms, social network analysis examines the relations established between individuals, identifies patterns of relations, and studies the impact of such patterns upon local, regional, national or transnational processes of social change. In the social sciences the term 'social networks' has been widely used for several decades, but it has been mostly employed in a metaphorical sense. This article intends to embrace it in an analytical sense: here we will use social network methodologies as tools to shed light on the processes in-

1 We would like to thank our colleagues from the Comparative Education Center at Humboldt University, Berlin, for reading previous versions of this work and providing constructive feedback. We are also very grateful to Thomas Manke, whose patient and friendly advice on the technical aspects of network analysis was extremely helpful to us, novices in this field.

2 See, for example, J. Schriewer, *Welt-System und Interrelations-Gefüge. Die Internationalisierung der Pädagogik als Problem Vergleichender Erziehungswissenschaft* (= Humboldt-Universität zu Berlin, Öffentliche Vorlesungen, H. 34), Berlin: Humboldt-Universität zu Berlin, 1994.

volved in the introduction and early expansion of an educational innovation, the monitorial system of instruction in early-independent Spanish America (ca. 1818–828). Given the relative novelty of this approach in both the fields of history and of comparative education, this article is conceived of not as an extensive application of social network analysis to a historical phenomenon, but rather as an exploration of the possibilities of this approach for historical educational research, a reflection on its limitations, and, finally, an invitation for other scholars to delve into it as well.³

Our analysis is based on a substantial body of empirical research compiled over a number of years, seen in the light of a selection of basic tools drawn from social network analysis. It is our first experiment using this methodology, and it is meant to serve as a first step for the analysis of a large bulk of data from a project that studies the expansion of the monitorial system all over the world.⁴ However, far from endorsing a form of 'network imperialism' that treats network analysis as the only correct way of discussing social phenomena, we will instead use this kind of analysis as a complementary tool, a means to explain what, in our view, a conventional (non-relational) social, cultural or political approach fails to explain, in the concrete historical case we are concerned with.⁵ In so doing, we are certainly aware of two of the strongest criticisms that have often been made against social network analysis: firstly, the lack of any adequate conceptualisation of how culture orients and constructs the relations and the rate and form of the flow within a network; secondly, the underestimation of the individual as a rational, decision-making subject – in which case no psychological make-up, motivations or competencies are attributed to him *a priori*.⁶ We certainly do not attempt to

3 Two comprehensive articles on the uses and potential of social network analysis in historical research are those of R. V. Gould, *Uses of Network Tools in Comparative Historical Research*, in: J. Mahoney/D. Rueschemeyer, *Comparative Historical Analysis in the Social Sciences*, Cambridge 2003, pp. 241–269 and C. Wetherell, *Historical Social Network Analysis*, in: *International Review of Social History* 43 (1998), pp. 125–144.

4 Most of the empirical data has been gathered from primary and secondary sources by Eugenia Roldán Vera over the course of ten years, whereas the analysis and visual representations are the result of collaborative work of both authors, much facilitated by the IT skills of Thomas Schupp. This analysis will be applied for the data compiled within the project 'Nationalerziehung und Universalmethod: Globale Diffusionsdynamik und kulturspezifische Aneignungsformen der Bell-Lancaster-Methode im 19. Jahrhundert', funded by Deutsche Forschungsgemeinschaft (DFG) in the Comparative Education Centre at Humboldt University, Berlin, under the direction of Jürgen Schriewer and Marcelo Caruso.

5 On 'network imperialism' see Gould, *Uses of Network Tools* (see note 3), p. 244.

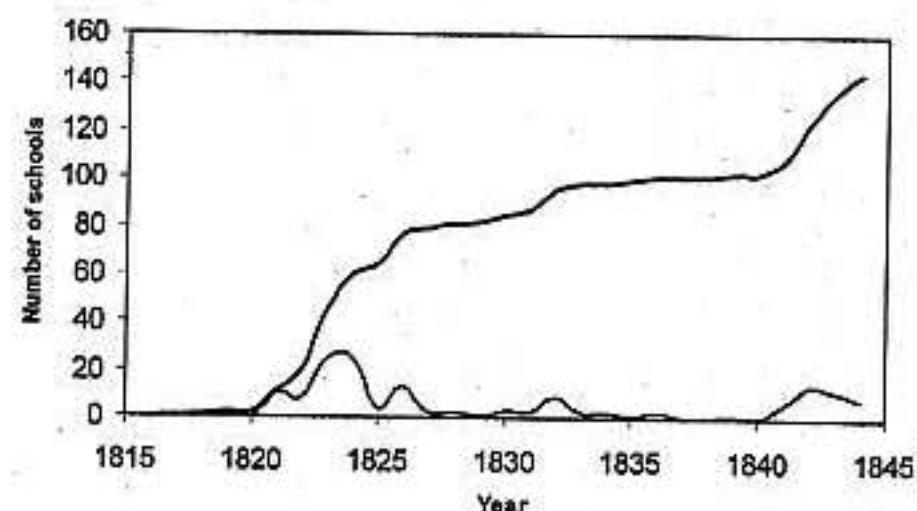
6 In the field of comparative education, this criticism has been formulated mainly by the Neo-Institutional school, especially in the works of D. Strang/J. W. Meyer, *Institutional Conditions for Diffusion*, in: *Theory and Society* 22 (1993), pp. 487–511.

the method was particularly attractive because it suited the demands of the ideal of mass education that was formulated after the independence of those countries from Spain. There mass education was perceived as a constitutive element of the new republican, representative order (in which the authority of the State was underlain by the existence of an educated citizenry able to vote and be voted), and the monitorial method appeared to be the most suitable device to bring education to everybody in a short time and at low cost.¹¹ Yet, as we will argue, its appeal was not the only prerequisite for its widespread dissemination in the region.

The various histories of the introduction of the monitorial method in Spanish America report that it was first implemented around 1818 in the Río de la Plata region, and by the end of the 1820s a significant portion – say from 1/3 to 1/8 – of all primary schools in the Spanish American countries was already using this educational innovation. Between 1821 and 1826 the method was officialised by national or regional laws in Chile, Gran Colombia, Peru, Uruguay, and the *Provincias Unidas del Río de la Plata*; in Mexico and in the Central American republics this occurred during the first half of the 1830s.¹² Certainly not all these laws corresponded with the number and functioning of schools in reality, but the fact that laws were issued is in itself evidence of the importance that the method had acquired.¹³

- 11 See E. Roldán Vera, *The Monitorial System of Education and Civic Culture in Early Independent Mexico*, in: *Paedagogica Historica* 35 (1999), pp. 297-331; E. Roldán Vera, *Order in the Classroom: The Spanish American Appropriation of the Monitorial System of Education*, in: *Paedagogica Historica* (forthcoming 2005).
- 12 For a list of the laws and decrees that officialised monitorial schooling in the region, see E. Roldán Vera, *Internacionalización pedagógica y comunicación* (see note 7).
- 13 See, among many others, D. Amunátegui, *El sistema de Lancaster en Chile*, Santiago 1895; M. Báez Osorio, *La escuela lancasteriana en Colombia*, in: *Revista de Ciencias de la Educación* 155 (1993), pp. 381-397; M. Caruso/E. Roldán Vera, *Pluralising Meanings. Latin America and the International Movement for Mutual Education in the early nineteenth Century*, in: *Paedagogica Historica* (forthcoming 2005); R. Fernández Heres, *Sumario Sobre La Escuela Caraqueña De Joseph Lancaster (1824-1827)*, Caracas 1984; C. López/M. Narodowsky, *El mejor de los métodos posibles* (see note 8). H. H. Sumaya, *Apuntes para la historia del método lancasteriano en Guatemala*, in: *Antropología e historia de Guatemala* 2 (1953), pp. 32-62; J. Sosa, *La Escuela lancasteriana: ensayo histórico-pedagógico de la escuela uruguaya durante la dominación luso-brasileña (1817-1825)*, Montevideo 1954; D. Tanck, *Las escuelas lancasterianas en la ciudad de México*, in: *Historia Mexicana* 32 (1973), no. 4, pp. 494-513; E. Vaughan, *Joseph Lancaster en Caracas (1824-1827) y sus relaciones con el Libertador Simón Bolívar, con datos sobre las escuelas lancasterianas en Hispanoamérica en el siglo XIX*, Caracas 1987; M. I. Vega Muytoy, *La instrucción primaria en el estado de México, 1836-1845*, in: M. del C. Sánchez (Hrsg.), *Vistillas para un hacer*, Toluca 1999, pp. 78-87.

Figure 1: New monitorial schools created by year and their cumulative number



Although not comprehensive, figure 1 demonstrates the dynamic of expansion of monitorial schooling (the creation of new monitorial schools or the conversion of traditional schools into monitorial ones) across the whole of Spanish America.¹⁴ The graph, based on aggregated data for all the countries in the region, displays the characteristics of an 'S-Shape' curve, typical of the theory of diffusion of innovations. This represents the diffusion of an innovation as if it was an epidemic, proceeding through the phases of innovation, take-off point, 'explosion', stabilisation, and burn out. Described according to the role the various actors play in the diffusion process, these phases can also be characterised as those of innovators, early adopters, first majority, second majority, and laggards (figure 2).¹⁵ We see how, after a period of slow, grad-

- 14 The empirical data upon which this figure is based can be found in supplement 1. This, together with other statistical and graphical information related to this article, can be accessed through the internet site of the Comparative Education Centre: http://www2.hu-berlin.de/vgl_ewi/networks. The following supplements are to be found there:
- Supplement 1: New monitorial schools in Spanish America (absolute numbers)
 - Supplement 2: Detailed interactive sociogram of the overall network
 - Supplement 3: Attributes of early adopters
 - Supplement 4: Ordered centrality measures of the overall network
 - Supplement 5: Sociogram of the 'London clique'
- 15 On diffusion of innovations and S-Shape curves, see E. M. Rogers, *Diffusion of Innovations*, 5th ed., New York 2003. For a description of the different phases of the curve in a totally different context, see D. J. Watts, *Six Degrees: The Science of a Connected Age*, New York 2003, chapter 6.

embraced it whole-heartedly at an early moment of its existence, and some of whom played a decisive role in its publicising and dissemination. In the case of the monitorial method in Spanish America, we have identified the following individuals as 'early adopters':

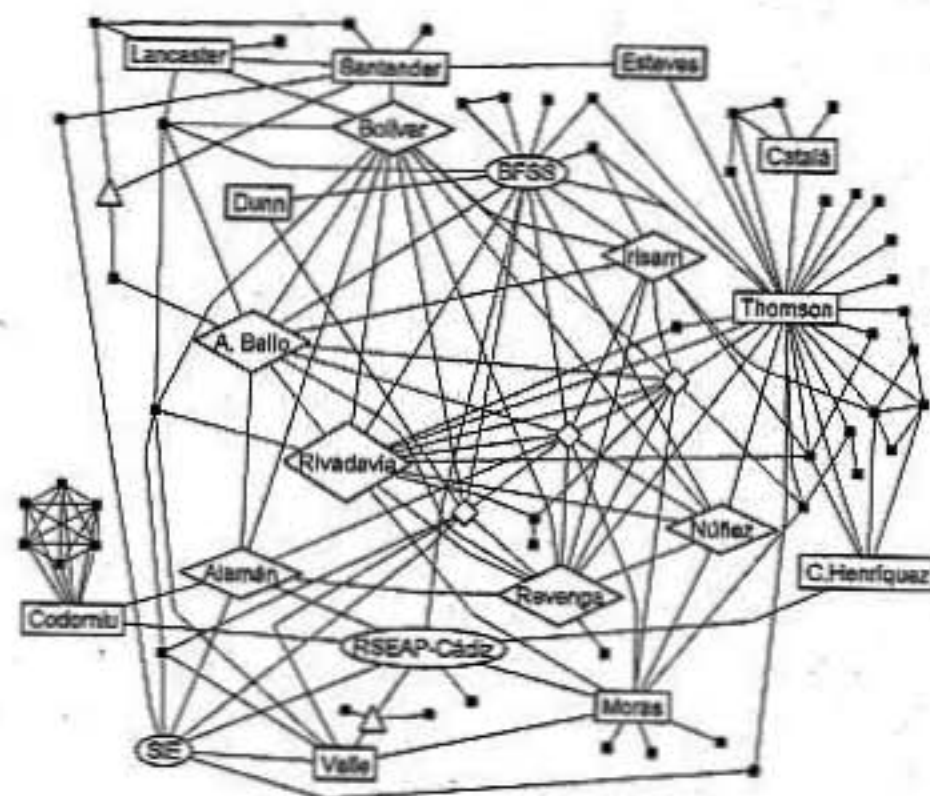
- (1) Those who founded a monitorial school, or started teaching in accordance with the monitorial method in an existing school, or founded a society to promote the monitorial method in a place where it was considered a novelty, with no connection to any pre-existing establishment in the area nor as a consequence of any law;
- (2) those who played an active role in disseminating the principles of the method by writing newspaper articles, or translating manuals, or by advising key members of the government on that implementation, in other words, 'opinion leaders' in the language of diffusion of innovations;
- (3) high-ranking government officials directly responsible for the formulation and execution of laws introducing, officialising or facilitating the implementation of the monitorial system of education in its first stages (congressmen, cabinet ministers, governors, vice-presidents or presidents of their countries).

The network of communication among the early adopters is represented graphically as a series of nodes or 'actors' (75 in total) linked to one another by a number of lines (figure 3).¹⁸ The nodes are represented by different symbols: rectangles and diamonds are used to identify individuals (diamonds constitute a particular group of special characteristics which we discuss afterwards), whereas the rest of individuals are represented by small black squares. To allow for a better reading of the network, we have labelled only those actors whose role within the network we analyse in this paper. Municipalities are represented by triangles, and societies promoting the monitorial method by ellipses. The three European societies that were involved in promoting the monitorial method in Spanish America were: the British and Foreign School Society (BFSS), the French *Société pour l'Instruction Élémentaire* (SIE), and the Spanish *Real Sociedad Económica de Amigos del País* (RSEAP-Cádiz). Both the societies and the municipalities are taken as individual nodes in so far as they behave like a united organisation; yet the agents sent by the societies to Spanish America are considered as individual nodes because they acted with a high degree of independence (financial, political, practical) with respect to their organisation.¹⁹

¹⁸ The terms 'nodes' and 'lines' (or 'edges') derive from graph theory (whereby graphics are taken as synonym for networks), an important branch of mathematics which is highly relevant to network analysis.

¹⁹ An interactive version of our network, including the names of all nodes, can be seen in supplement 2 (see note 14).

Figure 3: Sociogram of the overall network



The lines between the different nodes represent channels of communication – 'ties' – through which the monitorial method was communicated, discussed, or recommended, and they can refer to personal contact, correspondence, shipment of material, or reading of specific printed works produced by other nodes (usually the societies). We are taking into account only recorded evidence of those contacts, evidence collected from secondary and primary sources ranging from private and official correspondence, personal memoirs, newspaper articles, and histories of the monitorial school movement in various countries (only in a few exceptions have we deduced the relationship from tangential sources). The fact that we consider only historically recorded links considerably reduces the overall number of nodes and connections in the network, yet this makes the exercise more faithful. Eventually it might be possible to make estimations of possible contacts based on other kinds of information.²⁰

Regarding the dimension of time in which these relations took place, it should be borne in mind that this network is in a sense an artificial construct:

Figure 5: Mobility of actors from Europe to Spanish America and back



Whether these travels were carried out with the specific purpose of learning or implementing the monitorial method is not relevant for an analysis of the network's composition and behaviour; at any rate, it is possible to say that, with a few notable exceptions, the majority of actors did *not* travel with such intentions in the first place but became involved in it after reaching their destination. Out of a total of 75 individuals involved in the early adoption of the method, 31% were foreigners and the rest were Spanish Americans, which suggests that direct foreign influence was not decisive for the embracing of the method. Yet out of the 52 Spanish American early adopters, 19 (25% of the total network) became acquainted with the method

while they were in Europe; the rest learnt about it without leaving Spanish America, but at least 6 of them (8% of the total network) knew about the system when they were living in a Spanish American country other than their own. Therefore, the actors who found themselves in more than one country between Europe and Spanish America comprise 64% of the network (31% Europeans in Spanish America + 25% Spanish Americans in Europe + 5% Spanish Americans in other Spanish American countries). While this dominant cosmopolitanism of the network is crucial to understand the general receptivity of the monitorial method (indeed cosmopolitanism is a typical characteristic of early adopters of all kinds of innovations), it also shows that nationality was not the most important factor in the introduction and spread of the system, but what mattered was the fact of having been in – or having strong contacts with – more than one country across the Atlantic or throughout the American continent. Moreover, in this case cosmopolitanism is a feature which, as we will see below, increases the betweenness value of the network, that is, the number of 'bridges' or 'connectors' between its distant or poorly-connected parts.

Furthermore, if we look specifically at the group of first teachers of the monitorial method, nationality does not seem to have played a significant role in the overall dissemination of the method either.²² Among the individuals who are known to have taught in monitorial schools during the early implementation of the method in a given place, we find 16 foreigners (6 British, 5 French, 4 Spaniards, and 1 Italian) and 12 Spanish Americans. Of the foreign teachers, 3 were *sent* by a missionary organisation, the British and Foreign School Society (BFSS), with the purpose of teaching the monitorial system: James Thomson, Henry Dunn and Anthony Eaton. They all acted with some degree of independence from the BFSS and therefore they are considered as separate nodes. Only five foreign teachers were hired or sought after, and all the others arrived independently – including Joseph Lancaster himself who arrived in Caracas in 1824 – or with a different purpose, and only when they were there were they offered the job or did they offer themselves for the job. It is possible to say that there was a certain level of opportunism in the way

22 We take the category of 'first' teachers with some flexibility: not only is it sometimes impossible to determine who the very first one was, but also are often the 'second' and 'third' and 'fourth' considered as innovators in a given place as well – and they may or may not be related to one another. Therefore, within this group we list all individuals whose work was consigned in the contemporary sources or in some of the secondary literature as 'innovative' in a particular place (and who were not formed in an already existing monitorial school of that same place). In defining these groups, we employ a good deal of judgement, which requires a good knowledge of the sources but also means that we are bound to problems of interpretation. The results can be found in supplement 3 (see note 14).

- (5) *Centralisation of networks*: for every node centrality (degree, closeness and betweenness) there is a corresponding centralisation index. It measures the relation of the actor with the highest centrality value to all others. Taking the particular centrality values, the centralisation of the network is the sum of the differences between the largest value and all other values equally standardised by dividing the resulting sum by the highest possible value. So this is not the average of all node centralities but a new measurement indicating the level of network centralisation, and therefore it cannot be compared with the actor centrality values.
- (6) *Clustering coefficient*.²⁶ In contrast to the density, which simply describes the relative amount of connections in the network, the clustering coefficient highlights the local density of connections. If nodes are arranged in strongly interconnected clusters where the node neighbours are linked to one another, the clustering coefficient has a higher value than in loosely connected networks, scattered in fragmented parts. This degree of connectivity can be formalised by identifying the 'triangles' in the network, that is, situations in which three nodes are all connected to each other. The term transitivity is also frequently used to explain clusters in the network structure, since it is the mathematical term for relations between three elements: if there is a link between the first and the second node and a link between the second and the third node, then there must necessarily be a link between the first and the third node.

Although we do analyse the individual network of each country, it is the analysis of the whole network which, in our view, renders the most useful results. Furthermore, given the relative scarcity of historical evidence for some countries, the analysis fares better in this case in a global than in a particular perspective. At any rate, it is important to mention that in the analysis of each country's network we include actors which were not necessarily physically present in the country itself nor were influential in only one country.

26 D. J. Watts and S. H. Strogatz, *Collective Dynamics of Small-World Networks*, in: *Nature*, 393 (1998), pp. 440ff. See also A. L. Barabási, *Linked: How Everything Is Connected to Everything Else and What It Means for Business, Science, and Everyday Life*, New York 2003, pp. 46f. For a simple explanation how the cluster coefficient is calculated, see S. Wasserman/K. Faust, *Social Network Analysis* (see note 20)

4. Connecting the nodes

What kind of network did these nodes constitute? Why did it allow for a successful and rapid introduction of the monitorial method in the first place, but afterwards the method developed at such different paces in the various countries? Which agents were more influential than others in spreading the method? At the beginning of this study, we had a number of assumptions concerning the introduction of the monitorial method in Spanish America, based on the sheer amount of information we had gathered. We had assumed, for example, that Great Britain had played the most prominent role in the introduction and dissemination of the method in the region, given that the method originated in Britain in the first place, that a high number of Spanish Americans learned about the method in London, that the majority of foreign monitorial teachers came from England, and that the British societies promoting the monitorial method were the most active on the continent. Yet previous research had already suggested that the impact of entities such as the highly-connected British and Foreign School Society was not as decisive as it seemed – or at least not as visible as one should expect – in the introduction of the monitorial method on the continent. Indeed, network analysis reinforced the idea that *quantity* of links is not always the best means of measuring the real influence of a node – be it an individual, an organisation, or a country – and that it is instead the structure of the network and the *position* of each individual actor within it which is decisive for the spread of an innovation. Let us discuss why.

First, to solve the puzzle about the simultaneity of the introduction of the method all over the Spanish American region and the coincidence of its climax in most of the countries, we asked ourselves: in what sense did the structure of the network of early adopters affect the communication of the monitorial method? Two elements were essential in answering this: an analysis of how fluid communication throughout the network could be, and a study of how well the network would succeed in holding together if some nodes ceased to exist. The common measurement of 'robustness', which determines how far a network can hold together under 'random attack' (the hypothetical case of one or more random nodes failing) did not seem very useful to us in analysing a historical network, for it was conceived as a criterion for constructing artificial networks (telephone or computer networks). However, we did perform some 'targeted attacks' (hypothetical removal of specific nodes) on the most highly connected nodes to assess their relative importance, and to make evident other alternative communication paths within the overall network.²⁷

27 A similar kind of analysis is described in S. Wasserman/K. Faust, *Social Network Analysis* (see note 20), p. 218.

why Thomson was such an attractive node: it is a rule of scale-free networks that well-connected nodes tend to attract more nodes, and thus their centrality increases more rapidly than that of an average node. Thomson was indeed 'fit' (had the intrinsic qualities that made him look attractive for the job), and his growing reputation – reported in the press or in letters from diplomats to the governments of their own countries – led him to be sought after by various governments and people in positions of influence for the implementation of the monitorial method. The more links he had, the more inclined he was to make new connections. Moreover, the notion of preferential attachment is also related to the time of entry of a node into the network – the earlier a node enters the network, the larger the number of connections it develops – and Thomson was indeed one of the earliest adopters of the monitorial method in Spanish America – only after Solano García started teaching in Uruguay (1816) and José Rafael Revenga in Colombia (1819).³⁴ It goes without saying that Thomson's vast network of personal links did not necessarily guarantee the consolidation of the method once he was gone from a place, consolidation which depended on other factors (some of them of a relational nature as well) and was very varied in the different countries.

The second place in terms of degree of connectivity is occupied by the BFSS, with 15 direct links. This society was extremely active in Spanish America between 1818 and 1829, maintaining correspondence with influential individuals and Lancasterian societies, shipping classroom materials, and sending or certifying teachers (hired by Spanish American diplomats) on request. Yet, as we will see, this high-degree position does not correspond, in comparison to the other nodes, to an equally high centrality value, which suggests that a high number of direct connections does not necessarily equate to a high efficiency in the dissemination of the method.

After the BFSS, and excluding the *Real Sociedad Económica de Amigos del País*-Cádiz, the Moras couple, and Codorniu, we identify a series of 10 individuals with significantly high betweenness values, and whose number of direct connections ranges from 7 to 13.³⁵ These individuals, represented by diamonds and located in a central position in the visualisation of the density

American Historical Review 4 (1921), pp. 49-98; A. Téllez, James Thompson [sic], un viajero británico en México, in: *Secuencia: revista de historia y ciencias sociales* 27 (1993), pp. 71-84; E. Roldán Vera, Export as Import: James Thomson's Civilising Mission in South America (1818-1825) (see note 7).

34 On nodes' 'fitness' and preferential attachment, see A. L. Barabási, *Linked* (see note 24), pp. 95 f. We are planning to make, eventually, a correlation between the time of entry of each node into the network and their actual degree. On Solano García, see J. Sosa, *La escuela lancasteriana* (see note 13); on Revenga, see R. Fernández Heres, *Sumario sobre la escuela caraqueña de Joseph Lancaster* (see note 13).

35 The table with ordered centrality values (degree, closeness and betweenness) can be found in supplement 4 (see note 14).

of the network (figure 3), constitute a peculiar group within the overall network in terms of the pattern of their behaviour. Not only do they have a similar number of direct connections, but they are also strongly interconnected between themselves. In social network analysis terminology, highly-connected subgroups are referred to as 'cliques', and this group indeed constitutes a structural clique within this network.³⁶ What the members of this group have in common is that they all lived in London as diplomats, independence fighters (collecting money and organising military expeditions) or political exiles for some time during the late 1810s or early 1820s, and afterwards returned to their own (or to a different) Spanish American country to occupy influential government positions. The group, which we have denominated the 'London clique', comprises prominent (and well-researched) personalities in the independence struggle and the establishment of the post-independent political order in Spanish America:³⁷ Lucas Alamán (Mexico), Andrés Bello (Venezuela/Chile), Simón Bolívar (Venezuela/Colombia/Ecuador/Peru/Bolivia), Antonio José de Irisarri (Central America/Río de la Plata/Chile), Ignacio Núñez (Río de la Plata), José R. Revenga (Venezuela/Columbia), Bernardino Rivadavia (Río de la Plata), Vicente Rocafuerte (Ecuador/Mexico), Marcial Zebadúa (Central America), and José de San Martín (Río de la Plata/Chile/Peru). Most of them were acquainted with the method while they were in England, and either wrote favourable articles about it for their fellow countrymen or recommended the method to their governments, and, with a few exceptions, contributed to its implementation when they were back in Spanish America.³⁸ For these individuals, educational reform was one of the crucial elements in the re-organisation of the countries in which they were involved, and that partly explains their commitment to the dissemination and implementation of the monitorial method. It is also possible to argue that the reasons why they all and so eagerly embraced the method while they were in England were not only political and cultural, but also had a relational component – their internal proximity as a group. The period of their residence in London brought the group very close together, as all their members shared

36 A graphical representation of this 'clique' can be found in supplement 5 (see note 14).

37 In brackets appears first the country where they were born and second the country or countries in which they were active participants of the political life in the early-independent period.

38 The exception was the Venezuelan Andrés Bello, who settled in Chile after 1829, when the enthusiasm for the monitorial method had already dwindled in that country. It is fair to say that, from the start, he had been slightly more reserved about the potential of the monitorial method than his contemporaries (he thought it suitable only for elementary schools because of its mechanistic methods), but still had helped his brother Carlos to run a monitorial school in Caracas in 1823, by sending him materials and manuals from London (see also note 49).

even smaller.⁴⁴ Only in the network without the 'London clique' does the betweenness value of the BFSS increase significantly (from 0.186 to 0.27) – yet the escalation of the RSEAP-Cádiz (from 0.190 to 0.35) is in this case considerably higher. Regardless of which node we remove, in the resulting geodesics the BFSS is only rarely an intermediate station. These results reduce the *de facto* importance of the British society as mediator in the network of communication of the early adopters of the monitorial method, and suggest an explanation for its puzzling poor visibility in the records of the expansion of the method in Spanish America. (Of course one could argue that without BFSS there would have been no Thomson in the first place, but the fact is that Thomson followed a trajectory in the region that was quite independent – in financial, administrative and logistic terms – from its link to the society, and this is why we treat him as a separate node). The facts that the diameter of the network increases only from 6 to 7 when the BFSS is removed, and that the average geodesic distance becomes only slightly higher as a result, serve to support this hypothesis: the BFSS made comparatively less of a contribution to shortening the geodesic and facilitating the flow of communication within the network.

The opposite trend is evident in the case of the *Real Sociedad Económica de Amigos del País* from Cádiz (RSEAP-Cádiz). This society was not explicitly founded to disseminate the monitorial method, like the BFSS, but it published one of the first Spanish manuals of the method and gave it some transatlantic publicity. Its geographic location meant that it was in touch with a number of Spanish American liberal deputies taking part in the *Cortes* of 1820.⁴⁵ With only eight direct connections, half of that of the BFSS, this society fares as high in betweenness as the BFSS, and always occupies a higher place than the British society when any of the other hubs is removed. Without Thomson, the RSEAP-Cádiz indeed becomes the most central actor in terms of betweenness values, which confirms the efficiency of this society in conveying its message and influencing other parts of the network through a relatively small number of direct connections. This 'efficiency' of the RSEAP-Cádiz's network, in comparison to that of the British society, can perhaps be explained by the commonality of language and liberal political orientation of this society with those of a large proportion of early adopters in Spanish America. It was bound to be more influential for the few links of the Spanish society than the more numerous but culturally more distant links

44 Whilst the betweenness value of Alamán becomes surprisingly prominent.

45 On the Spanish societies who contributed to the promotion of the monitorial method, see R. Jiménez Gámez, *La Sociedad Económica gaditana y la educación en el siglo XIX*, Jerez de la Frontera 1991; V. Calderón España, *Apuntes históricos sobre la escuela de enseñanza mutua de la Real Sociedad Económica sevillana de Amigos del País*, in: *Espacio y tiempo* 5-6 (1991), pp. 171-174.

with the British one. Yet, since our analysis is based on the relational structure of the network, we cannot derive that the efficiency of the Spanish society in the dissemination of the method was due to an intentional or conscious tactic; we simply conclude that this was a result of the structure of its connections and its position within the overall network. In any case, the correspondence between cultural conditions and an effective mediating role in the communication of the monitorial method is remarkable.

A less efficient role was the one played by the French *Société pour l'Instruction Élémentaire* (SIE). Although this society has only one direct link less than the RSEAP-Cádiz, it fares significantly less well both in closeness and betweenness than the Spanish one. We have argued elsewhere that the SIE's contacts with Spanish America had much more of a self-legitimacy function for the French organisation than a real impact on the introduction of the method (which is not the case for Brazil, where the SIE played a more significant role than any other foreign society).⁴⁶ An analysis of its secondary position within the network reinforces this argument, since the SIE seems to have been unable to reach the relevant nodes that eventually could lead to a further dissemination of the method.

It can thus be said that, in spite of the rupture between Spain and its colonies, and in spite of the self-conscious efforts of many of the early adopters of the method to look for educational models from international references other than the metropolis, in reality Spain did play an important role in the introduction of the method in Spanish America. This was by virtue of the position of influential nodes such as the RSEAP-Cádiz in the overall network, as well as a few highly-central individuals of Spanish origin such as Manuel Codorniu and José Joaquín de Mora.⁴⁷ In what follows we examine the role of some of the individual actors within the network.

4.2. Individual actors

The scope of this paper does not allow us to look at each particular individual, yet it is worth mentioning two general characteristics of the network in this respect: on the one hand, the existence of actors whose degree value is considerably higher than their betweenness, such as Ignacio Núñez, José Cecilio del Valle, José Rafael Revenga, Andrés Bello, and Henry Dunn:

46 E. Roldán Vera, *Internacionalización pedagógica y comunicación* (see note 7).

47 Husband of Stephanie de Mora, also a founder and teacher of monitorial schools for girls. For the purposes of network analysis we have aggregated these two nodes into one (just as we aggregated the members of Lancasterian societies into one node), for they followed the same trajectory and had roughly the same connections.

There is no essential difference in the attributes of the individuals of both groups: all of them were cosmopolitan liberals; they all believed strongly in the benefits of the method; and one could not even argue that they differed in their degree of awareness or 'consciousness' of the role they were playing in the dissemination of the method. The main difference lies simply in the position they occupied within the network.

Another method of social network analysis consists in identifying the so-called 'local bridges', that is, ties connecting separate parts of the network without which these parts would be divided into disconnected components. As for ties, it is also possible to remove individual actors from the network to gain a better understanding of how important those actors are in terms of connectivity and thus also in centrality.⁵² Through this, social network analysis allows us to play with the different variables in order to assess their real importance *a posteriori*: what would happen if a certain node had not been there? This speculation is not an exercise of counterfactual historical enquiry, but simply a tool to assess the specific weight of an individual agent or organisation – understood as a relational node – in a given scenario. In our case, taking away *one* of the most highly connected nodes – Thomson, the BFSS, RSEAP-Cádiz, or the 10 members of the 'London clique' – does not make the global network of early adopters fall apart in its components, but only leads to the isolation of a small number of actors (table 4). The absence of local bridges clearly shows that the communication flow within the network was not dependent on one single hub. The network was centralised enough to guarantee short distance paths, but not too centralised to break apart if one or several nodes failed. This shows also a weakness in the bridges' definition because in highly connected networks there are hardly any bridges – the more connections there are, the greater the possibilities of reaching one node from another. Fortunately, there are more methods and measurements to describe the transition between centralised topologies with many bridges and decentralised ones without bridges.

4.3. Individual countries

The question of why the monitorial method dwindled very fast in some countries while it prevailed much longer in others has until today not been properly dealt with in the national histories of this educational innovation. Al-

⁵² The definition of local bridges is weaker than the definition of bridges. By contrast to bridges, by removing a local bridge the nodes on either side of it become reachable from each other only via very long paths, but the network still remains connected. See S. P. Borgatti, Centrality and AIDS, in: *Connections: Official Journal of the International Network for Social Network Analysis* 18 (1995), no. 1, pp. 112-115 for a description of the relation between centrality and bridges for any kind of network diffusion, and especially for sexual networks.

though an analysis of the network of early adopters cannot provide a comprehensive answer to it, there is one measurement that may offer some insights, the so-called 'clustering coefficient'. The principle of this measurement consists in classifying the links between the different actors into 'strong' and 'weak' 'ties' and identifying the different roles that each kind of tie plays within the network. 'Strong ties' (closer relationships such as those of family and friendship) facilitate cohesion and thus are a prerequisite for the continued existence of groups, whereas 'weak ties' (distant or occasional contacts such as acquaintances, business partners, etc.) connect those groups with one another. Not all 'weak ties' have to be local bridges, but all local bridges constitute 'weak ties'.⁵³ Regarding the diffusion of an innovation, 'weak ties' are decisive for its dissemination and 'strong ties' are more important in its implementation. Although Granovetter has formulated a theory concerning strong ties as implication (strong ties create transitivity) and not as equivalence (strong ties are by necessity transitive and vice versa), in our opinion the amount of transitive relations (i.e. the size of the clustering coefficient) also indicates that these relations are strong ties. The foundation of a society to promote the monitorial method is a good example of how common ideas of the members of a group generate cohesion but they are not necessarily a precondition for that cohesion – they can also be a result of the interactions within the group. It is obvious that the existence of common models or ideas cannot be explained solely by reference to a certain social structure, but in fact mutual goals and collective values or norms and transitive ties between the actors can influence one another. We can certainly say that an idea will have a shorter life if the individual who adopts it does not belong to a cluster of individuals with whom he can share it and possibly start some kind of action (e.g. founding a school), whereas the existence of clusters facilitates (without guaranteeing) a longer life for that idea. The clustering coefficient can thus help to explain the dynamic of diffusion of an innovation in the different countries, although it does not say anything about the reasons why the idea was introduced or successfully communicated in the first place.

As table 4 shows, the clustering coefficient in most of the individual countries studied is similar to the average clustering coefficient of the whole network (0.35). Yet there are three remarkable exceptions: on the one side Gran Colombia (0.03), and on the other side Chile (0.49) and Mexico (0.65). This clearly indicates that in Gran Colombia there was no aggregation of individuals into groups, whereas in both Chile and Mexico actors formed groups that were closely interconnected.

⁵³ M. Granovetter, The Strength of Weak Ties, in: P. V. Marsden/N. Lin, *Social Structure and Network Analysis*, Beverly Hills 1982.

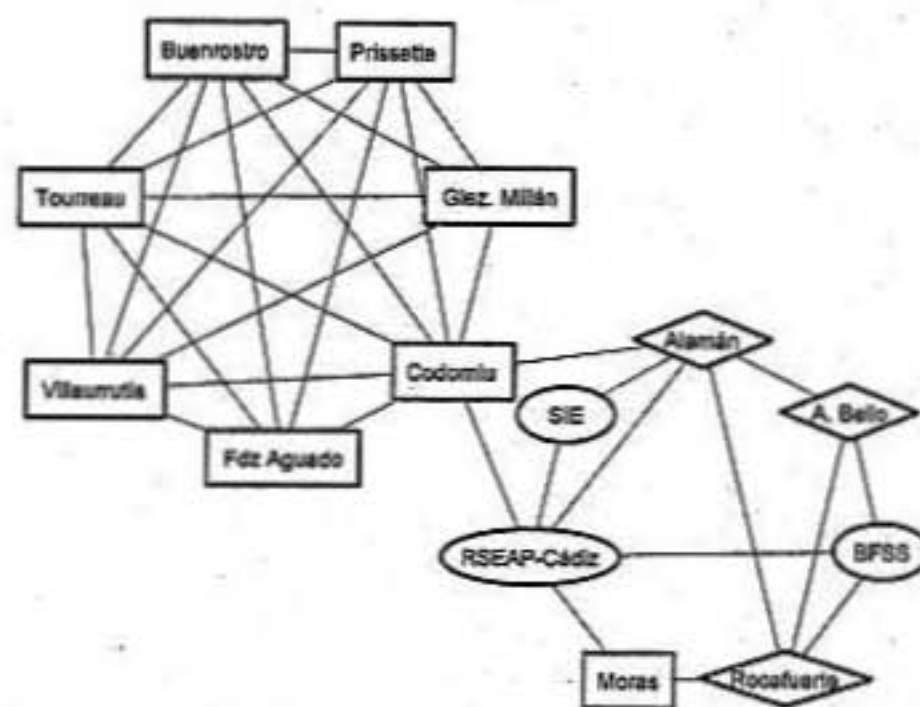
country at the time (a confederation of today's Venezuela, Colombia, Ecuador, and Panama), it is interesting to note that institutionalisation is not necessarily a result of a pre-existing centralisation (actually, in cases such as this one institutionalisation seems to have been an attempt to homogenise what already existed in heterogeneous form). On the other hand, Chile and Mexico are much more centralised but in very different ways: whereas Chile's network develops mostly in a tree-like topology around the figure of Thomson (who has a much higher than average value of closeness), the centre of the Mexican network is occupied by Codorniu as the connector of two groups (figures 7 and 8).⁵⁴

As we said before, a centralised network with a small clustering coefficient may favour rapid communication, but it is highly vulnerable if the most central actor (or the actor with the highest betweenness value) ceases to exist. Following this logic, it should not be surprising to realise that the method disappeared faster in those countries in which it had established itself more rapidly thanks to a centralised network. This was the case for the countries in which Thomson was most active, Río de la Plata and Chile. Indeed the betweenness value of the network of early adopters in those countries, that is, the measure of the centralisation of the network depending on the most central actor, is much higher than in the rest (0.62 and 0.56 respectively).

We observe quite the opposite trend in Mexico, where the method had a longer life precisely because Thomson *did not* play a role there: instead of the 'ego-centered network' that Thomson was so good at creating in Río de la Plata and Chile, the network in this country did not rely on one single individual and therefore was less vulnerable to failure if that node failed. Yet the persistence of the monitorial method cannot be explained only by the lack of centralisation of the network of early adopters, but also by the cohesion of the groups involved in the diffusion of it. With Codorniu as the intersection between the group of members of the Lancasterian Company and another section of inter-connected individuals, the betweenness centralisation is 0.5, third on the list of all the countries, but the clustering coefficient occupies first position with 0.65. Therefore, we can conclude that centralisation was not the decisive factor in the expansion of the method in this country, where this was taken over by at least two different groups.

54 For a chronicle of the development of the monitorial method in Chile, see D. Amunátegui, *El sistema de Lancaster en Chile* (see note 13). On Gran Colombia, see M. Báez Osorio, *La escuela lancasteriana en Colombia* (see note 13); M. Caruso, *New Schooling and the Invention of a Political Culture: Community, Rituals, and Meritocracy in Colombian Monitorial Schools (ca. 1820-1840)*, in M. Caruso/E. Roldán Vera (eds.), *Promising Imports* (see note 7). On Mexico see, for example, J. M. Lafragua/W. Reyes, *Breve noticia de la erección, progresos y estado actual de la Compañía Lancasteriana de México*, Mexico 1853.

Figure 8: Sociogram of the Mexican network of early adopters



This non-dependency on a central actor may also account, to an extent, for the slower pace in the dissemination and implementation of the method in this country (as well as in Central America, whose network of early adopters was also relatively decentralised), but it also meant that the network was less linked to the changing political scene. The formation of an articulated cluster from the very beginning of the introduction of the method reduced the dependency on one individual node and created the conditions which enabled actors to be changed within the cluster without affecting its general functioning.⁵⁵ An interesting case in which the monitorial method survived for a confined sector of society when it was no longer in use in the rest of it, is that of the Argentinian schools for girls ran by the *Sociedad de Beneficencia*, where the method prevailed for 60 years. This was an institution founded by Rivadavia (independent from Thomson) but which formed such a strong and independent cluster that it managed to survive once Rivadavia was no longer in power. This cluster maintained, like the Mexican Lancasterian Company, a

55 For a study of the members of the board of the *Compañía Lancasteriana* of Mexico City over time, see W. Fowler, *The Compañía Lancasteriana and the Élite in Independent Mexico, 1822-1845*, in: *Tesserae* 2 (1996), pp. 81-110.