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Jesús Rogel-Salazar, Rosario Rogel-Salazar

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Identification of Core Journals and Analysis of Collaboration Networks Among Researchers in Ibero America

Jesús Rogel-Salazar *Applied Mathematics and Quantitative Analysis, STRI, School of Physics, Astronomy and Mathematics, University of Hertfordshire, UK*

Rosario Rogel-Salazar *Facultad de Ciencias Políticas y Sociales, Universidad Autónoma del Estado de México, México*

Abstract

INTRODUCTION In this paper we survey scientific production published in Ibero American journals in four subject areas: Medicine, Education, Administration & Finance, and Psychology. The aim of the paper is to provide a view of the available state-of-the-art of Ibero American publications in Open Access journals compiled in well-respected repositories such as Redalyc. **METHODS** The scholarly Open Access production in Ibero America was analysed using data from Redalyc during the period between 2005 and 2007 for the four areas mentioned above, using data and metadata such as author affiliation and subject area. **RESULTS** The data analysis carried out in this paper identifies those journals that compose the core and first Bradford zone for the subject area in question. These journals are therefore those that condense the majority of relevant articles for a researcher in that particular field. The application of network analysis allows us to map the collaboration networks, per country, of researchers publishing in Ibero America. **DISCUSSION & CONCLUSION** The analysis presented here reflects the status of journals in the areas in question reflecting the information held in the repository's database. The authors conclude that a careful revision and improvement of the requirements that editors and journals require of their authors is of paramount importance for emerging online electronic libraries such as Redalyc.

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Implications for Practice:

- The paper analyses the Open Access scientific production of Ibero America, whose visibility has been improved by sites such as Redalyc. As an emerging electronic library, Redalyc and similar repositories require to take into account the journals, authors and articles they make available and this work provides a view of the state-of-the-art for some subject areas classified in Redalyc.
- Emerging electronic libraries as well as Open Access journal editors, researchers, and library specialists in regions such as Ibero America can gain a general overview of the importance of data and metadata normalisation as well as editorial standards that a quality publication is expected to have.
- The collaboration networks obtained from the analysis presented in this paper can help authors, editors, and library specialists to gain a better understanding of the users, readers, and audience that Open Access journals in the region have.

INTRODUCTION

There is no doubt that the generation and dissemination of knowledge is one of the most significant and defining endeavours of research institutes, universities, and academic organisations. This mission does not only take place in the lecture theatres, laboratories or seminars rooms, nor does it finish when graduate and undergraduate students leave the above mentioned institutions. It is, however, a continuous feedback process that permeates the various areas of research and development. It therefore stands to reason that the visibility of this undertaking is an integral part of the feedback loop. The outcomes and achievements of the scientific quest are best understood when they are shown and shared both within the research institution as well as outside it. A very important aspect of this process is the fact that a large number of academic research projects are by nature collaborative tasks and thus not only do they involve several researchers, but also various institutions and countries. These collaborative networks play a very important role in the dissemination and democratisation of science (Wagner & Leydesdorff, 2005) and that is the main reason for our interest in them.

One of the most common ways to achieve visibility is through the publication of research results in scholarly journals and similar outlets, where peer review is usually the cornerstone of the quality assurance process (Gannon, 2001). The peer review process is indeed at the heart of science, and although there are a number of criticisms against it (Bohannon, 2013; Cole, Cole, & Simon, 1981; Realman, 1989; Realman & Angell 1989) it is still the most widespread method to assess the quality

and accuracy of scientific results (Kassirer, 1994). Peer review might be slow, expensive and prone to bias, but it is indeed very difficult to imagine scientific publishing without it. Some attempts have been made to understand the dynamics of peer reviewing: for instance, Squazzoni, Bravo, and Takács (2013) report on the impact that incentives for reviewers has on the peer review process and conclude that the most effective scheme is the one currently used. There have been some endeavours to include post-publishing peer reviewing (Beel & Gipp, 2008) or even open review (Walsh, Rooney, Appleby, & Wilkinson, 2000), but none of these are as widespread as double-blind peer reviewing. Some journals that have implemented open peer review include *PeerJ*, *PLOS Medicine*, *F1000Research*, and the benefits of its use include improved accountability, fairness and review crediting (Godlee, 2002; Pöschl, 2012) as well as improved quality of the review (Kowalczyk, Dudbridge, Nanda, Harriman, & Moylan, 2013). Some negative aspects include the reluctance of providing a review (Khan, 2010), in particular by less senior researchers in the case of rejection recommendation, and in general a lack of volunteer reviewers.

With this in mind, it is not surprising that an increasing number of organisations rely on the number of articles published in highly recognised peer reviewed journals to assess the impact their research has both internally and externally. This raises the question as to what makes a particular journal worth publishing in and worth reading. One can rely on the catalogue of journals kept by organisations such as ISI by Thomson Reuters or Scopus by Elsevier. However, there are a number of publications

that do not necessarily make it into such databases, and this is not necessarily because of lack of quality, but in many cases because of lack of visibility (Estrada-Mejía & Forero-Pineda, 2010; Wagner & Wong, 2012). This is the case of a number of publications in regions such as Ibero America. In recent years the number of scientific journals that are edited in Ibero America has been steadily increasing (Delgado, 2010; Delgado Troncoso, 2014) and this has therefore had an impact in the communication among researchers in the region. However, it is important to realise that the impact this development has had in the global scientific production is still somewhat limited to a local level (Alonso-Gamboa & Russell, 2012). In this article we present some exploratory results coming from scientific literature generated and published in Ibero America. We have made use of the database created and maintained by Redalyc (Redalyc, 2002), which is a project that aims to contribute to the dissemination of the scientific editorial activities produced in Latin America, the Caribbean, Spain and Portugal. We survey the production of four important scientific areas: Administration & Finance, Education, Medicine and Psychology. The analysis includes a ranking of those publications that are seen as the most important ones in the areas mentioned above, as well as an exploration about the network connections among authors (per country) in these areas during a three-year period from 2005 to 2007.

The data analysed was provided by Redalyc during February 2011; after that date new journals have been incorporated into the database and some have been discarded. Moreover, given that prior to the second quarter of 2011 there were on average 30% of journals with incomplete collections (for the period of 2005-2010), the need to complete them was prioritised. By May 2012 this lag had been reduced to less than 3% and more recent figures are unfortunately not available. With that in mind, this article presents a view of the available information from Redalyc giving us an opportunity to glance at the scientific publication landscape in Ibero America. According to personal communications from Redalyc (Redalyc, 2002), the data after 2007 is being processed and is not available to the public. The growth that the repository has seen in recent years has put some strains on resources and priority has been given to the availability of journals and their articles in the Redalyc portal. We would like to point out that given the lag in the information, it not possible to provide an up-to-the-minute view, but given the issues mentioned above, we

believe that it is relevant to disseminate studies such as this one with the view, on the one hand, of providing some insight into the scientific production of the region in question, and on the other hand, pointing out the drawbacks and shortcomings encountered while adding relevant arguments to the discussion.

We would like to note that the journals that are in Redalyc's database have been vetted in order to ensure that they meet international quality parameters, including peer review and the publication of original results. Also, it is important to mention that one of the objectives of Redalyc is to enable the scientific literature produced in and about Ibero America to be available in a fast and efficient manner to the general public in order to increase its visibility, internationalisation and impact. To that end, Redalyc has made available online the abstract, full text and other editorial information of a large number of publications that have undergone a rigorous process in order to be included in the database. We believe that this database is a valid and important resource to analyse the alternative universe of scientific publications that are not included in other major databases.

This is by no means an exhaustive analysis; nonetheless, it opens up a window to characterise the productivity and impact of Ibero American journals as well as to visualise collaboration networks among researchers, per country, in the region and in the world.

MATERIALS AND METHODS

The scientific production in Ibero America, and Latin America in particular, has routinely suffered with a relative low impact and lack of dissemination. A number of reasons for this disadvantage can be traced for instance to the lack of English language writing skills of researchers in the region or the hindrance imposed by the unavailability of costly subscriptions to reputed bibliographic databases and journals. Nonetheless, thanks to portals such as Redalyc and SciELO (SciELO, 1997) for example, this is a trend that has started to change.

One of the main motivations of this work is the recent emergence of so-called peripheral science thanks to technological advances such as the Internet. With that in mind, we have made use of the Redalyc's database, which is an initiative driven by Universidad Autónoma del Estado de México that started in 2002. Initially, Redalyc

published exclusively journals in the Social Science and Humanities arena. However, given its impressive success, it started to incorporate journals in other areas such as natural sciences including physics and engineering. Up until the beginning of 2011, Redalyc had over 760 journals and more than 220,000 articles in a wide range of scientific areas. Each of the journals in the database undergoes a strict and rigorous evaluation process that ensures the quality of the publication (Redalyc, 2002). In order to provide some perspective we would like to point out that, like Redalyc, SciELO is interested in supporting the electronic publishing in developing countries. However, it is not dedicated only to Latin American countries (SciELO South Africa opened in 2009). The project is supported by the Foundation for Research Support of the State of São Paulo (FAPESP) and the Brazilian National Council of Scientific and Technological Development, CNPq. SciELO has both Journal and Book collections, although the latter are only available for Brazilian publications. As mentioned in the introduction, this article deals only with information provided by Redalyc.

For the purposes of this case study we identified, together with Redalyc, four areas of interest in order to assess the research collaboration networks per country. These four areas are: Education, Medicine, Psychology and Administration & Finance. Given that the information that Redalyc holds is constantly being updated, it became apparent that starting off with some historical data would provide a more complete dataset and that is why this study analyses publications in the areas mentioned above which were published from 2005 through to 2007. This provides us with a total of 156 journals (Medicine–37, Education–54, Administration & Finance–17, Psychology–48) and a total of 9779 articles (Medicine–2,905, Education–2,907, Administration & Finance–848, Psychology–3,119). As mentioned earlier on, the data detailed above correspond to a snapshot of the database taken at the beginning of 2011. By May 2012, Redalyc records in its collection a total of 811 journals and more than 230,000 articles; out of these, 56 correspond to the area of Medicine, 75 to Education, 27 to Administration & Finance and 69 to Psychology.

Given the dataset detailed above, we are interested to find what journals, among the ones included, are those that can be seen as core journals for a researcher in the area of interest. Also, we are interested in providing a framework

to analyse the collaboration networks per country that researchers publishing in the region have established. In order to tackle our first aim, we have chosen to carry out a Bradford analysis to identify core journals as well as secondary sources (Bradford, 1934). Establishing this nucleus is an important step, as in essence the further you go from the core the more diluted the relevant content becomes. In this sense, the core journals basically contain the most relevant articles for a researcher. A Bradford analysis takes therefore into account the articles that are seen to be relevant in a particular area, in proportion to the total number of articles in the journal. The relationship of the number of journals in the core (zone 0) to the first zone is a constant k (called the Bradford multiplier) and to the second zone the relationship is k^2 . This relationship is thus expressed as $k^0 : k^1 : k^2$. It is important to mention that the value of the Bradford multiplier is typically different for different research areas.

In order to capture articles that are deemed to be relevant in a particular area, the keywords chosen for the four areas analysed in this study are shown in Table 1. Please note that since the journals used publish material in Spanish, Portuguese and English, the search was performed in these three languages so as to capture the content of all articles used. In Table 1, for simplicity, we only present the term in English. Also, the keywords used were established at random. With this data at hand we have carried out a search in each of the four subsets and calculated their Bradford multiplier as well as the core journals for the four sets. Results are presented in the following section.

Table 1. Keywords used to capture relevant articles in the four different research areas analysed in order to calculate Bradford zones

Research Area	Keyword
Education	<i>Education</i>
Medicine	<i>Diabetes</i>
Psychology	<i>Violence</i>
Administration & Finance	<i>Development</i>

Finally, the collaboration network among researchers in the four areas identified was carried out by means of adjacency matrices obtained from the affiliations listed in the different articles used for this study. Each adjacency matrix has as nodes the countries of the authors, and the

edges correspond to relationships among authors in a single publication. This results in an undirected weight graph that can be analysed using tools stemming from graph theory and network analysis. In particular, we have calculated the PageRank (Brin & Page, 1998) which is an indicator that shows the relative importance of a particular node, and one that has been widely popularised by the search engine Google. Although originally the PageRank algorithm was first used as a metric for evaluating webpages, its ideas have influenced other areas such as citation analysis (Ma, Guan, & Zhao, 2008) and journal evaluation (Bollen, Rodriguez, & Van de Sompel, 2006). In this study, we propose the value given by PageRank as a form to evaluate the relative importance of a country in terms of collaborations in the network. In order to explain how this works, let us remember that each node (representing a country) has a certain number of inbound edges (collaborations), this number is the in-degree of the node. The PageRank algorithm uses this information and normalises it by taking into account the links of other (neighbouring) nodes. The algorithm defines the links as the probability of going from one node to another one in terms of a random walk, transforming the network into a strongly connected graph, which can be understood as a network where given any two nodes, there is always some path between them. The visualisations presented in the following section have been done using the map equation of Rosvall, Axelsson, and Bergstrom (2009).

RESULTS

Core Journals

As stated above, the core journals for the four areas under consideration in this study are taken from Redalyc's database between 2005 and 2007 (with data taken from a snapshot of the database dated on February 2011). The results are presented per area in order to draw individual remarks.

Medicine: In the area of Medicine, the catalogue contained a total of 37 journals with 2,905 articles. The Bradford multiplier obtained was 2.24 for the keyword "diabetes". This provides us with a core of two journals namely *Archivos Venezolanos de Farmacología* (Venezuela) and *Terapéutica and Pharmacy Practice* (Spain). Table 2 (following page) shows the core and first Bradford zone journals for this area.

Education: In the area of Education, the dataset contained a total of 53 journals with 2,907 articles. For the

keyword "education" we obtained a Bradford multiplier of 1.55, giving us a core of three Journals and three Bradford zones. The core journals in this case are: *Revista Mexicana de Investigación Educativa* (Mexico), *Educação & Sociedade* (Brazil) and *Revista Electrónica Actualidades Investigativas en Educación* (Costa Rica). Table 3 (following page) presents the core and first Bradford zones.

Administration & Finance: In the area of Administration & Finance, the number of journals and articles turned out to be less than in the other three areas. There were 17 journals with a total of 848 articles. For the keyword "development," the Bradford multiplier was calculated to be 1.94, with two journals in the core zone: *Revista-Escuela de Administración de Negocios* (Colombia) and *RAC: Revista de Administração Contemporânea* (Brazil). Table 4 (following page) shows the core and first Bradford zones for this area.

Psychology: In this area there were 48 Journals with a total of 3,119 articles. For the keyword "violence" the Bradford multiplier was 1.93 and the core consists of three journals: *Revista Colombiana de Psiquiatría* (Colombia), *Enseñanza e Investigación en Psicología* (Mexico) and *Universitas Psychologica* (Colombia). Table 5 (following page) summarises the journals in the core and first Bradford zone.

It is important to note that the results shown in the tables are very particular to the research outcome during the period analysed and that the ranking provided by the Bradford analysis is simply a reflection of the amount of content and not necessarily of the impact of the journal. It is interesting to see that Colombia, Brazil, Mexico, Costa Rica and Spain are those countries that consistently featured in the core and first Bradford zones.

Collaboration Networks

We will now turn our attention to the collaboration networks per country that can be constructed using the affiliation information in each of the articles considered. We constructed collaboration maps both per year and overall during the period in question, namely, between 2005 and 2007. There are cases where the country of affiliation was not provided. Either the information was not available or it was not possible to decide the affiliation. In those cases, authors were assigned to the "Unknown" category. For the sake of brevity, in this paper we will

Table 2. Core and First Bradford Zones in the area of Medicine

Bradford Zone	Journal Name	Country
Core	<i>Archivos Venezolanos de Farmacología y Terapéutica</i>	Venezuela
Core	<i>Pharmacy Practice</i>	Spain
Zone 1	<i>Archivos en Medicina Familiar</i>	Mexico
Zone 1	<i>Acta Médica Colombiana</i>	Colombia
Zone 1	<i>Acta Médica Costarricense</i>	Costa Rica

Table 3. Core and First Bradford Zones in the area of Education

Bradford Zone	Journal Name	Country
Core	<i>Revista Mexicana de Investigación Educativa</i>	Mexico
Core	<i>Educação & Sociedade</i>	Brazil
Core	<i>Revista Electrónica Actualidades Investigativas en Educación</i>	Costa Rica
Zone 1	<i>Educere</i>	Venezuela
Zone 1	<i>Educación y Educadores</i>	Colombia
Zone 1	<i>REICE. Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación</i>	Spain
Zone 1	<i>Educação e Pesquisa</i>	Brazil
Zone 1	<i>Eccos - Revista Científica</i>	Brazil

Table 4. Core and First Bradford Zones in the area of Administration & Finance

Bradford Zone	Journal Name	Country
Core	<i>Revista Escuela de Administración de Negocios</i>	Colombia
Core	<i>RAC. Revista de Administração Contemporânea</i>	Brazil
Zone 1	<i>Estudios Gerenciales</i>	Colombia
Zone 1	<i>RAE Eletrônica</i>	Brazil
Zone 1	<i>Gestión y Política Pública</i>	Mexico

Table 5. Core and First Bradford Zones in the area of Psychology

Bradford Zone	Journal Name	Country
Core	<i>Revista Colombiana de Psiquiatría</i>	Colombia
Core	<i>Enseñanza e Investigación en Psicología</i>	Mexico
Core	<i>Universitas Psychologica</i>	Colombia
Zone 1	<i>International Journal of Clinical and Health Psychology</i>	Spain
Zone 1	<i>Anales de Psicología</i>	Spain
Zone 1	<i>Papeles del Psicólogo</i>	Spain
Zone 1	<i>Intervención Psicosocial</i>	Spain
Zone 1	<i>Tesis Psicológica</i>	Colombia

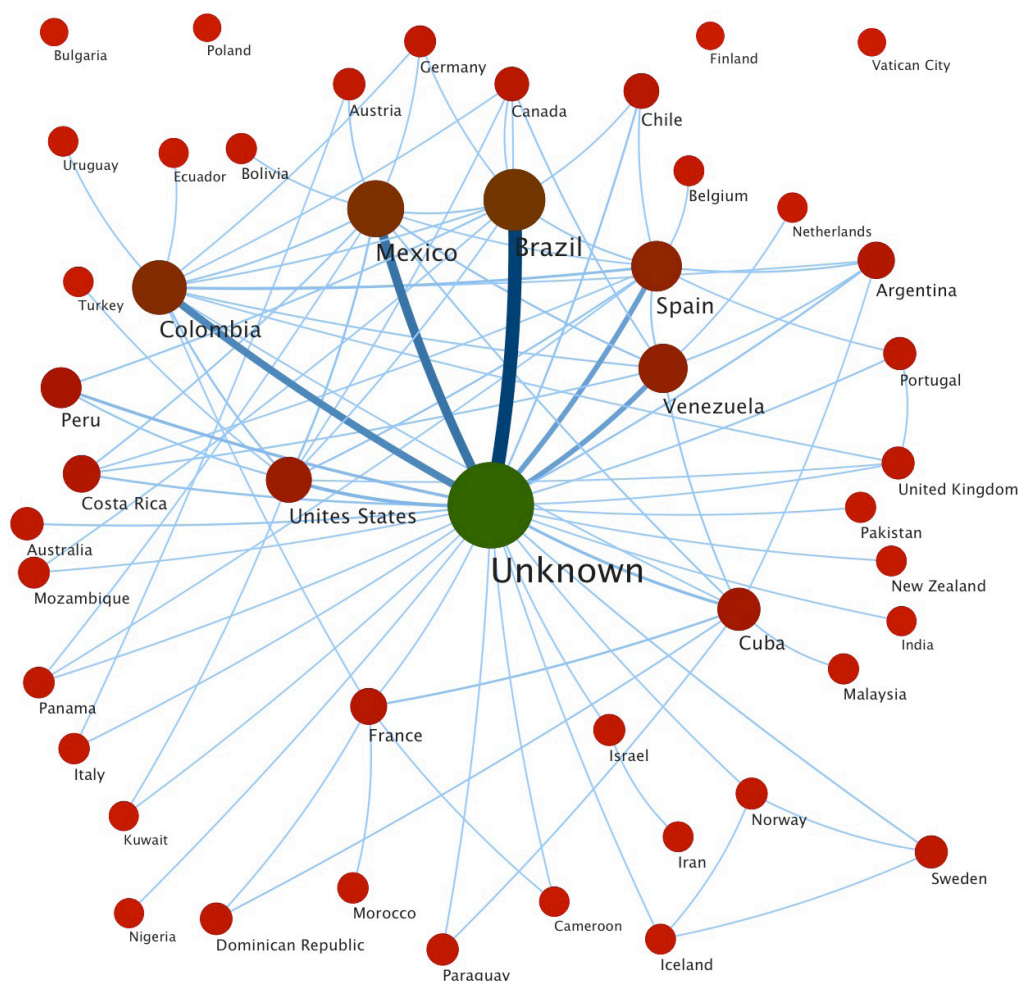
only refer to the aggregated network, nonetheless the information per year is available upon request. As before, we will concentrate on each area separately.

Medicine: In the area of Medicine, and leaving the PageRank of the “Unknown” category aside, the countries with a higher PageRank were Brazil (0.136), Mexico (0.099), Colombia (0.083), Spain (0.0604) and Venezuela (0.053). Indeed, if the “Unknown” category is removed the PageRank order changes to Colombia (0.13), Spain (0.1251), Mexico (0.1211), United States (0.1042) and Venezuela (0.088). This is an indicator that countries such as Brazil have a great number of collaborations with authors whose affiliation is not clearly stated. Cluster analysis reveals that a cluster lead by Spain (20.01) encompasses the vast majority of collaborations with countries such as Colombia, Brazil, Argentina, Peru, and Costa Rica. A second cluster is the one lead by France

(1.99) with collaborations with the Dominican Republic, Cuba, Paraguay, Morocco, Malaysia, and Cameroon. A third cluster is the one formed by the United Kingdom and Portugal. A Scandinavian network can be clearly identified as a fourth cluster, where Sweden, Norway and Iceland are represented. Finally an interesting fifth cluster is the one formed by Israel and Iran. A number of isolated countries are present such as Bulgaria, Poland, Finland, and the Vatican City. An overall graphical representation of this network can be seen in Figure 1.

Education: The research output in Education also contained a number of “Unknown” affiliations, and thus, leaving its PageRank aside, the countries with highest PageRank correspond to Spain (0.221), Brazil (0.101), Mexico (0.064) and Portugal (0.052). Nonetheless, when the “Unknown” category is removed, Mexico moves from the third place to the fifth, leaving Portugal and

Figure 1. Collaboration network in the area of Medicine. Data obtained from Redalyc for the period between 2005 and 2007

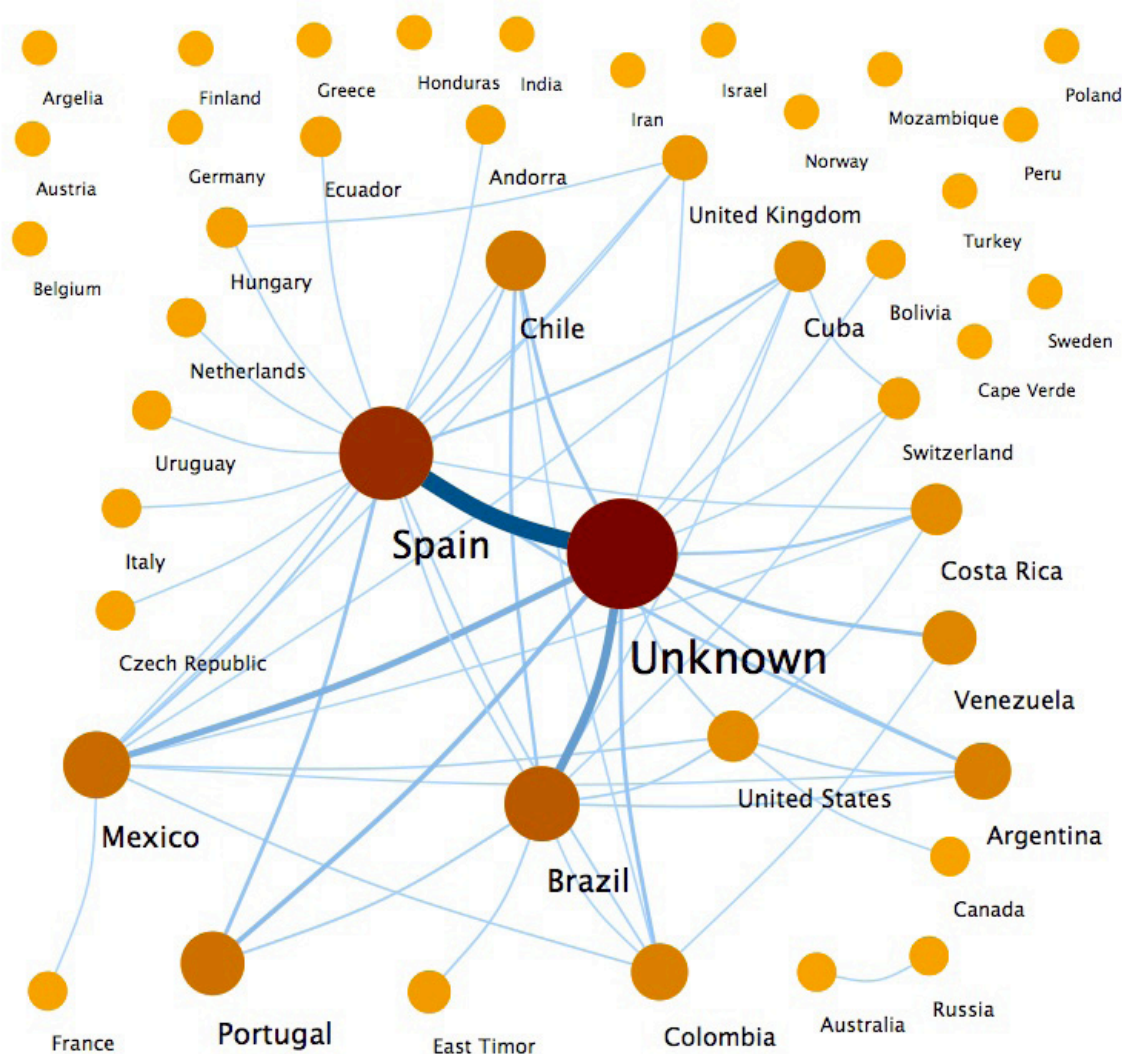


Chile in third and fourth places. This points out that Mexican researchers in the area of Education do hold a great deal of collaborations, however the data provided in their research outputs makes it difficult to pinpoint the countries with which they collaborate. A similar trend can be seen for Colombia (moving from seventh to ninth). Cluster analysis shows us two groupings: the first one lead by Spain (cluster PageRank of 28.15) holding relationships with Brazil (13.91), Portugal (9.27), Chile (8.61) and Mexico (7.95); and the second one between Russia and Australia (0.33 each). Finally, it is worth noting a number of isolated countries, including European countries such as Germany and Sweden, but also countries such as Mozambique and Algeria. Finally, it is interesting to see that Peru and Honduras appear as isolated countries in the area of Education, in spite of the

fact that the journals that are being analysed correspond specifically to the Ibero American region. An overall graphical representation of this network can be seen in Figure 2.

Administration & Finance: The network for the Administration & Finance research area is a very interesting one. Once again, leaving aside the PageRank of the “Unknown” category, the first five places correspond to: Colombia (0.14), Venezuela (0.098), Spain (0.095), the United States (0.063), and Brazil (0.063). However, when removing the “Unknown” altogether the picture is very different, leaving the first five places as follows: Mexico (0.154), Spain (0.147), Colombia (0.14), the United States (0.112), and Brazil (0.098). It is worth noting that Mexico moves from the 16th place to the

Figure 2. Collaboration network in the area of Education. Data obtained from Redalyc for the period between 2005 and 2007



first, this is in strong contrast to the situation seen in the area of education. Whereas countries such as Colombia may seem to have more collaborations, it is difficult to know its actual reach in the network due to the fact that the vast majority of those relationships are masked by the unknown affiliation. When performing cluster analysis it is clear that the network for the Administration & Finance area is tightly connected and led by Mexico. We note the appearance of Nicaragua and Uruguay as isolated countries; also note the presence of South Korea. An overall graphical representation of this network can be seen in Figure 3.

Psychology: In the area of Psychology, and ignoring the presence of the “Unknown” category, we have the PageRank order as follows: Spain (0.264), Colombia (0.0868),

Brazil (0.078), the United States (0.062), and Mexico (0.060). When removing the “Unknown” affiliation the PageRank changes to the following order: Spain (0.313), the United States (0.113), Mexico (0.087), Brazil (0.074), and Colombia (0.074). We note the swapping between Colombia and Mexico, the former with a larger amount of collaborations with authors whose affiliation is unknown. Cluster analysis shows us two groupings, the one lead by Spain (showing links with the countries mentioned above) and a second cluster lead by Venezuela linking with Peru and New Zealand. Ibero American countries that appear as isolated nodes in the network include Costa Rica, Ecuador, the Dominican Republic, Guatemala, and Paraguay. An overall graphical representation of this network can be seen in Figure 4 (following page).

Figure 3. Collaboration network in the area of Administration & Finance. Data obtained from Redalyc for the period between 2005 and 2007

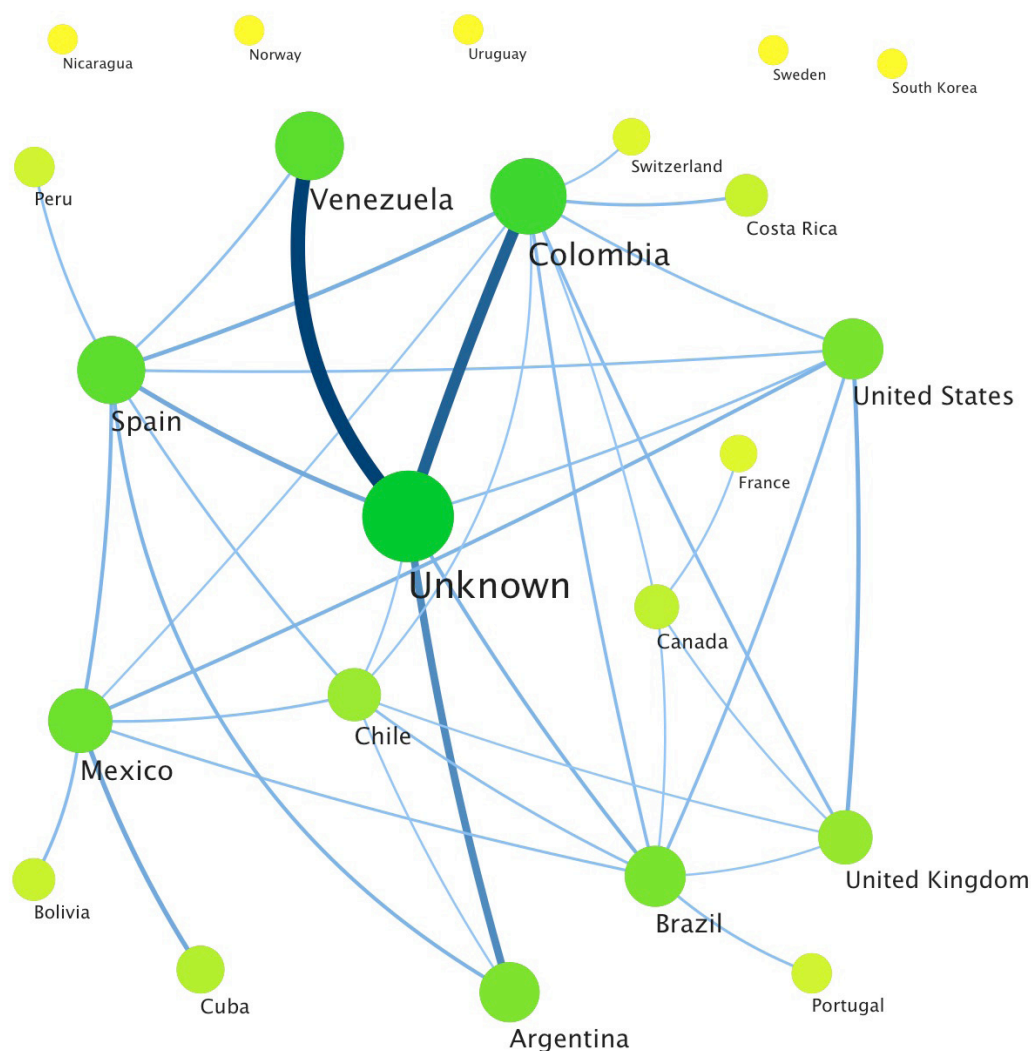
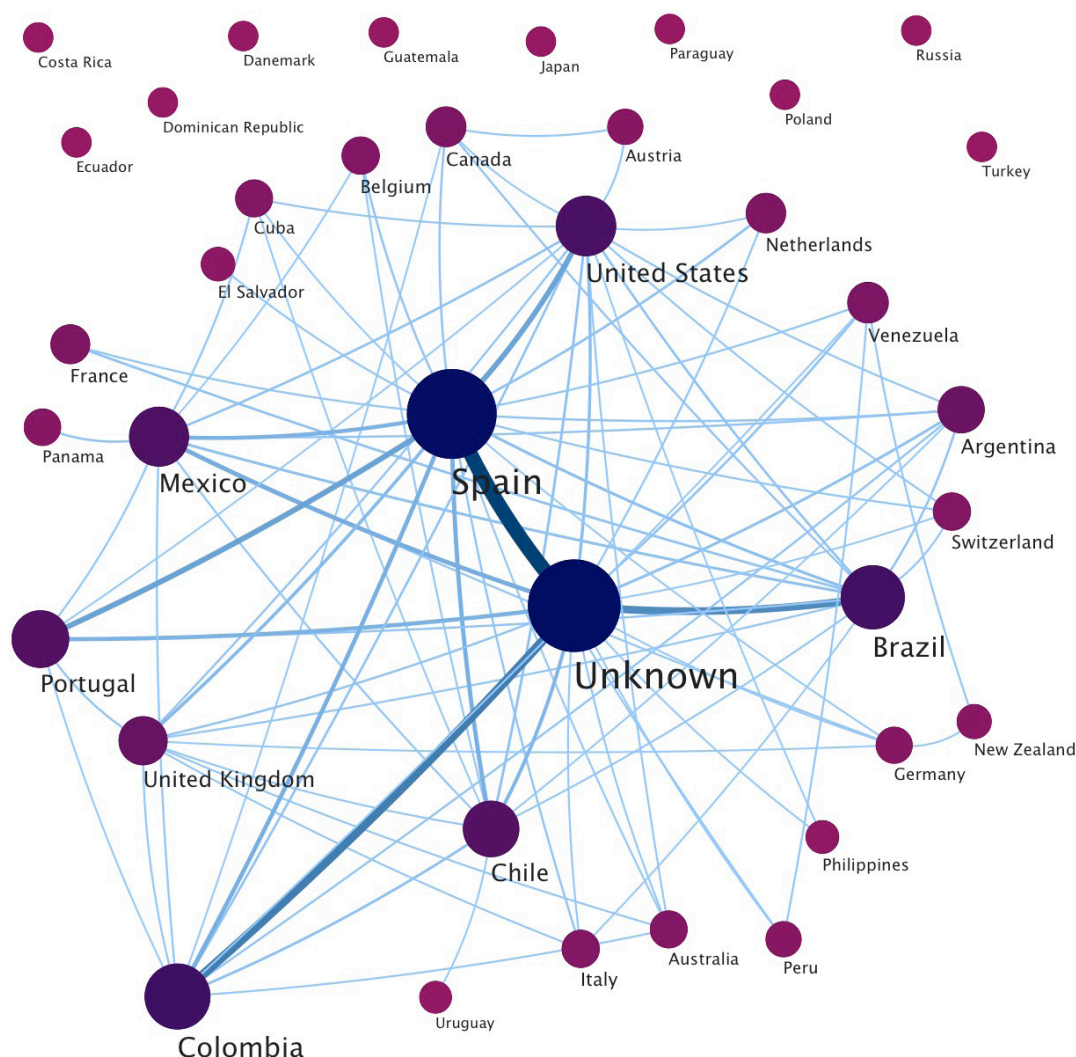


Figure 4. Collaboration network in the area of Psychology. Data obtained from Redalyc for the period between 2005 and 2007



CONCLUSIONS

In this paper we have analysed data stemming from a database assembled and maintained by Redalyc, whose aim is to provide visibility to the research output of the Ibero American region. It is important to mention that unlike other databases that enable metric analysis of scientific production, Redalyc offers open access to the full text of the articles in its collection. This helps reduce the problems of visibility of the scientific production in journals published in the region. The analysis was concentrated on four research areas, namely Medicine, Education, Administration & Finance, and Psychology, during the period between 2005 and 2007.

On the one hand, we have carried out a Bradford analysis of the scholar production in the areas mentioned above

within the journals that have passed the evaluation processes established by Redalyc. We have found that, for the period of 2005 to 2007, journals published in Colombia, Brazil, Mexico, and Spain are among those that concentrate a large part of the production in the areas examined. As it was mentioned, the journals identified by this analysis do not necessarily correspond to those with the highest relative impact factor. Nonetheless, they do provide a greater number of relevant articles (per keyword, for example) to researchers in the area in question.

The results presented here reflect, in part, the status of journals in the areas analysed; but at the same time, they only show the information that is recorded in the database at any given time. For the present case, the results may be different when considering the normalisation and standardisation registered in Redalyc's database by

including and discarding journals as well as completing the collections of its journals. It is, in general, a dynamic database that is updated continuously, and therefore any analysis must be considered under the timeframe in which it has been made. This is particularly important when taking into account the lag in availability for up-to-date information. As we mentioned in the introduction, the current study analyses a period in time that may not be perceived as current, however, we are of the view that should studies like this one only be done when there is updated information the discussions would stagnate and efforts such as those of Redalyc would not see an immediate need to improve. We are thus convinced that it is important to disseminate this type of study, as it allows us to assess the robustness of a database and to develop strategies to strengthen it.

On the other hand, the application of network and cluster analysis on the same dataset has enabled us to prove the collaboration relationships per country among researchers publishing in the Ibero American region. In order to carry out this analysis, the affiliation information provided by the authors in their papers was used and it was immediately clear that a large number of authors had incomplete information in this regard.

The high level of “Unknown” records can be explained in two ways: the first deals with the source database itself and the second is related to the routine work performed by publishers. For its part, Redalyc has sought to work with a normalised and updated catalogue of institutions that allows them to: identify the hierarchy of institutions (universities, hospitals, businesses, etc.); detect and rule out duplications; and standardise the different ways of referring to the same institution. In this sense, up until December 2011, Redalyc’s Institution Catalogue had registered about 27,000 institutions worldwide, not only in Ibero America, as the authors of the journals in the region can come from anywhere in the world.

However, in spite of the fact that Redalyc develops a database from journals published in Ibero American institutions, it is not its responsibility to publish the work itself; although it does seek to support this task in a variety of ways. This means that there are some issues related to editorial standards, that could indeed be a common fault, but which Redalyc cannot deal with directly. That is, the analysis of scientific collaboration networks in Ibero American journals will only be solid to the extent that

publishers of scientific journals in the region are aware of the importance of using consistently and appropriately, as well as in full, the institutional affiliation of all authors in their journals. This is particularly interesting in terms of the requirements that journals impose (or should impose) on their authors at the moment of submission and subsequently during the publication process. We would like to point out that some of the drawbacks identified in the case of the data from Redalyc are actually of relevance to other repositories such as SciELO or even institutional repositories where universities and research centres concentrate the research outputs of their principal investigators.

We believe that a careful revision to those requirements will vastly improve this situation and therefore improve the estimations of studies such as this one. For example, some countries dramatically changed the PageRank score obtained by taking (or not) into account the unknown affiliations. This means that those countries can indeed improve their positions in the collaboration network, at least from the point of view of the relationships established with other researchers in the same subject area but in a different country.

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REFERENCES

- Alonso-Gamboa, J. O., & Russell, J. M. (2012). Latin American scholarly journal databases: A look back to the way forward. *Aslib Proceedings*, 64(1), 32-45. <http://dx.doi.org/10.1108/00012531211196693>
- Beel, J., & Gipp, B. (2008). Collaborative document evaluation: An alternative approach to classic peer review. *World Academy of Science, Engineering and Technology*, 41, 409-412.
- Bohannon, J. (2013). Who’s afraid of peer review? *Science*, 342, 6154,60-65. <http://dx.doi.org/10.1126/science.342.6154.60>
- Bollen J., Rodriguez, M. A., & Van de Sompel, H. (2006). Journal status. *Scientometrics*, 60(3), 669-687. <http://dx.doi.org/10.1007/s11192-006-0176-z>

- Bradford S. C. (1934). Sources of information on specific subjects. *Engineering*, 137, 85-86.
- Brin S., & Page L. (1998). The anatomy of a large-scale hypertextual web search engine. *Computer Networks and ISDN Systems*, 30, 107-117.
http://dx.doi.org/10.1016/S0169-7552(98)00110-X
- Cole S., Cole, J. R., & Simon, G. A. (1981). Chance and consensus in peer review. *Science*, 20(214), 881-886.
http://dx.doi.org/10.1126/science.7302566
- Delgado, J. E. (2010). Trends in the publication of refereed journals in Spanish- and Portuguese-speaking Latin America? *Comparative & International Higher Education*, 2, 43-49.
- Delgado Troncoso, J. E. (2014). Scientific journals of Universities of Chile, Colombia and Venezuela: Actors and roles. *Education Policy Analysis Archives*, 22, 34, 1-26.
- Estrada-Mejía, C. & Forero-Pineda, C. (2010). The quest for visibility of scientific journals in Latin America. *Learned Publishing*, 23, 237-252. http://dx.doi.org/10.1087/20100306
- Gannon, F. (2001). The essential role of peer review. *EMBO Reports*, 2(9), 743. http://dx.doi.org/10.1093/embo-reports/kve188
- Godlee, F. (2002). Making reviewers visible: Openness, accountability, and credit. *JAMA*, 287, 2762-2765.
http://dx.doi.org/10.1001/jama.287.21.2762
- Kassirer, J. P., & Campion, E. W. (1994). Peer review: Crude and understudied, but indispensable. *JAMA*, 272, 96-97.
http://dx.doi.org/10.1001/jama.1994.03520020022005
- Khan, K. (2010). Is open peer review the fairest system? No. *BMJ*, 341, c6425. http://dx.doi.org/10.1136/bmj.c6425
- Kowalczyk M. K., Dudbridge, F., Nanda, S., Harriman, S. L., & Moylan, E. C. (2013). A comparison of the quality of reviewer reports from author-suggested reviewers and editor-suggested reviewers in journals operating on open or closed peer review models. *F1000 Posters*, 4, 1252. Retrieved from http://f1000.com/posters/browse/summary/1094564
- Ma N., Guan, J., & Zhao, Y. (2008). Bringing page rank to citation analysis. *Information Processing and Management*, 44, 800-810.
http://dx.doi.org/10.1016/j.ipm.2007.06.006
- Pöschl, U. (2012). Multi-stage open peer review: Scientific evaluation integrating the strengths of traditional peer review with the virtues of transparency and self-regulation. *Frontiers in Computational Neuroscience*, 6, 33.
http://dx.doi.org/10.3389/fncom.2012.00033
- Realman, A. S., & Angell, M. (1989). How good is peer review? *New England Journal of Medicine*, 321, 827-829.
http://dx.doi.org/10.1056/NEJM198909213211211
- Realman, A. S. (1990). Peer review in scientific journals —What good is it? *The Western Journal of Medicine*, 153, 520-522.
- Redalyc (2002). Redalyc: Red de revistas científicas de américa latina y el caribe, espa-a y portugal. Retrieved from http://www.redalyc.org
- Rosvall M., Axelsson, D., & Bergstrom, C. T. (2009). The map equation. *European Physical Journal Special Topics*, 178, 13-23.
http://dx.doi.org/10.1140/epjst/e2010-01179-1
- SciELO (1997). SciELO: Scientific electronic library online. Retrieved from http://www.scielo.org
- Squazzoni, F., Bravo, G., & Takács, K. (2013). *Research Policy*, 42(1), 287-294. http://dx.doi.org/10.1016/j.respol.2012.04.014
- Wagner, C. S. & Leydesdorff, L. (2005). Network structure, self-organization, and the growth of international collaboration in science. *Research Policy*, 34(10), 1608-1618.
http://dx.doi.org/10.1016/j.respol.2005.08.002
- Wagner, C.S. & Wong, S.K. (2012). Unseen science? Representation of BRICs in global science. *Scientometrics*, 90, 1001-1013.
http://dx.doi.org/10.1007/s11192-011-0481-z
- Walsh, E., Rooney, M., Appleby, L., & Wilkinson, G. (2000). Open peer review: A randomised controlled trial. *The British Journal of Psychiatry*, 176, 47-51. http://dx.doi.org/10.1192/bjp.176.1.47

CORRESPONDING AUTHOR

Jesús Rogel-Salazar
Lecturer in Mathematics

Applied Mathematics and Quantitative Analysis, STRI
School of Physics, Astronomy and Mathematics,
University of Hertfordshire
Hatfield, Hertfordshire
AL10 9AB
UK

j.rogel@physics.org