Toward a homogenization of academic social sites: a longitudinal study of profiles in Academia.edu, Google Scholar Citations and ResearchGate

José Luis Ortega

Cybermetrics Lab, Madrid

Abstract

Purpose: The main objective is to analyse the distribution of profiles from academic social networking sites according to disciplines, academic statuses and gender, and detect possible biases with regard to the real staff distribution. In this way, it intends to know whether these academic places tend to become specialized sites or if there is a homogenization process.

Design/methodology/approach: To this purpose, the evolution of profiles of one organization (CSIC, Spanish National Research Council) in three major academic social sites (Academia.edu, Google Scholar Citations and ResearchGate) through six quarterly samples since April 2014 to September 2015 are tracked

Findings: Longitudinal results show important disciplinary biases but with strong increase of new profiles form different areas. They also suggests that these virtual spaces are gaining more stability and they tend toward a equilibrate environment

Originality/value: This is the first longitudinal study of profiles from three major academic social networking sites and it allows to shed light on the future of these platforms' populations.

Keywords: ResearchGate, Academia.edu, Google Scholar Citations, Academic social sites, longitudinal studies

Introduction

Social networks for scientists have recently become an important medium to disseminate open and free scientific outputs because many scholars use this contacts network as a communication channel. This possibility allows to track how these documents are used by the online community, obtaining an immediate feedback on the impact of these results in the web environment (Neal, 2012; Bartling and Friesike, 2014; Ortega, 2016). Due to this, document sharing services such as ResearchGate and Academia.edu, and other profiling platforms such as Google Scholar Citations, are experiencing a strong growth, caused by a massive incorporation of new members from all over the world and every discipline. Thus, ResearchGate has almost doubled its population in just one year (Internet Archive, 2016; ResearchGate, 2016), while Academia.edu is now the biggest academic portal by number of registered users, with more than 46 million of members in December 2016 (Academia.edu, 2016). Google Scholar Citations, in the meantime, has reached more than half million of profiles in less than four years (Ortega, 2015a). This strong addition of researchers to academic social sites in a short time period could have caused that the population of these spaces could be biased and it could not be representative of the real world. Thus, for example, it has been confirmed that Academia.edu is mainly populated by researchers from developing countries (Ortega, 2016) and from Humanities and Social Sciences (Almousa, 2011; Thelwall and Kousha, 2015); Google Scholar Citations has been dominated from the beginning by researchers from Computer Sciences and related fields (Ortega and Aguillo, 2012; Ortega, 2015c); and ResearchGate has shown a higher presence of physicians and biologists (Thelwall and Kousha, 2017). These imbalances could have important implications for the resulting statistics and the meaning of their metrics. Thus, for instance, a clinical paper would have more views, downloads and/or readers, whether the network is exceeded by biomedicine researchers. At the same time, certain profiles would be underperformed because belong to disciplines with a low proportion of users into that network. In other words, the metrics of a profile is determined, to a large extent, by whom are populating the social network site (Bornmann, 2014; Sud and Thelwall, 2014). Therefore it is very important to previously know how these populations are represented in the academic social sites, in order to identify possible biases that would influence the performance of determined metrics.

Related Research

The literature on academic social networking sites has proliferated during the last decade, due to the strong impact that these services are causing in the academic community (Kjellberg et al., 2016). From a sociological view, many studies have analysed the motivations that lead scholars to join to these platforms (Almousa, 2011; Gruzd and Goertzen, 2013; Elsayed, 2016; Jeng et al., 2015) and which benefit they may find (Jordan, 2014a; Van Noorden, 2014). Also, other studies have analysed the adoption rate of these services, finding, in a first moment, low penetrations (Bik and Goldstein, 2013; Mas-Bleda et al., 2014). However, as new studies were done, higher values were observed at the institutional level (Ortega, 2015b; Dafonte-Gomez, et al., 2015; Mikki et al., 2015; Fernandez-Marcial and Gonzalez-Solar, 2015). These studies suggest that we are still in a phase of incorporation of researchers to these platforms. Many other publications have explored how these spaces have been populated and which particularities have these populations. Menendez et al. (2012) described more than 30,000 profiles from Academia.edu, finding a majority of graduate students and western countries' users. Nández and Borrego (2013) observed that the users of Academia.edu are young, mostly lecturers and doctoral students from the social sciences and humanities. Jordan (2014b) pointed that the Open University's members network in Academia.edu rests on Humanities and Social Sciences, and Thelwall and Kousha (2014) exposed the prevalence of human and social scientists over scientific disciplines in this same network. These same authors (Thelwall and Kousha, 2017), with regards to ResearchGate, describe that most of the contents are Biomedicine articles, which could be associated with an important presence of users from that discipline. Fernandez-Marcial and Gonzalez-Solar (2015) also observed that *Natural Sciences* and *Health Sciences* presented the highest presence levels in ResearchGate. On the other hand, many studies have evidenced the overrepresentation of Computer Science's profiles in Google Scholar Citations (Ortega and Aguillo, 2012; 2014; Ortega, 2015c).

Other aspects such as gender and positions have been analysed in these social spaces as well. Thelwall and Kousha (2014) found that the women presence in Academia.edu is lower than the expected in other generalist social networks, suggesting that the scholarly sites reflect scholarly norms for academia rather than general social network site norms. This perception is confirmed by Dafonte-Gomez, et al. (2015) in the case of Academia.edu and ResearchGate and Mikki et al. (2015) in other social spaces, where

the proportion of women is always lower than men. According to academic statuses, Jordan (2014b) analysed the centrality of profiles by their academic position in Academia.edu; Li and Gillet (2013) studied the influence of profiles by academic statuses through the number of readers in Mendeley, and Hoffmann et al. (2016) analyzed the influence of the seniority in the shaping of contacting networks in ResearchGate. In all these cases, the online relationships reproduce the academic hierarchy.

However, the number of longitudinal studies that explores the evolution of academic social sites along the time has been scarce. Rogers (2015) studied ResearchGate comparing two moments: 2013 and 2015. He found that the activity increased in all the aspects. Ortega (2015c) studied the evolution of Google Scholar Citation during a year, observing that the site was taken up by successive waves. Goodwin et al. (2014) studied the evolution of the communication interfaces in ResearchGate and detected that users adapt the use of these interfaces to their needs.

Objectives

This study attempts to longitudinally analyse the evolution of the new profiles of an organization (CSIC, Spanish National Research Council) in three major academic social sites (Academia.edu, Google Scholar Citations and ResearchGate) through six quarterly samples since April 2014 to September 2015. The principal objective is to observe whether these scholarly spaces tend toward a specialize environment, where new profiles come from specific disciplines, positions and gender or, on the contrary, there is a homogenization process in which the proportion of profiles is balanced and similar to the real staff. Several research questions were formulated to detail the objectives of the study:

- How do CSIC's profiles evolve in each academic social network? And which is the most successful service for CSIC staff?
- What is the disciplinary distribution of each academic social network? And how does it evolve?
- What is the distribution of the CSIC academic statuses in each academic social network? And how does it evolve?

- What is the gender distribution of the CSIC's profiles in each academic social network? And how does it evolve?

Methods

A way to observe how an academic social site evolves toward the specialization or, on the contrary, goes to the homogenization is observing the addition of new users along a time period.

Object of study: CSIC

Consejo Superior de Investigaciones Científicas (CSIC) is the largest research organization in Spain, which comprises around 11,000 staff members and more than 120 research institutes and centres (CSIC, 2015). The choice of CSIC for this study was due to:

- Size: Being one of the largest research institutions in the world ensures the obtaining of a wide and statistically representative sample.
- Controlled population: A sample from a specific institution makes easy the retrieval of profiles, the unambiguous identification of users and disambiguating researchers with similar names.
- Multidisciplinary centre: CSIC is divided in 8 research areas, going from Humanities and Social Sciences (Area 1) to Chemical Science and Technologies (Area 8). This allows to ensure the sample is well-adjusted by subject matter and it represents every type of research activity.

CSIC Annual report (CSIC,2015) was used to contrast the figures obtained about gender, position and research area in each academic social site, in comparison with the staff distribution according to these same criteria.

Sources and Data Extraction

This study selected three of the most important academic platforms (ResearchGate, Google Scholar Citations and Academia.edu), because they are representative examples of the current outlook of the academic social sites. Their size in number of users and their impact on the scholarly communication and the research evaluation system are justified reasons to explore their performance. In order to observe the evolution of the

CSIC's population in those sites, five quarterly samples were taken from October 2014 to September 2015. An additional sample from April 2014 was added to these five data sets (Ortega, 2015d). These samples were obtained through several SQL scripts that extracted descriptive information on profiles, as well as their performance indicators. Finally, 7,193 profiles were retrieved form these platforms, belonging to 6,206 authors. Next, data extraction process is detailed by each academic social site:

Google Scholar Citations (GSC) presents a brief curriculum where researchers list their publications indexed in Google Scholar beside to some bibliometric indicators. These profiles are created and edited by the users themselves, so the information on each researcher is optional and written in natural language. This provokes the principal disadvantage of GSC, that is, the hard and tedious task of normalization and identification of affiliations. Three queries were therefore launched to retrieve the largest number of CSIC's researchers: CSIC, "Consejo Superior de Investigaciones Cientificas" and "Spanish National Research Council". In consequence, profiles without this institutional information were not retrieved.

ResearchGate (RG) is a social network site that allows uploading papers, taking part in discussions and following other researchers. RG is the site that most indicators show at author level, going from social measurements (followers, following) and usage metrics (page view, document downloads) to bibliometric indicators (impact points, papers and citations). Authors are optionally able to link with their academic institutions; therefore the Institutions section does not ensure that all researchers from CSIC are actually attached to their organization. For example, 4% of CSIC's researchers are not linked to "Spanish National Research Council". Other problem is that researchers from mixed centres are linked to university. To solve these problems, the three above queries were then launched to retrieve all the CSIC's researchers and to take the widest picture.

Academia.edu is a web platform centred in hosting academic papers that can be shared among their users. Academica.edu allows users to build an own profile along with the list of research outputs uploaded to Academia.edu. This profile is completed with statistics on usage (views) and social interactions (followers/following). As RG, each author profile is assigned to an institution, but in this case the action is

compulsory. All the profiles linked to "CSIC (Consejo Superior de Investigaciones Científicas-Spanish National Research Council)" were then extracted.

Profiles classification and Statistics

Once that profiles were extracted from the academic social sites, they were classified by research area, position and gender. CSIC arranges their institutes in eight research areas. Then each profile was assigned to only one research area through its research institute. Gender of each profile was determined by the surname and the picture of the profile. Finally, six categories were defined to group profiles by their academic status:

- *Doctoral Students*: this category sets pre-doctoral and graduated students.
- *Research fellows*: it includes all post-doctoral fellows: (i.e. Ramon y Cajal, de la Cierva, Marie Curie fellowship, etc.).
- *Research assistants*: technical staff involved in supporting research activities.
- *Scientists (Científico Titular)*: the initial academic category for the scientific staff in the CSIC.
- *Researchers (Investigador Científico)*: an intermediate position between Scientist and Professor.
- *Professors (Profesor de Investigación)*: the highest academic category for the scientific staff in the CSIC.

Compound annual growth rate (CAGR) was used to measure the increase rate of the profiles and their attributes. This formula was considered because it is suitable for models with exponential trends. Thus, V_1 is the initial observation, V_n the final one and n is the number of moments between the first and the last observation. Next, it was converted to percentage:

$$CAGR = \left[\left(\frac{V_n}{V_1} \right)^{\frac{1}{n}} - 1 \right] * 100$$

Results

Next, this section presents descriptive and longitudinal results at the level of research areas, academic statuses and gender of CSIC's profiles in three major academic social sites.

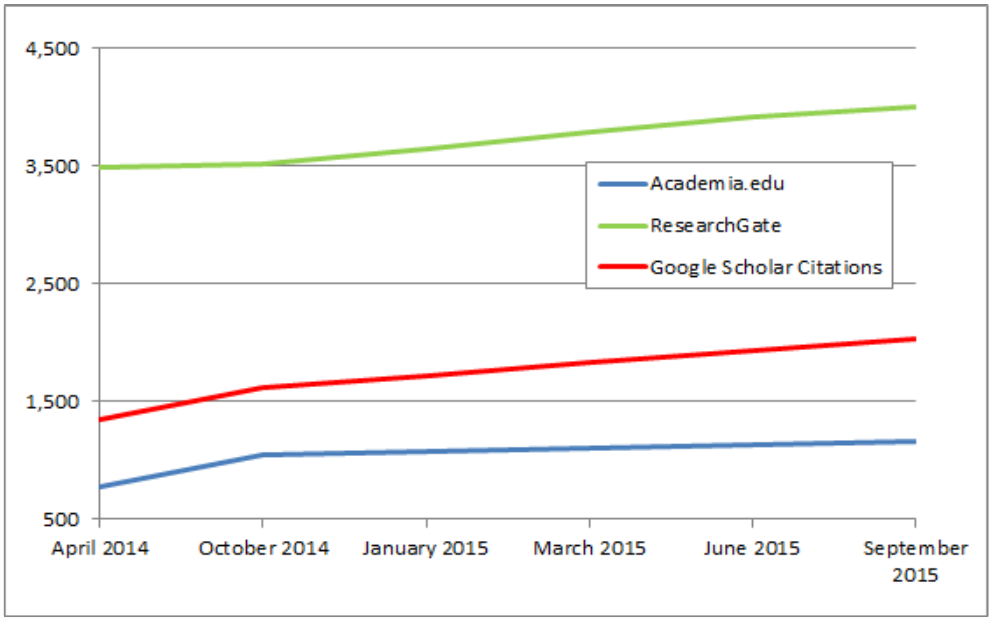

Figure 1. Evolution of the number of profiles affiliated to CSIC that are registered in each academic social site

Academic site	April 2014	October 2014	January 2015	March 2015	June 2015	September 2015	CAGR %	Penetration %
Academia.edu	778	1,045	1,080	1,105	1,136	1,156	32.2	**10.6**
ResearchGate	3,480	3,508	3,641	3,783	3,914	4,001	10.3	**36.6**
Google Scholar Citations	1,342	1,616	1,713	1,825	1,933	2,036	34.1	**18.6**
Total	**5,600**	**6,169**	**6,434**	**6,713**	**6,983**	**7,193**	**19.3**	**53.3**

Table 1. Number of profiles affiliated to CSIC that are registered in each academic social site, annual growth rate and penetration percentage

Figure 1 and Table 1 show the evolution of the number of CSIC's profiles registered in Academia.edu, ResearchGate and Google Scholar Citations. Figure 1 describes a positive increase in the number of profiles in every service, following a linear trend. A slight jump is observed between April 2014 and October 2014 data because this time period is of six months, while the rest ones are of three months.

Overall, the penetration of the academic social networks in the CSIC's staff is rather high (53.3%) and slightly upper than previous studies (Ortega, 2015b) and other organizations (Mikki et al., 2015), which it suggests that the commitment of this organization with the Science 2.0 and social networking is substantial. The services that experience the biggest annual growth is Google Scholar Citations (34%) and Academia.edu (32%), while ResearchGate describes a growth much less pronounced (10%). Even then, these increases are, in general, very elevated and confirm that these

spaces are still attracting a great proportion of users (Ortega, 2016). However, the weak growth of ResearchGate could be explained by its high penetration (36%), with almost the double of profiles than Academia.edu (11%) and Google Scholar Citations (19%), which could cause that the addition of new profiles descends as the site is already populated. Thus, the strong growth of Google Scholar Citations could be also explained by the youth of the service (created in 2011) and that many of CSIC's users are now creating their profiles. In the case of Academia.edu, mainly taken up by human and social scientists, it is possible that new users from different disciplines are incorporating to this platform with more energy. Somehow, these results suggest that some institutions tend to take up academic social sites, firstly, initiating a strong exponential addition of profiles during the first moments, and next following a slow linear incorporation of new members throughout the subsequent years.

Disciplinary evolution

This section details the evolution of the CSIC's profiles from a disciplinary view.

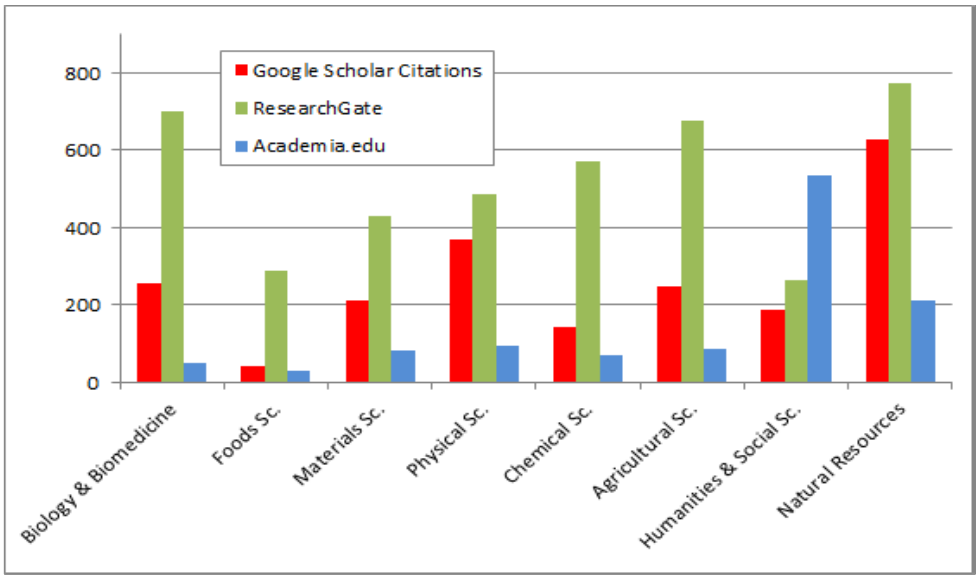

Figure 2. Distribution of number of profiles affiliated to CSIC by research area according to each academic site

Research Area	Total staff	Total staff %	Total profiles	Total profiles %	GSC %	RG %	Academia.edu %
Biology & Biomedicine	2,217	21.52	894	15.32	12.38	16.68	4.40
Foods Sc.	575	5.58	314	5.38	2.02	6.91	2.42
Materials Sc.	1,193	11.58	578	9.90	10.12	10.22	6.99

Physical Sc.	1,263	12.26	730	12.51	17.66	11.63	8.02
Chemical Sc.	1,164	11.30	652	11.17	6.86	13.65	6.04
Agricultural Sc.	1,483	14.39	797	13.65	11.90	16.13	7.51
Humanities & Social Sc.	689	6.69	687	11.77	9.02	6.31	46.25
Natural Resources	1,719	16.68	1,185	20.30	30.04	18.47	18.38
Total	**10,303**		**5,837**				

Table 2. Percentage of profiles in each research area by academic site

Figure 2 and Table 2 show the disciplinary distribution of profiles in each academic site. As it was said before, CSIC's institutes are arranged in eight principal research areas, which it makes possible the thematic classification of profiles according to this disciplinary organization. Table 2 displays the proportion of researchers in each research area in comparison with the same distribution in each academic site. In this form, it is possible to observe biases in the population of these academic social sites. Thus, for example, the proportion of academic staff in *Biology & Biomedicine* is 21.5%, while only 15.3% of these employees have a profile in these academic social networks. On the other hand, *Natural Resources* are 16.7% of the CSIC's staff, but they are 20.3% in these academic social sites. This allows to specify that, in general, *Biology & Biomedicine*'s users are less prone to use social networks (21.5% of total staff vs. 15.3% of profiles) than colleagues from *Humanities & Social Sciences* (6.7% of total staff vs. 11.8% of profiles) and *Natural Resources* (16.7% of total staff vs. 20.3% of profiles).

In detail, these percentages also describe the introduction of these academic spaces by scientific research areas. Thus, Google Scholar Citations presents a higher proportion of users from *Physical Sciences* (17.7% in GSC vs. 12.5% of total profiles) and *Natural Resources* (30% in GSC vs. 20.3% of total profiles) than from *Chemical Sciences* (6.8% in GSC vs. 11.23% of total profiles) and *Food Sciences* (2% in GSC vs. 5.4% of total profiles). According to ResearchGate, *Humanities & Social Sciences* is the worst represented area (6.3% in RG), while *Chemical Sciences* (13.6%) and *Agricultural Sciences* (16.1%) are those that have the highest proportion of scholars in ResearchGate. However, Academia.edu is the service that describes the largest disciplinary bias, because 46.2% of the profiles only come from *Humanities & Social Sciences*.

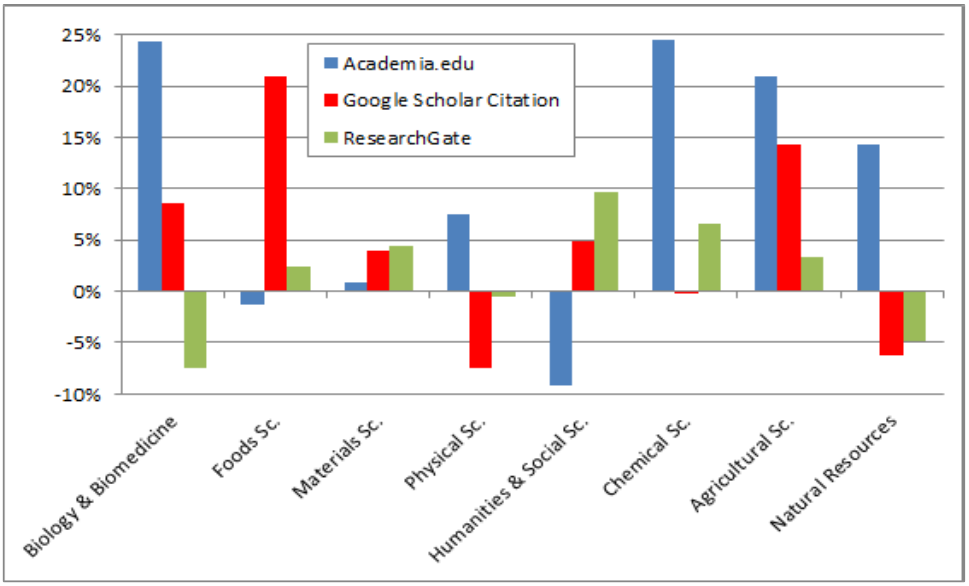

Figure 3. Percentage of annual growth of profiles in each research area by academic site

Once analysed the disciplinary distribution of profiles in each site, it was calculated the compound annual growth rate (CAGR) of each research area in the three academic social sites. This formula was calculated on the percentages of each research area along the successive samples. This allows to observe if the thematic evolution of each platform tends toward specialization, that is, differences among areas increase even more or, on the contrary, the observed biases tend to be reduced, reaching a homogenization state. Thus, for example, in the case of Academia.edu, every discipline constantly incorporates new users, highlighting *Chemical Sciences* (24.5%) and *Biology & Biomedicine* (24.4%). Surprisingly, *Humanities & Social Sciences*, the research area that supplies the most amount of users to the platform (46.2%), reduces the addition of new members (-9.2%). In the case of Google Scholar Citations, the situation is similar. *Physical Sciences* (-7.4%) and *Natural Resources* (-6.2%), the disciplines with the highest number of profiles in Google Scholar Citations, are also the research areas that less new users come during this period; while *Foods Sciences* (20.9%) and *Agricultural Sciences* (14.3%) are now the disciplines that most increase the number of new profiles. According to ResearchGate, *Humanities & Social Sciences*, the area with worst coverage, grows now with the most strength (9.7%). These results demonstrate that the new incorporations come from the disciplines less represented and therefore it is possible that these platforms move toward a steady scenario in which the distribution of profiles is more equilibrated and similar to the real proportion of academic staff, at least thematically.

Positions evolution

Another important aspect with regard to the evolution of these platforms is the age of their users and to observe if there is any difference in the use of these platforms according to the academic juniority/seniority of their users. The academic position of each profile is used as a proxy to describe the scholarly age of their users. The academic position of only 4,427 (71%) profiles could be identified.

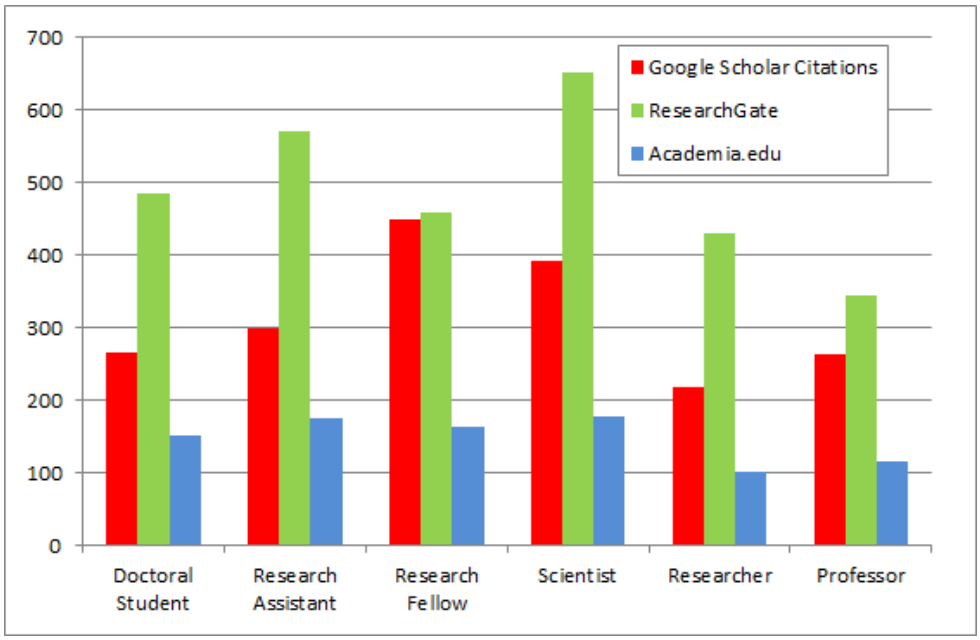

Figure 4. Distribution of number of profiles affiliated to CSIC by academic position according to each academic site

Position	Total profiles	Total profiles %	Google Scholar Citations %	ResearchGate %	Academia.edu %
Doctoral Students	720	16.26	14.03	16.49	17.06
Research Assistants	931	21.03	15.88	19.38	19.66
Research Fellows	787	17.78	23.77	15.61	18.53
Scientists	900	20.33	20.80	22.14	20.11
Researchers	553	12.49	11.54	14.65	11.53
Professors	536	12.11	13.98	11.73	13.11
Total	**4,427**				

Table 3. Percentage of profiles by academic position in each academic social site

Figure 4 and Table 3 present the distribution of profiles according to their academic statuses on each social site. In this case, the Annual report (CSIC, 2015) does not

present any distribution of staff positions, so it was not possible to contrast the proportion of users regarding the full staff. However, the observed distribution is rather balanced and it suggests that the proportion of profiles could be similar to the real staff distribution, emphasizing the high proportion of *Research Assistants* (21%) and *Scientists* (20.8%), in contrast to *Researchers* (12.5%) and *Professors* (12.1%), the less frequent categories. According to each academic platform in particular, results show that there are not important differences among sites. For instead, Google Scholar Citations has a high proportion of *Research Fellows* (23.8% in GSC vs. 17.8% of total profiles), while the number of *Research Assistants* is much lower (15.9% in GSC vs. 21% of total profiles). It is possible that this elevated proportion of *Research Fellows* could be due to these young scholars are initiating their academic careers and they are looking for new job vacancies. Then, it is possible that they understand that this service is a proper showcase for promoting their starting curriculum. In the case of ResearchGate, there is a higher proportion of *Scientists* (22.1% in RG vs. 20.3% of total profiles) and *Researchers* (14.6% in RG vs. 12.5% of total profiles), which it means that senior scholars have a greater presence on ResearchGate than in other platforms. Finally, Academia.edu shows a less defined pattern and, in the manner of Google Scholar Citations, it also presents a higher proportion of *Research Fellows* (18.5% in Academia.edu vs. 17.8% of total profiles). These results are in line with Menendez et al. (2012) which found more starting scholars than senior ones.

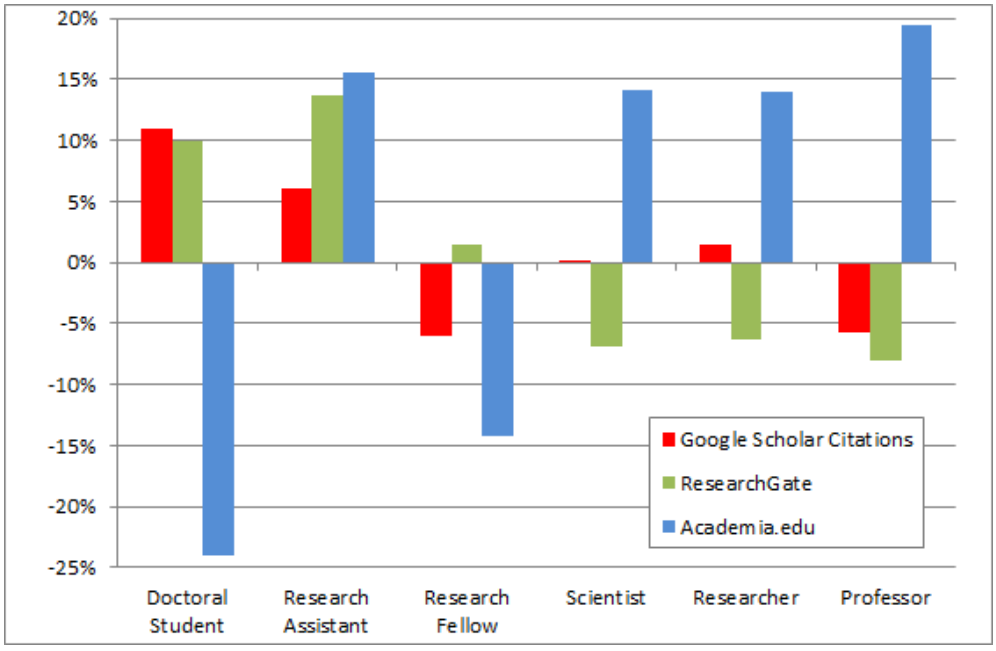

Figure 5. Percentage of annual growth of profiles in each academic position by academic site

According to the evolution of new academic statuses, Figure 5 displays two differentiated patterns. On the one hand, Academia.edu describes a strong imbalance in the evolution of scholarly positions, with more than 40 percentage points between *Professors* (19.4%) and *Doctoral Students* (-24%). Besides this, the Academia.edu's case describes an important increase of senior positions (*Scientists*, *Researchers* and *Professors*), while young statuses (*Doctoral Students* and *Research Fellow*s) are falling down their participation. This situation shows an important incorporation of established researchers. On the other hand, ResearchGate describes an opposed pattern, the categories that more increase in this space correspond to young researchers (*Doctoral Students*, *Research Assistants* and *Research Fellows*), while the older positions (*Scientists*, *Researchers* and *Professors*) reduce their presence in the network. Unlike Academia.edu, these results suggest that ResearchGate has a deficit of young scholars that it is being adjusted. Finally, Google Scholar Citations displays an irregular pattern, closer to ResearchGate than Academia.edu, in which the types of academic statuses that grow most are *Doctoral Students* (11%) and *Research Assistants* (6%).

Gender evolution

Finally, this section attempts to analyse differences in the use of these platforms according to the gender of the CSIC's researchers. The gender of 5,564 (89.6%) profiles was identified through the first name and the picture of the profile.

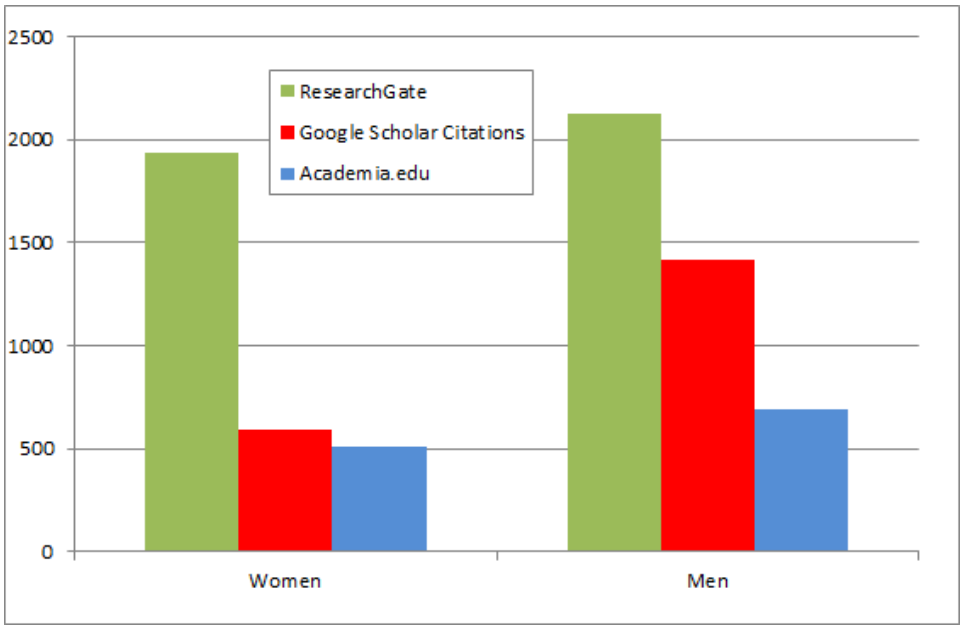

Figure 6. Distribution of number of profiles affiliated to CSIC by gender according to each academic site

Gender	Total staff	Total staff %	Total profiles	Total profiles %	Google Scholar Citations %	ResearchGate %	Academia.edu %
Female	5,277	49.54	2,475	44.48	29.37	47.71	42.24
Male	5,374	50.46	3,089	55.52	70.63	52.29	57.76
Total	**10,651**		**5,564**				

Table 4. Percentage of profiles by gender in each academic social site

Figure 6 and Table 4 present the number and percentage of females and males in each academic social site. In general, the presence of male profiles (55.5%) is slightly greater than female ones (44.5%). This unbalanced proportion could be caused by the real distribution of scientific staff in the CSIC, and not by a greater attraction of males for academic social sites. The last data on gender distribution demonstrate that there are much more males (64.7%) employed in the CSIC than females (35.3%) (Mujeres y Ciencia, 2015). The fact that this proportion is better adjusted for profiles than for the staff, suggests that females are more proactive to use academic social networks (Joinson, 2008; Jones et al., 2008; Tufekci, 2008). These initial differences in the staff could affect the general distribution of scholarly profiles in the social networking sites. Thus, observing in detail each academic platform, it is surprising the disproportionate distribution of females (29.4%) and males (70.6%) in Google Scholar Citations, with almost one woman per each three men. Meanwhile, ResearchGate and Academia.edu

also present more males than females, but these proportions are closer to the staff distribution. The significant imbalance in the case of Google Scholar Citations was already observed by Ortega (2015a) and it could be due to this service has more users from research areas where men are predominant (Computer Science, Engineering, etc.) (Blickenstaff, 2005; Leslie et al., 2015).

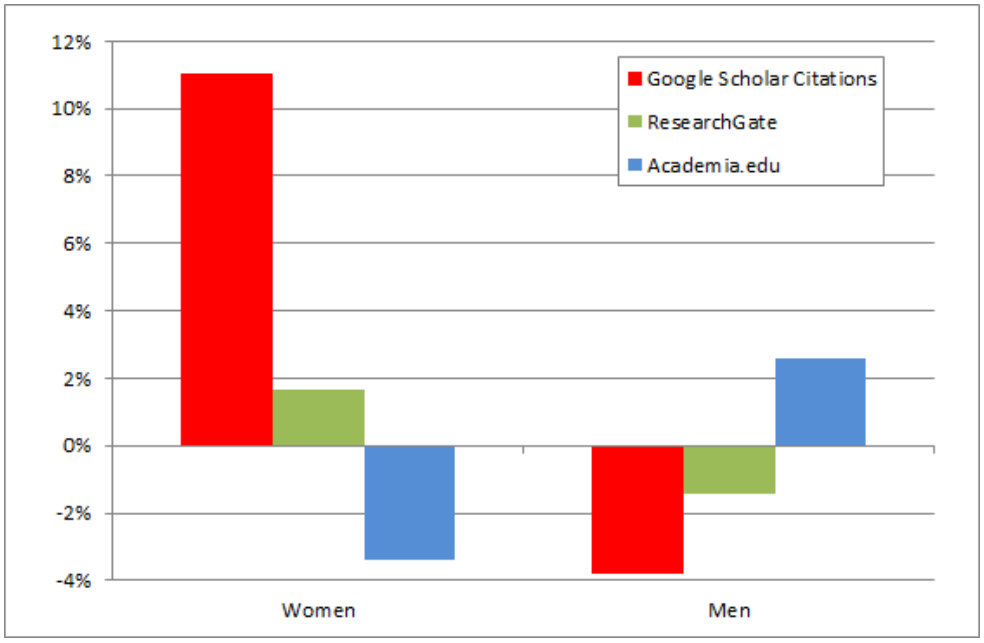

Figure 7. Percentage of annual growth of profiles of each gender by academic site

With regard to the evolution of new profiles of females and males in these academic social sites, Figure 7 shows that while Google Scholar Citations (11%) and ResearchGate (1.7%) increase the presence of females, Academia.edu (-3.4%) is reducing the number of new females in favour of males. As it happens with the disciplinary distribution, the strong increase of female profiles in Google Scholar Citations is due to the chronic absence of these profiles. Thus, in 2013, the proportion of females was around 15% (Ortega, 2015b) and now this same proportion has increased up to 29.4%.

Discussion

The longitudinal analysis of the evolution of CSIC's users in the three main academic social spaces has brought a range of interesting results on the use of these platforms. The first one is that these populations start from very unbalanced scenarios, more pronounced in the disciplinary distribution. In this way, Academia.edu presents a high

proportion of users from Humanities and Social Sciences, widely corroborated by Nández and Borrego (2013), Thelwall and Kousha (2014) and Ortega (2016); Google Scholar Citations rests on a Computer Science core (Ortega and Aguillo, 2012; Ortega, 2015b) and ResearchGate tends to favour the presence of biomedicine profiles (Rogers, 2015; Ortega, 2016). However, the successive samples describe a gradual process toward the homogenization of these sites. That is, the distribution of users by disciplines, gender and position tends to show similar figures to the real world. In this way, disciplines with a low weight considerably increase their presence, while overrepresented disciplines diminish the addition of new members. Thus, Academia.edu, where almost the half of their CSIC's users comes from *Humanities & Social Sciences*, precisely experiences an important drop in these research areas (-9.2%), while the remaining ones grow in a considerable way. Google Scholar Citations presents a similar pattern, *Physical Sciences* (-7.4%) and *Natural Resources* (-6.2%), the disciplines with the highest number of profiles in Google Scholar Citations, are those that reduce, to a greater extent, the addition of new profiles. To a lesser extent, ResearchGate also describes this behaviour, although it departs from a much more adjusted scenario. This pattern is also observed with regard to gender, although with much less intensity. Thus, for example, Google Scholar Citations is the platform that most increases the addition of new females (11%), motivated by the chronic deficiency of women in this service (29.4%). However, ResearchGate and Academia.edu do not show an excessive imbalance in the proportion of men and women, so their growth rates are small and less significant. It is possible then that the strong women's absence in Google Scholar Citations could be caused by a disciplinary reason because the research areas with a larger number of profiles are traditionally taken by men (i.e. Physical Sciences, Engineering). Nevertheless, the distribution of academic positions is rather balanced on the three platforms, fitting with the total staff. This suggests that there is not any bias in the distribution of users by statuses and it refutes the belief that these spaces are more attractive to young scholars than senior professionals. Nández and Borrego (2013), for example, observed that Academia.edu is taken up by young, mostly lecturers and doctoral students; and Nentwich and König (2014) suggested that these spaces are more attractive to young scholars. In this form, these results let to state that the population biases are only important at disciplinary level, while gender and academic positions are weak factors that little influence on the shaping of these populations. These results allow to think, at least from a disciplinary view, that

academic social sites, in an initial stage, are greatly biased toward specific research areas. But, as the time goes by, these imbalances are adjusted with the incorporation of users from all the academic world.

This homogenization and stability in the distribution of profiles of the academic social sites have important implications for research evaluation and altmetrics. This trend toward an equilibrium ensures that these spaces are representative of the real academic world and the analysis of profiles, disciplines, organizations, etc., can be comparable and extensive to the real scientific structure. One of the limitations of altmetrics is that their indicators strongly depend on the site that generates their metrics (Bornmann, 2014; Sud and Thelwall, 2014; Ortega, 2015e). In this way, a network with an excessive proportion of biologists, for example, would produce metrics that overestimate the performance of these users at expense of other disciplines' users. Thus, the number of readers, views or followers of this type of users could be higher than other ones, because only profiles of biologists would be visited, read or followed. This fact has been specifically observed in Academia.edu (Thelwall and Kousha, 2014) and at less extent in other academic social sites (Ortega, 2015e). Due to this, it is very important that these spaces present equilibrated and representative populations that produce reliable and robust metrics. A homogeneous population, therefore, ensures that these metrics are not biased, permitting the comparison and ranking of disciplines, organizations or countries.

One of the most important limitations of this study is that these results are exclusively based on profiles from one organization and they could only express the growing pattern of a specific institution into academic social sites. It is possible that this equilibrium phase occurs at different moments for different institutions. Thus, organizations with an important number of profiles since a long time ago could reach now this phase, while other ones would still describe serious imbalances in their populations. In this way, new studies that track the evolution of profiles from one or various organizations would be welcome to compare and test these results (Mikki et al, 2015; Kjellberg et al., 2016). Another important limitation is the possible assignment errors, mainly according to gender. The use of the surname (there are names both for males and females) and the profile's picture (some profiles do not have one) is not enough to confirm the gender of the researcher, then it is possible that there are some false positives in the gender distribution.

Conclusions

Several conclusions were brought from the obtained results.

ResearchGate is the platform that most CSIC's profiles has (4,001), far from Google Scholar Citations (2,036) and Academia.edu (1,156). However, Google Scholar Citations (34.1%) and Academia.edu (32.2%) are the sites that most increase their populations, evidencing that these last platforms are still in process of consolidation.

Disciplinary distributions are the most unbalanced aspect of each academic social site and they are the characteristic that most distinguish academic platforms. Thus, results show that Academia.edu is preferred by human and social scientists (46%), Google Scholar Citation by Physical Sciences (18%) and Natural Sciences (30%) users and ResearchGate by biology and biomedicine researchers (17%). However, the growing rates describe a continued increase of the less represented disciplines, which confirms that these spaces are reaching a continuing equilibrium, almost for CSIC's profiles.

According to academic positions, the distribution is rather homogeneous in all the sites and it only worth mentioning that Academia.edu and Google Scholar Citation contain little more young scholars who are starting their careers. Nevertheless, Academia.edu shows a very strong incorporation of senior researchers, while ResearchGate is recruiting more early career researchers.

Finally, the distribution of profiles by gender does not display strong differences, except in the case of Google Scholar Citations, where men predominate over women (Women=29%). However, the longitudinal data shows an elevated incorporation of women (11%) and it predicts a soon compensation of this imbalance.

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