Picking the best publications to showcase graduate courses: Do institutional mechanisms reinforce gender differences?

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ABSTRACT
Previous studies performed by our research group have brought to light the concept "scientific capital" developed by Bourdieu to characterize the vertical segregation framework in Brazilian science, specifically Brazilian graduate programs, which is the main piece of the country's S&T system. The present study still focuses on gender differences in Brazilian graduate programs but it turns attention to their institutional assignments. Among all information sent annaually to Capes evaluation process, heads of graduate programs have to send the top five publications of the year. Considering the institutional relevance of this set of publications, the present study aims to identify whether an institutional mechanism, as the choice of the best publications of the graduate program by the heads, promotes gender equality or reinforces discrepancies in Brazilian academia. Preliminary results, performed upon official data of teacher-researchers performance affiliated to Federal University of Rio de Janeiro, suggest that males rather than females more are more represented in this selective set of publications.

INTRODUCTION
Some decades ago, we have witnessed the flourishing of a new field of knowledge devoted to gender studies in science activities, generally called "women in/and science" or "gender in/and science". In recent years, this field has displayed both an impressive growth in the number of scientific publications and a diversity of areas involved on it (Dehdarirad, Villarroya & Barrios, 2015).

In the social science literature on women and science issue, the identification of social and institutional factors involved in the success of men and women in scientific careers appears as one of its main targets (Schienbinger, 2001). In line with this approach are the studies on author productivity that, despite the lack of a consensus, mostly reveal an uneven scene between men and women, where men usually present higher rates of papers and citations (e.g., see Long, 1992; Prpić, 2002; Larivière et al., 2013). Such gender differences in productivity may represent a disadvantage for women and, consequently, for their career advancement (e.g., see Long, Allison & McGinnis, 1993; van Arensbergen, Weijden & Besselaar, 2012).

Previous studies developed by Leta's research group (Leta et al., 2013; Olinto & Leta, 2015) have brought to light the concept "scientific capital" developed by Bourdieu (1997) to

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characterize the vertical segregation framework in Brazilian science, specifically the graduate programs, which is the main piece of the country's Science and Technology (S&T) system. The goal was to map whether different academic tasks were evenly distributed between male and female teacher-researchers, that is, those affiliated to a Brazilian graduate course. Considering the complexity of graduate programs environment, the expectation was to find Brazilian male teacher-researchers showing higher burdens of time consuming in tasks, who promote and reflect higher levels of "scientific capital", such as publishing in top-ranked journals.

It is important to highlight that there is a strong inter-relationship between Brazilian graduate programs and S&T activities. Since the beginning of the 1990's, graduate programs are regularly evaluated by Capes, an agency of the Ministry of Education. Different indicators are considered in this evaluation but, depending on the field of the graduate program, the number of publications (especially with international visibility) is the main criterion for getting the higher grades in the evaluation. In this scenario, Brazilian teacher-researchers have to cope with both their workaday roles (e.g., teaching undergraduate and graduate courses) and with the pressure to publish original research.

The present study still focuses on gender differences in the Brazilian graduate programs but it turns attention to their institutional assignments. Every year, heads of graduate programs are required to organize and send to Capes hundreds of academic and scientific information related to each different tasks performed by teacher-researchers who are under their responsibility. The quality and reliability of the whole set of information sent to Capes may result in a higher grade for graduate programs, which in turn means higher amounts of resource for the program. Among the information sent to Capes are the best five publications of the year, which are expected to be representative of the performance of the whole staff during the year. In most of the cases, the decision to choose the best five publications is the sole responsibility of the heads of graduate programs.

Considering the institutional relevance of this set of publications, the present study tackles the following research question: How are male and female teacher-researchers featured in the best publications of graduate programs? Thus, the study aims to identify whether an institutional mechanism (i.e., the choice of the best publications of the graduate program), promotes gender equality or reinforces discrepancies in Brazilian academia. Preliminary results from this first essay suggest that program heads tend—consciously or not—to indicate more male-authored publications. Nevertheless, such observation needs to be corroborated with some additional analyses.

METHODS

As input of a document analysis technique, the main source of information was a form named "PB - Produção Bibliográfica," which contains the list of all publications published in a given year as well as the indication of the five best publications per program. This form (one out of 11 in total) is an official document elaborated by Capes and it is part of the set on documents that each graduate program is required to submit to Capes for the annual evaluation process. All forms are accessed through the following URL: http://conteudoweb.capes.gov.br/conteudoweb/CadernoAvaliacaoServlet.

For the present study, we downloaded the PB forms available in PDF format for 91 programs in 2009 and 100 programs in 2012 registered by Federal University of Rio de Janeiro (UFRJ,

short name in Portuguese). UFRJ is the oldest and largest public university in Brazil supported by funds from federal government. We then extracted the text of the best five publications appearing under the "Trabalho Completo - Qualis" headings. We focused our attention on the first author of each of these publications addressed as "docente" (Portuguese word for teacher). About 700 teacher-researcher names (i.e., *docentes*) were then identified in the bibliographic entries.

A particular difficulty for this study — as in all studies about women in science — is the availability of information about the scientist's sex. The PB-form does not mention the author's sex of best publications. In addition, the PB form identifies authors by their linkage to the graduate program and only those identified as "teacher" where considered. Eventually, each "teacher" was manually tagged with a sex based on the annotator's knowledge and on information provided online (e.g., Lates CV, personal webpage). We were unable to identify the sex of teachers in 15 best publications only (8 in 2009 and 7 in 2012).

Information about the grade of each graduate program awarded by Capes in 2009 and 2012, as well as about the type of publication was also added (semi-automatically) to the original file.

After data cleaning and duplicate removal, data on 90 and 97 graduate programs and 366 and 384 best publications in 2009 and 2012, respectively, were the basis for this case study, since they refer to a single institution, the UFRJ. It's noteworthy that data for 2009 and 2012 are available online and refer to the last years of the Capes triennial evaluation processes; 2015 is not yet available.

RESULTS

Among the 735 best publications of UFRJ's graduate programs (those which had the identification of author's sex, the teacher), 60.4% are authored by men as first "docente" author (n = 444) and 39.6% by women as first "docente" author (n = 291). The same distribution is found when the year of the best publications is considered (Table 1).

When checking the total amount of male and female teacher-researchers registered at UFRJ's graduate programs in 2009, the distribution is as follows: 56.5% men (n = 1,318) and 43.5% women (n = 1,016). Although it is not the best comparison, the distribution of total amount of male and female among graduate programs' staff suggests that women are slightly underrepresented among the authorships in the set of publications classified as the "best" of graduate programs.

Table 1: Number and percentage of male and female teacher-researchers as authors in the best publications of UFRJ's graduate programs, 2009 and 2012.

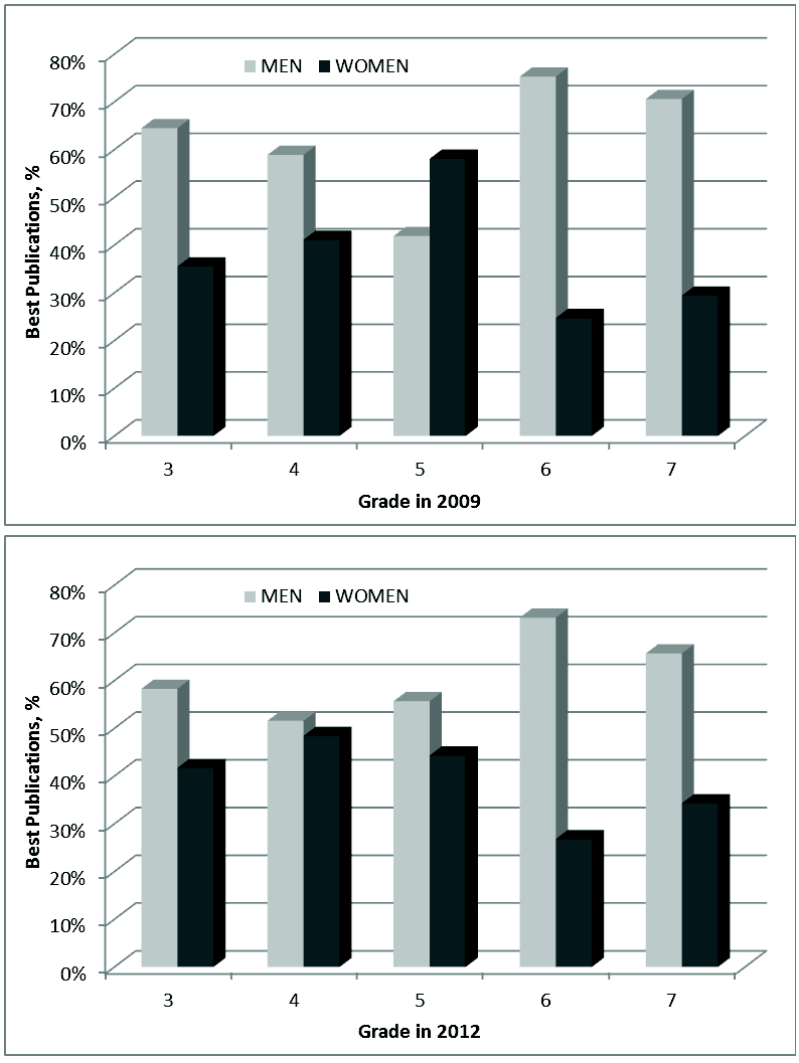
Gender	2009	2012	Total	2009 (%)	2012 (%)
Men	218	226	444	60,9	59,9
Women	140	151	291	39,1	40,1
Total	358	377	735	100,0	100,0

The 90 and 97 UFRJ's graduate programs registered in Capes in 2009 and 2012, respectively, were evaluated according to their academic and scientific performance in the respective year.

The grades were recorded in a scale from 3 to 7. Usually grade 3 is granted to younger programs. Along the evaluation period, it is expected that all the newest programs reach higher grades as far as grades 6 and 7, which are granted to more established programs with highest performance.

The share of male and female teacher-researchers in the best publications of UFRJ's graduate programs considered also the grade of the program he/she were linked to, as it is shown in Figure 1. A first insight is that, with the exception of year 2009, grade 5 programs, the chance to have a female-authored publication among the best publication is always lower than a male-authored. This chance increases among lower grade programs but it reduces dramatically among the programs with the highest performance, that is, among grade 6 and 7 programs.

Figure 1: Percentage of male and female teacher-researchers as first "docente" authors in the best publications of UFRJ's graduate programs by Capes performance grade,2009 and 2012



Considering only grade 7 programs, women-authored publications (as first "docente" in the byline) represent about 30% of all best publications. The eleven graduate programs included,

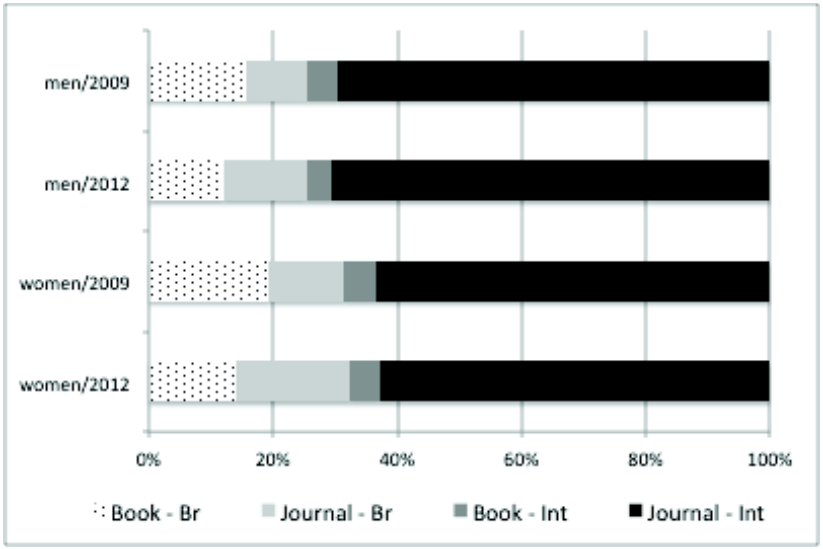
in 2009, in this very selective set of programs featured 459 teacher-researchers, 154 of which were women (33.4%). However, five out of the eleven programs were in engineering, an area where women are ever underrepresented. Together these programs summed 171 teachers, being 21 women (12.3%).

Hence, although Figure 1 points to an underrepresentation of women as first "docente" authors of the best publications, it seems indeed that the share of women in this set of publications is in accordance to the share of women among the whole staff of teacher-researchers linked to UFRJ's grade 7 programs.

A final aspect investigated in the 735 best publications of UFRJ's graduate programs was the type of publications. Each publication was classified into one of the four main groups: (1) book or chapter edited in Brazil, (2) book or chapter edited abroad, (3) article published in a Brazilian journal and (4) article published in an international journal. The expectation in performing this analysis was to observe whether the most relevant publications of male and female teacher-researchers have similar or different targets in terms of venues, readership, and visibility.

The distribution of each type of publication among male and female teacher-researchers total publications in 2009 and 2012 is shown in Figure 2. As it can be seen, independently of the sex of the "teachers," the most relevant publications of UFRJ's graduate programs are articles published in international journals. In other words, the choice of the best publications prioritises publications geared to peers abroad for both males and females. Such trend may be a result of Capes annual evaluation, which increasingly incentivises Brazilian scientific community to publish in international journals (Leta, 2012).

Figure 2: Distribution (%) of publication type by male and female teacher-researchers as first "docente" authors in the best publications of UFRJ's graduate programs, 2009 and 2012



Although data apparently suggest a uniform performance in terms of types of publication indicated to male and female teacher-researchers by the heads, a more detailed look in the data indicates a slight tendency for men to increase the share of articles in international

journals. On the other hand, women tend to increase the share of articles publish in Brazilian journals.

DISCUSSION

Considering the research question "how are male and female teacher-researchers represented in the best publications of graduate programs?", the set of preliminary results shown in this paper suggests that males rather than females are increasingly represented as first "docente" authors in this selective set of UFRJ's publications. Since the choice behind picking the best publications is mostly a decision of the head of graduate program, this institutional decision is, apparently, reinforcing gender discrepancies in our case study, UFRJ's graduate programs.

Nevertheless, we do believe such an observation needs to be corroborated with some additional analyses, for instance: to compare the ratios of male and female both in the best five publications and in the total corpus of authored papers of the UFRJ graduate programs. Other complementary analysis would be to assign 1/n authorship credit to each author that is, to proceed a fractional counting.

Next steps include the development of these analyses, as well as others to better characterize the top five publications (such as the impact factors of journals). Our aim is to provide a better understanding of the rationale behind how these publications are picked. To the best of our knowledge, this specific dataset has not been studied in women in science studies to date. Hence, although it deals with Brazilian academia only, its originality may bring new insights about institutional mechanisms that push vertical segregation, forcing women to assume mostly the periphery in Brazilian science.

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