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What's in a number? How (and why) measuring research productivity in different ways changes the gender gap

Lynn P. Nygaard ^{a, b, *}, Karim Bahgat ^a^a Peace Research Institute Oslo (PRIO), PO Box 9229 Grønland, 0134 Oslo, Norway^b Institute of Education, University College London, 20 Bedford Way, London, WC1H 0AL, UK

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ABSTRACT

A persistent finding in studies of research productivity is the 'gender gap', where men seem to publish more academic research than women. However, this gap varies widely from study to study, and little has been done to explore how these claims might be sensitive to what is being measured and how. Using a dataset of publications statistics spanning five years for a Norwegian social science research institute, this paper looks at how (and why) measuring productivity in different ways provides different pictures of the gender gap. Based on the situated context of the institute, we also disaggregate the data by staff category, methodological orientation, and language background, and consider the impact of leaves of absence. We find widely varying measures of the gender gap depending on how we measure and disaggregate, and argue that different bibliometric indicators capture different aspects of research performance, including diversity of output and collaboration, which reflect different publication practices that are both gendered and situated. We suggest that looking at academic writing as a situated - and gendered - social practice offers a potential for deriving more theoretically consistent explanations for both the seeming persistence of the gender gap and the wide contextual variations.

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1. Introduction

For researchers around the world, excellence in academic writing, or 'research productivity', is usually measured by success in academic publishing, particularly publication in international (English language) scholarly journals. A tremendous amount of research has been carried out on productivity using bibliometric indicators (statistical measures of publications output, citations, or both). One persistent finding over the last 40 years is a gender gap: not only do men seem to produce more publications than women, but men are over-represented among the top producers (so-called research stars, see e.g., White, James, Burke, & Allen, 2012) and women are over-represented among the low or non-producers (those who produce little or no published research) (see, e.g., Creamer, 1998; Kweik, 2015). This is often referred to as the 'productivity puzzle,' based on the observation that the gender gap seems to persist despite increasingly progressive attitudes about women in science (Cole & Zuckerman, 1984, pp. 217–258; see Thieme and Bahgat this issue).

To be sure, much has changed since Cole and Zuckerman's landmark study and Creamer's 1998 review of the literature, and the picture is now far more complex. Van Arensbergen, Weijden, and Besselaar (2012), for example, find evidence that the

* Corresponding author. Peace Research Institute Oslo (PRIO), Hausmanns gate 3, 0186 Oslo, Norway.

E-mail addresses: lynn@prio.org (L.P. Nygaard), karim.bahgat.norway@gmail.com (K. Bahgat).

gender gap has disappeared in the younger generation of (social science) researchers – and where any gap exists, women seem to outperform the men. However, the bulk of the current research still suggests that men produce more than women, although there appear to be big differences in this gap depending on context. Geographical location seems to make a substantial difference in how much women produce relative to men (Aiston & Jung, 2015; Frietsch, Haller, Funken-Vrohling, & Grupp, 2009; Padilla-Gonzalez, Metcalfe, Galaz-Fontes, Fisher, & Snee, 2011). In Norway, where this study takes place, both Bentley (2009) and Rørstad and Aksnes (2015) find academic rank (staff category) to be a stronger predictor of productivity than gender.

Disciplinary differences in the relative performance of men compared to women are evident not only between the natural sciences, humanities, and social sciences, but also within disciplinary subfields (Rørstad & Aksnes, 2015). Within the social sciences (the disciplinary location of the institution in this study) Bird (2011), for example, finds significant differences between social science disciplines in the UK, with women's contributions particularly low in political science (the main discipline represented in this study). Evans and Bucy (2010) find that women's productivity is much lower than men's in sociology, economics, and political science.

Men and women in the social sciences also seem to differ with respect to concrete publication practices, not just in the amount produced. Using journals as the unit of analysis, Evans and Bucy (2010) find that in the social sciences women publish more qualitative research than men, and men are twice as likely to publish a quantitative article. In the field of international studies, Hancock, Baum, and Breuning (2013) found gendered differences related to research focus (where women were more likely to publish in newer subfields), methodological orientation (men are more likely to publish quantitative research); type of output (men are more likely to author books, but no gender differences in publication of book chapters or non-peer reviewed publications).

These different publication practices raise questions about what exactly is measured in a productivity indicator. Although 'productivity' may sound like a neutral and unambiguous term, it is difficult to both define and measure and there may be a mismatch between the way individual authors conceptualize their own productivity compared to the way in which it is measured in their institutional environment (Nygaard & Bellanova, 2018). Outputs that are valued in one context are considered irrelevant in another; textbooks, reports, and popular scientific dissemination are all examples of research outputs that are valued differently in different contexts. Moreover, an indicator is only as reliable as the data that goes into it (see, e.g., Kyvik, 1990; Xie & Shauman, 1998 for a discussion on the difficulty of acquiring high-quality data); while some research-producing environments regularly collect data on a wide range of outputs, others collect data only sporadically, or rely on the commercial databases (such as Web of Science, Scopus, or Google Scholar) that focus mainly (if not exclusively) on English-language journal articles. Thus, productivity scores are less a simple measure of scholarly activity and more a reflection of which outputs are considered desirable within the context, and more importantly, feasible to measure. For these reasons, most studies on productivity rely on journal article publication as a sole indicator of productivity, although a notable few take into account additional outputs, such as book chapters (e.g., Aiston & Jung, 2015; Kyvik (1990)) or patents (Frietsch et al., 2009).

The question that we address in this paper is whether the size (or even existence) of the gender gap in productivity depends on how productivity is conceptualized and measured – that is, what is counted and how it is counted. Our reasoning is that if writing practices are situated (varying across disciplines, methodological orientations, countries, or institutions), and if academic writing is a gendered social practice where women are concentrated in different demographic groups than men, then the gender gap can be expected to vary depending on the composition of the sample and what is captured by the indicator used (Cameron, Gray, & White, 2013). By analyzing a dataset of publications statistics spanning five years for all researchers within a single Norwegian research institute in the social sciences, we consider how measuring productivity in different ways affects the resulting account of the gender gap.

After presenting a theoretical framework of academic writing as a situated and gendered social practice, we describe the context of the study site, how productivity is conceptualized and measured in Norway, and how this provides the backdrop for our approach to exploring the bibliometric data. Our findings demonstrate some relatively large differences in the reported gender gap depending on the specific indicator used and how the data is disaggregated. Overall, we find that women's measured productivity increased relative to men's when leaves of absence are controlled for, and when the indicators include a wider range of publications (more than just journal articles), fractionalize for co-authorship, and do not add a bonus for publication in high-ranking journals. Within disaggregated groups, however, there were some striking exceptions to this pattern, and the measured gender gap ranged from men producing 80% more than women in one context to women producing 22% more than men in another. We conclude by arguing that in the debate about the productivity puzzle, too little attention has been paid to the gendered and situated nature of academic publication practices and how indicators of research productivity are able – or unable – to capture the complexities of context.

1.1. Academic writing as a situated and gendered social practice

The literature on gender gaps in productivity provides a wide variety of explanations for why men seem to produce more than women. Many of these explanations have an essentialist flavour to them: Women by nature prioritize differently, have different preferences, are more perfectionistic, or are more risk-adverse (see, e.g., Kessler, Spector, & Gavin, 2014). These types of explanation take little account of context, of the possibility that being a woman in Japan might be a different experience than being a woman in Norway, that women in a female-dominated discipline in the social sciences might face different

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