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Chapter 13

The value of data and other non-traditional scholarly outputs in academic review, promotion, and tenure in Canada and the United States

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Abstract

Academics are regularly involved in a wide range of activities spanning research, teaching and service, and the breadth of necessary outputs for review, promotion, and tenure (RPT) in each category only continues to grow. In linguistics, for example, research increasingly relies on the creation and management of datasets and on research software used to process these data. How do faculty manage their academic careers in the face of such growing sets of demands? Although we know that discussions of research assessment across the academy, including in the linguistics community, are increasingly recognizing the need to value the creation of outputs beyond research published in peer-reviewed journals, it is not clear whether these discussions have made their way into formal assessment structures. By analyzing the extent to which non-traditional outputs, including data and software, are mentioned in the RPT documents of a representative set of 129 universities from the United States and Canada, this chapter offers empirical evidence from across many disciplines of which types of faculty work are recognized in the RPT processes, and which are not. We confirm that traditional outputs such as peer-reviewed journal articles, book chapters and monographs are mentioned almost universally, whereas data-related items such as datasets and databases are mentioned only by a fraction of institutions. We find that research-intensive institutions acknowledge more types of research outputs in general, whereas institutions that focus more on undergraduate and master's degree programs tend to mention fewer forms of scholarship in their RPT guidelines. Within research-intensive institutions, units from the life sciences present a greater range of outputs in the guidelines offered to faculty, including the 15% that explicitly mention data-related outputs. In contrast, none of the academic units in mathematics and physical and social sciences in our sample recognize data-related outputs, and generally recognize fewer forms. Overall, we conclude that many current structures for faculty assessment do not explicitly recognize the increasing complexity and demands of faculty work.

Acknowledgements

1. Introduction

Conducting a research program is becoming an increasingly complex enterprise for many academic faculty. In many fields, large volumes of research data are collected, and solutions must be found not only for interpretation and analysis, but also for aspects of data management such as organization, storage, sharing, transfer, and security, as well as management of software, hardware, and/or cloud services (Marx 2013). This can be the case not only in fields in which it might be expected (particle physics, genomics; Marx, 2013) but also in medicine (e.g., Margolis et al., 2014) and in fields that may incorporate both qualitative and quantitative approaches, such as the social sciences and humanities (e.g., Kaplan, 2015).

As of 2010, the Linguistics Society of America (LSA) has also recognized the diverse complexity in forms of scholarly work in the field, acknowledging the use and production of "not only grammars, dictionaries, and text collections, but also archives of primary data, electronic databases, corpora, critical editions of legacy materials, pedagogical works designed for the use of speech communities, software, websites, or other digital media" in its *Resolution Recognizing the Scholarly Merit of Language Documentation*.[1] In this document, the LSA further recommends that these forms of work be recognized when hiring new faculty, as well as in tenure and promotion decisions, and acknowledges this will require developing methods to review these alternative forms of scholarship compared with more traditional works such as monographs, books, and journal articles.

In addition to navigating the complexities of academic research and scholarly activities, there are also expectations of faculty to contribute teaching and service at their institutions. In fact, for career advancement, expectations overall have increased over the last several decades. Whereas it was once sufficient for faculty to excel in either teaching or research, it is now typical to expect excellence in all three of the academic trifecta: research, teaching, and service (Gardner and Veliz 2014; Schimanski and Alperin 2018; Youn and Price 2009). That being said, there is also considerable evidence that the research component, supported mainly by scholarly outputs such as publications, is widely considered to be the most strongly weighted of the three (e.g., Acker & Webber, 2016; Harley, Acord, Earl-Novell, Lawrence, & King, 2010; Macfarlane, 2007; and see Schimanski & Alperin, 2018 for review). Nonetheless, significant contributions to academic service and teaching are required, and these rising demands of the academic faculty lead to time pressure to fulfill all obligations. Considering their limited time, faculty are in a position of needing to prioritize their activities to balance their own career objectives with those required by their institutions and departments for career advancement via the review, promotion, and tenure (RPT) process.

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[1] Available at: https://www.linguisticsociety.org/resource/resolution-recognizing-scholarly-merit-language-documentation

Those faculty serving on RPT committees also need to prioritize their time; when assessing the research outputs of other faculty, it is easier for committee members to rely on factors such as the prestige and reputation of the venues in which scholarly works are published including their impact factors (e.g., Adler, Ewing, & Taylor, 2009; Harley et al., 2010; Malsch & Tessier, 2015; McKiernan et al., 2019; Niles, Schimanski, McKiernan, & Alperin, Forthcoming; Walker, Sykes, Hemmelgarn, & Quan, 2010). Just as there is evidence that the prestige of the publisher matters for RPT—some institutions provide ranked lists of journals and publishing with university presses is most desirable for books (King et al. 2006; Thatcher 2007)—there is also evidence that various academic fields value some types of academic outputs more than others. Most commonly, the highly valued outputs include peer-reviewed journal articles and monographs, and to a lesser degree, books and submissions to academic conferences (Coonin and Younce 2009; Harley et al. 2010; Liner and Sewell 2009). However, faculty tend to produce a greater range of scholarly outputs, including but not limited to software, datasets, reports, pre-prints, creative performances, educational materials, articles in newspapers and magazines, blogs and social media, and various forms of public outreach. That faculty devote their time to such scholarly contributions indicates that they find value in these activities, despite the perception that they contribute less towards career advancement. This leaves us to ask: *What role do activities and outputs beyond those that appear in traditional publication channels such as journals, books and academic conferences play in review, promotion, and tenure processes?* To investigate this topic, we focus on the following related sub-questions:

1. What activities and outputs are mentioned in documents related to RPT?
2. How do the activities and outputs mentioned in documents related to RPT vary across institution types and disciplines?

Finally, and more specifically, given the topic of this handbook, we examine the following third sub-question:

3. To what extent and in which ways are data-related outputs mentioned in RPT documents?

In asking these questions, we must acknowledge that the framing of our research unintentionally pits "traditional" forms of scholarship against "other," "alternative," and "non-traditional" forms. We adopt this language from the existing literature, but acknowledge that doing so risks bias in favor of the status quo (Eidelman and Crandall 2012). With that warning in mind, we begin answering the research questions with a brief overview of previous research on the role that scholarly outputs play in the RPT process and, in the following two sections, we describe our methodological approach and our findings, including a summary statistics and specific examples of how outputs are discussed. We conclude the chapter with a discussion of how our findings fit into the wider literature on scholarly outputs and research evaluation.

2. The role of scholarly outputs in the RPT process
The types of scholarly outputs that are recognized in the assessment of research and publication may vary across institutions and the disciplines, but there are some overall trends discussed in previous research. In many disciplines (e.g., physical and life sciences, engineering, psychology, business), the peer-reviewed journal article is the gold standard and typical means for

demonstrating productivity, as well as the quality and reach of one's research outcomes (Coonin and Younce 2009; Harley et al. 2010). In other disciplines (e.g., history, English, anthropology), monographs and edited volumes are the preferred medium (Estabrook and Warner 2003). RPT guidelines generally give credit for these traditional mediums in the communication of scholarly work.

For journal articles, it is generally understood that those published in peer-reviewed journals, in international journals, and in those with high Journal Impact Factor (JIF) are most highly valued in the RPT process (Dennis et al. 2006; Foos, Holmes, and O'Connell 2004; King et al. 2006; Seipel 2003; Walker et al. 2010). Although most would agree that having gone through peer-review should correspond to higher quality publications, it is less clear whether publishing in a journal perceived as prestigious, with good name-recognition, and/or with a high JIF really indicates high-quality scholarly work (Brembs 2018). Similarly, for monographs and books, publishing by presses with editorial boards and/or peer review, and by university presses, may be taken to suggest higher quality (Thatcher 2007). The use of the venue of publication has been widely critiqued, most prominently in the Declaration on Research Assessment (DORA n.d.) and in the Leiden Manifesto (Hicks et al. 2015), because they substitute in-depth assessment, using both qualitative and quantitative measures, of the scholarly work in question.

RPT committees may consider additional forms of scholarly outputs, but these tend to carry less weight towards the decision, if they are mentioned at all in the policies and guidelines for the process (e.g., Harley et al., 2010). These may include conference proceedings, textbooks, reports, websites, creative performances and compositions, exhibitions, development of software and instrumentation, patents, commercialization, databases, grant funding, social media, and more (Cabrera et al. 2017; Harley et al. 2010; Sanberg et al. 2014; Stevens, Johnson, and Sanberg 2011). In their survey of US Faculty, Blankstein and Eisenberg (2019), found a general belief that non-traditional scholarly works should receive less recognition, but also that about a third of faculty think that preprints, which are traditional publications that have not yet undergone peer review, should be valued equally to published traditional research publications. This number may continue to increase with efforts like those of ASAPBio, a non-profit organization promoting transparency in research communication, and changing editorial policies that promote the use of preprints (Nature 2019).

With regard to data management and sharing, there is a dearth of evidence in the published literature regarding their consideration in the RPT process. This lack of evidence may reflect a perceived risk of making research data available to others and losing one's first rights to uncover important findings in those data, as well as having others expose errors in one's work (e.g., Gorgolewski, Margulies, & Milham, 2013; Kim & Adler, 2015; Tenopir et al., 2015) despite evidence that sharing data tends to increase citations and funding opportunities (reviewed by (McKiernan et al. 2016; further discussion of data citations, also see Chapter 12). It may also

reflect that data-sharing practices are relatively new, and their consideration in the RPT process may become more common as attitudes towards data continue to evolve, as they did during the period studied by Tenopir et al. (2015). Their surveys suggest that faculty (especially younger age groups) became more accepting of data sharing during 2009-2014. More recently, another survey found that over half of US-based researchers believe that data sharing is important to enable others to attempt to reproduce findings (Blankstein and Wolff-Eisenberg 2019). This shift in attitude is supported by policies encouraging or requiring data sharing from some journal publishers and from funders who have an interest in maximizing the benefits emerging from grant funding (Kim and Stanton 2016; McKiernan et al. 2016), and from projects like Make Data Count, which seeks to generate metrics to capture data usage (further discussion of the practice of data archiving and sharing can be found in Chapter 7). Also, to bridge the gap between traditional outputs and the sharing of datasets, the notion of "data papers" has been suggested as a mechanism for sharing and explaining datasets (Gorgolewski, Margulies, and Milham 2013). The notion of data papers and efforts for data metrics are both indicative of a perceived need of having data valued as part of the RPT process.

The collective evidence seems to suggest that RPT policy tends to focus on traditional academic outputs such as publication of journal articles and monographs/books, depending on discipline. However, if we directly evaluate documentation related to the RPT process, such as policies and guidelines, can we find evidence for non-traditional outputs and data-related works being valued in academic career evaluations?

3. Methods

This chapter presents selected findings from a larger study on RPT practices in the United States and Canada for which we collected and analyzed documents pertaining to the RPT process. A full description of the methods for selecting institutions, identifying documents, and analyzing them can be found in Alperin et al. (2019) and in the research note in the accompanying dataset (Alperin et al. 2018).

Briefly, we used the 2015 edition of the Carnegie Classification of Institutions (Carnegie Foundation for the Advancement of Teaching 2015) and the 2016 edition of the Maclean's University Rankings (Rogers Digital Media 2016) to identify universities in both countries and proceeded to select a stratified random sample across three institutions types: those that focus on Doctoral programs (i.e., research-intensive institutions; labelled R-type), those that predominantly grant Master's degrees (labelled M-type), and those focused on undergraduate programs (i.e., baccalaureate degrees; labelled B-type). We then used a combination of web searches, crowdsourcing (i.e., calls on social media), and targeted emailing to collect documents that pertain to the RPT process. We obtained a wide range of documents, including collective agreements, faculty handbooks, guideline documents, forms, and presentations. Some of the documents pertained to the university as a whole, whereas others were produced by a specific

academic unit (i.e., a school, department, or faculty). We classified the latter group into three main disciplinary areas according to the National Academies Taxonomy (National Academy of Sciences 2006): Life Sciences (LS); Physical Sciences and Mathematics (PSM); and Social Sciences and Humanities (SSH). Units that could not be classified into a single discipline were deemed to be multidisciplinary and were coded as such.

In the end, we obtained 864 documents from 129 universities, with an intentional oversampling of R-type institutions given the prominent role that research and research outputs play at these institutions. This led to obtaining university-level documents from 57 R-type institutions, 39 M-type institutions, and 33 B-type institutions. We were also able to obtain at least one document from academic units at a subset of 60 universities, reaching a total of 381 distinct academic units. Due to the different sample sizes across institution types and a particular interest in the processes at research-intensive institutions, we limited our disciplinary analysis to academic units from the 57 R-type institutions. This analysis included 33 (28%) LS units, 21 (18%) PSM units, 39 (34%) SSH units, and 23 (20%) multidisciplinary units, spanning 43 (75%) of the 57 R-type institutions in the sample.

Documents were loaded into QSR International's NVivo 12 and grouped into two sets (i.e., NVivo nodes) corresponding to the institution-level guidelines and those for individual academic units following the procedure described in Alperin et al. (2019). We performed a series of text queries combined with manual revision and uncoding of irrelevant sections for an extensive set of terms that refer to research outputs. We took a maximalist approach to identifying the relevant terms, first by reading through the Research or Scholarship sections of a subset of documents chosen from each institution type and noting the outputs listed there. We then proceeded to perform a text query for each output and related variants, including plurals and alternate spellings, to identify all instances of those terms across the entire corpus regardless of where it appeared in the document. In manually reviewing every instance, we uncoded any instances where the term was used to refer to something other than a research output and identified additional terms to be included in the search. In this way, we expanded the original list of terms whenever a new type of output was mentioned in proximity to one already identified. A detailed description of all of the terms used, as well as the text query used to search for all variants of each term, can be found in the research note that accompanies the public dataset (Alperin et al. 2018).

To our knowledge, there is no agreed-upon list of outputs, or categories of outputs on which to base our work and so, we set out to construct our own list of terms and bespoke categories. Informed by the research team's experience on issues related to scholarly communications and research assessment, we began with a deductive approach to identify the traditional outputs, including those discussed in the RPT literature. We complemented this approach by doing a close read of the RPT documents to identify the types of outputs that are recognized towards

faculty evaluation. Following an open-coding and constant comparison approach (Strauss and Corbin 1990), we labelled each new term separately and compared to the already existing terms and categories. If they referred to an output considered to be synonymous with one seen previously, they were grouped together. If the new term was judged to refer to something previously not seen, a new label was assigned to the term and, if necessary, a new category was created. In all cases we were careful to be inclusive of variations of spelling, terminology, and synonyms whenever querying for a new output. Several iterations of this process led to categories of variable size (described in detail in Table 1). The data related to each individual term (prior to categorization) are publicly available along with the scripts used to perform aggregations by institution type and discipline to facilitate replication and further exploration (Alperin et al. 2019).

When counting the number of mentions per institution type, we considered there to be a mention when at least one document belonging to that institution or any of its academic units made mention of the output. Similarly, when counting the number of mentions per discipline, we considered there to be a mention when at least one of the documents belonging to that discipline at the institution in question made a mention of the output. For example, we have two university-level documents from the University of Utah and an additional eleven documents from ten different academic units. Of these, only one document, pertaining to the Department of Psychology, mentions a variant of the term "dataset". It does so in the following way: "Research/scholarship is sustained and ongoing, with evidence of work at all stages of the research process (e.g., publications, submitted manuscripts, draft manuscripts and conference presentations, collected *data sets*, plans for future work, intra- and/or extra-mural funding, and so on)" (emphasis added). We would therefore consider this to be an example of an R-type mention (the University of Utah's Carnegie classification) as well as a SSH mention (the Department of Psychology's classification). In much the same way, we considered one of our defined category of outputs to be mentioned if at least one of the terms within that category was mentioned, as per the description above, in a given institution or discipline. Using the example above, we could consider the Data category to have been mentioned at an R-type institution and in an SSH discipline.

4. Results
4.1. Types of outputs

We identified 127 different kinds of outputs in our corpus, which we grouped into twelve categories. In what follows we present a brief overview of the categories we arrived at, along with several examples of the terms included within each (Table 1). A full description and a list of every term is available in the methodology note of the accompanying dataset (Alperin et al. 2018).

The categories we created are varied in their composition. While some are made up of very few types of output (e.g., *Preprints* and *Data*), others represent a variety of output types (e.g., *Arts*, *Education*, and *Events*). Four of the categories (i.e., *Traditional*, *Conventional*, *Funding*, and *Unspecified)* could be considered by some to fall under a broader definition of "traditional." We have chosen to analyze them separately, even though many of the outputs, especially those in the *Unspecified* category, are likely to be referring to traditional and conventional outputs as well (see Schimanski & Alperin, 2018, for discussion of the values of different output types in RPT). To reflect the conceptual similarity in these four categories, they are grouped together in Tables 1-3.

4.2. Mentions of outputs across institutions and disciplines

As previously reported (Alperin et al. 2019), we found that terms referring to the most *Traditional* outputs were ubiquitous, appearing in around 95% of all institutions across the three institution types (Table 2). Although we consider the acquisition of grant funding a "traditional" output (Alperin et al. 2019), in this analysis we separated terms related to *Funding* separately, and found they were present in 82-87% of institutions. We have also added terms for what we refer to as *Conventional* outputs, which might be considered "traditional" and which were found in 82% of R-type, 62% of M-type, and 67% of B-type institutions. In this same vein, *Unspecified* terms that are likely stand-ins for traditional outputs can be found in over 90% of institutions of each type—significantly more than almost every remaining category. The only other two categories that come close in prevalence are the *Education* and *Events* categories, both of which are found in 85-91% of institutions of each type (Table 2).

Overall, we found that R-type institutions were more likely to mention the whole range of outputs. With the exception of the *Arts* and *Third Party* categories, R-type institutions have proportionally more or equal mentions of every output category when compared to M-type and B-type institutions. This is especially true of the *Intellectual Property (IP)*, *Information and Communication Technologies (ICT)*, and *Software* categories, all of which are mentioned in 65-68% of the R-type institution documents, but only in 33-38% of the M- and B-type institutions (Table 2). The difference was also noticeable in the *Data* and *Preprints* categories, which were the least mentioned overall (more on the difference in data-related outputs in section 4.3 below).

Table 1. Categories of outputs and examples of the outputs found in each

Category	Description	Examples
Traditional	Relating to the longest standing and most formal mediums of scholarly communication, verbal and written.	Books; Journal articles; Presentations
Conventional	Relating to other verbal and written work that caters to an academic audience.	Book Reviews; Editorials; Posters
Funding	Relating to the acquisition of research funding.	Grants; Funding
Unspecified	Relating to written dissemination of knowledge to an academic .audience, format not specified.	Publications; Outputs; Papers; Manuscripts
Arts	Relating to work that is in the realm of visuals, music, language, or performance.	Performances; Creator works; Exhibitions
Data	Relating to the creation or management of data.	Databases; Databanks; Datasets
Education	Relating to the creation of pedagogical materials or methods.	Textbooks; Syllabi; Lectures
Events	Relating to participation in a formally organized social occasion based around a topic with a specialized or academic audience.	Conferences; Workshops; Seminars
Information and Communication Technologies	Relating to the medium of work that is digital, audible, or visually recorded.	Audiovisual resources, aids, and materials; Videos
Intellectual Property	Relating to work that results in intellectual property.	Patents; Inventions; Technology transfer
Preprints	Relating to documents typically intended for peer-review, but published ahead of that process.	Pre-print; Working Paper
Public Media	Relating to the dissemination of knowledge to a non-academic audience.	Newspaper articles; Films; Newsletters
Software	Relating to computer code in the form of software or programs.	Software; Computer Programs
Third party collaborations	Relating to consulting or contract work where an individual is hired by a non-academic entity for their expertise.	Consulting works; Policy analysis and reports; Contract research and reports
Works in Progress	Relating to academic work that is in progress, has not been published, or is forthcoming.	Ongoing research; Unpublished work; Research in progress

Table 2. Presence of outputs in documents by institution type

Category of Output	R-type		M-type		B-type	
	N = 57		N = 39		N = 33	
Traditional	53	93%	37	95%	31	94%
Conventional	47	82%	24	62%	22	67%
Funding	49	86%	34	87%	27	82%
Unspecified	55	96%	36	92%	30	91%
Arts	47	82%	33	85%	29	88%
Data	9	16%	4	10%	2	6%
Education	52	91%	33	85%	30	91%
Events	52	91%	35	90%	29	88%
Information and Communication Technologies	38	67%	15	38%	12	36%
Intellectual Property	39	68%	15	38%	11	33%
Preprints	13	23%	2	5%	4	12%
Public Media	39	68%	19	49%	11	33%
Software	37	65%	15	38%	12	36%
Third Party Collaborations	25	44%	18	46%	12	36%
Works in Progress	34	60%	17	44%	16	48%

In looking within the 57 R-type institutions, we see a similar pattern across the academic units of the various disciplines. *Traditional* outputs are universally valued, with 94-95% of academic units across the three disciplines, and 77% of the multidisciplinary units, mentioning their use (Table 3). *Funding*-related output mentions can be found in 84-94% in the units of each discipline, with the LS and PSM units having more mentions than those of SSH. *Unspecified* outputs are also universally mentioned, with 94-97% of units in the three disciplines mentioning such terms along with 82% of the multidisciplinary units. Of the four categories that could be considered "traditional," the *Conventional* outputs are the least mentioned in the academic unit documents. Outputs in this category can be found in 64% of multidisciplinary units, 68% of those of SSH, 70% of PSM, and 76% of LS.

Similarly, we found cross-disciplinary interest in *Education*-related outputs, with 92-95% of the each of the three disciplines mentioning this category along with 77% of the multidisciplinary units. The *Events* category, which was mentioned in 91% of the R-type documents overall, showed a little more variation across disciplines, with 89% of the SSH and 86% of the multidisciplinary units mentioning outputs in this category, as compared to 95% and 97% of the PSM and LS units, respectively. Despite these variances, it is clear that *Traditional Outputs*, along with *Education*- and *Events*- related outputs are universally valued.

We note several other important differences across the disciplines in the categories that are much less frequently mentioned. In particular, the SSH units show the least acknowledgement of IP-related outputs and of *Preprints*, along with multidisciplinary units. This is not to say that SSH units had less mentions across all categories. Perhaps unsurprising, given that the SSH discipline includes "Arts and Humanities" fields, the *Arts*-related outputs were most widely found in SSH.

We also observed that the PSM units had a lower proportion of mentions in the *ICT, Software,* and *Public Media* categories. Lastly, we found that the LS units differ in their mention of *Data* outputs which, we describe in the following section.

Table 3. Presence of outputs in documents of R-type institutions by discipline

Category of Output	Social Sciences and Humanities		Physical Sciences & Mathematics		Life Sciences		Multi-disciplinary	
	N=39		N=21		N=33		N=23	
Traditional	36	95%	19	95%	31	94%	17	77%
Conventional	26	68%	14	70%	25	76%	14	64%
Funding	32	84%	18	90%	31	94%	19	86%
Unspecified	37	97%	19	95%	31	94%	18	82%
Arts	29	76%	5	25%	13	39%	11	50%
Data	3	8%	0	0%	5	15%	1	5%
Education	35	92%	19	95%	31	94%	17	77%
Events	34	89%	19	95%	32	97%	19	86%
Information and Communication Technologies	24	63%	7	35%	21	64%	7	32%
Intellectual Property	10	26%	14	70%	22	67%	8	36%
Preprints	4	11%	4	20%	4	12%	2	9%
Public Media	22	58%	7	35%	19	58%	8	36%
Software	19	50%	7	35%	21	64%	8	36%
Third Party Collaborations	14	37%	7	35%	15	45%	5	23%
Works in Progress	18	47%	7	35%	12	36%	6	27%

4.3 Data-related outputs

The mention of data-related outputs in RPT documents is relatively rare. They can be found in 16% of R-type institutions, 10% of M-type institutions, and only 6% of the B-type institutions in our sample (Table 2). Within the R-types, we found an uneven presence of data-related mentions across different disciplines in academic unit level documents, with 15% of the LS units mentioning the term at least once, as compared to 8% of the SSH units, and none of the PSM units, although it should be noted that the number of mentions is small (5 and 3 respectively). PSM units did not mention *Data* outputs at all.

To better understand how discussions around the importance of data are making their way into the documents that govern the RPT process, we did a closer reading of the three sub-terms included in this category: 'data banks,' 'data bases,' and 'data sets' (all in their singular and plural, with spaces and without, as well as hyphenated versions, as described in the methodology note found in the accompanying dataset for this chapter). Other data-related terms, like 'data management,' were not present in our collection of RPT documents. Of the data-related terms we did find, the term 'databases' and its variants were the most frequent (found in the documents of 10 institutions and 7 academic units), followed by 'datasets' and its variants (found in the documents of 3 institutions and 2 academic units). A vast majority of these mentions were found

as part of a longer list of outputs where the data-related item was closer to the end of the list than the beginning, and in several cases was grouped into a "new" or "alternative" category of scholarship.

For example, we found this to be the case for the institution-level documents of the University of North Carolina at Chapel Hill, which state that "academic units should recognize that evaluation of new forms of scholarship often will come after publication." The document goes on to list examples, starting with "databases" and followed by "blogs, web sites, and other forms that do not resemble traditional journal articles or monographs."

When mentions were are not found in a "new" or "alternative" section of the documents, these lists often place databases following a list of more traditional outputs, which might imply a lower importance relative to these other forms. For example, at the University of Calgary, Faculty of Arts, this relative importance is made explicit, with databases and software being the two least valuable of the outputs mentioned (*emphasis added)*:

> "Promotion -- scholarship will be judged, on a Department-specific basis, according to the quality of the research program, reflected *in roughly descending order* by the following kinds of publications: refereed books, book chapters, and articles, including major refereed research monographs; textbooks, edited books, other monographs and articles in non-refereed journals, book chapters, book reviews; other forms of scholarship, e.g., conference papers, research grants, editorship of journals, conference organization, development of computer-assisted learning, *data bases*, software."

However, this is not universally the case. An individual unit in that same faculty (Communication and Culture) contradicts this statement by stating that:

> "All research, scholarship and other creative activities shall be assessed on the merits of the work, regardless of the form in which they appear. Electronic publications – whether books, articles, journals, or databases – shall be considered equivalent to more traditional forms of publications if they are subjected to the same rigor of informed peer review or appropriate refereeing."

5. Discussion & Conclusions

When looking across institutions in the United States and Canada, there is a great deal of diversity in the kinds of research outputs that are presented to faculty in the documents that govern the RPT processes. Our analysis reveals that this diversity extends across institution types and disciplines. Most notably, the documents from R-type institutions offer a longer list of outputs to be considered and, within those institutions, we see substantial differences in which outputs are mentioned in the documents of each discipline. This variability may be a sign that RPT processes are beginning to recognize research activities more broadly. If this is indeed the case, it is evident that this broader conception has not been adopted everywhere. On the other hand, greater specificity could be seen as a way to further constrain the outputs which are valued.

Either way, traditional research outputs are universally presented to faculty as highly valued in RPT.

These two findings—the ubiquity of traditional outputs and the variability in the presence of other forms of scholarship—paint a complicated picture for those looking to understand what is valued for their academic career. Evidence suggests that in the face of ambiguous or incomplete information in the guidelines, committees revert to their own judgement and notions of disciplinary norms and expectations (Harley et al. 2010; May 2005; Schimanski and Alperin 2018). Such reliance on individual judgements of what is necessary for career advancement may be especially acute for pre-tenure faculty who will be evaluated by individuals from outside their institution who are less familiar with the institutional context and the corresponding guidelines. Even if internal and external evaluators rely on the documents that pertain to the candidates' RPT process, our analysis of the mentions of data-related outputs in these documents strongly suggests that new or alternative forms of scholarship (anything beyond the traditional peer-reviewed journal articles, books and book chapters) are of lesser importance. This framing of non-traditional outputs, when they are mentioned at all, perpetuates the notion that faculty should focus on traditional research activities. In a context where faculty are asked to excel in every aspect of their work, including research, teaching and service (Diamond and Adam 1998; Schimanski and Alperin 2018; Youn and Price 2009), and already do not spend as much time as they would like on research (Brownell 2018; Mamiseishvili, Miller, and Lee 2016), this message that some activities are less valued is likely to dissuade faculty from activities that result in non-traditional outputs. When it comes to data-related outputs and other forms of scholarship not mentioned in many RPT guidelines, it seems that while institutions are not dissuading faculty from undertaking such work, it is not actively encouraged or is devalued compared to traditional outputs.

This analysis supports various claims that current incentive structures are partly to blame for a lack of evolution in the state of research communications and in the push towards open science practices (G7 Science 2017; Harley et al. 2010; Wheeler et al. 2012). The need for change is evident, for example, in the growing reproducibility crisis, where researchers cite pressure to publish and incentive structures as important contributing factors (Baker 2016). In linguistics, change may also be necessary to improve the participation of historically marginalized groups, such as indigenous communities, so that research communications can serve to revitalize indigenous languages (Ramos and Empinotti 2017; Young 2019). While there is no commonly accepted approach to research communication and activities, our findings suggest that current RPT guidelines found in the United States and Canada have not shifted to be more inclusive of non-traditional outputs. This is especially true for new forms of scholarship like the production of datasets or the publication of preprints, both of which are mentioned in the documents of only a small percentage of all institutions.

The research presented here provides a benchmark against which future work can be measured, but we cannot observe from this single snapshot whether these practices are changing. For instance, it is possible that RPT committees do value data-related outputs in their decision-making process despite their absence or low valuation in the RPT documents. It has been observed that RPT documents typically espouse some degree of vagueness or flexibility in their requirements so as to allow committees to consider other information deemed appropriate for each unique faculty member's field of study (Macfarlane 2007; Schimanski and Alperin 2018; Smesny et al. 2007). This approach might allow for M-type and B-type institutions, which mentioned fewer output types in their RPT documents, to still be inclusive in assigning value to non-traditional forms of research output. However, the lack of explicit mentions of newer output forms, like datasets and preprints, indicates that broad acceptance of these forms is not yet observable in RPT documents.

Despite the lack of mentions of data-related items in the RPT documents we examined, scholars are actively working on enhancing the profile of data-related endeavours in scholarship. For instance, the Make Data Count project has been working to make data a "first class" research product by developing a framework to standardize and collect data usage metrics. Evidence of the acceptance and valuation of data work is also visible in other ways. In the field of computational linguistics, Wieling et al. (2018) found that by 2016, most researchers were willing to share datasets with other researchers, although sharing code occurred less frequently. Researchers appear to be driven by a desire to promote the reproducibility of research findings (Berez-Kroeker et al. 2018; Wieling, Rawee, and van Noord 2018) and to make data available in standard formats that facilitate their assessment by other parties (e.g., the "Cross-Linguistic Data Formats" initiative; Forkel et al., 2018). It will take future studies to determine whether calls for a greater valuation of data-related work are having an effect, and the valuation of data and other new forms eventually become encoded in RPT documents.

That said, our findings do indicate a wide range of outputs mentioned overall. This, and the high percentage of institutions that mention certain output categories (especially among the R-types), are signs that the academic community understands and values a broad notion of faculty work, even if it falls short of acknowledging the full range of outputs explicitly. As such, we believe that researchers can take steps to increase the likelihood that they receive recognition for data they create, curate, or publish. Perhaps most importantly, researchers should cite these data in any materials they present for review (e.g., CVs or tenure packages). Committees are likely to place these in the larger context of scholarly work, even if not yet recognizing them to the same degree as other scholarship. Moreover, as it becomes normal for data to appear in lists of outputs, it could, in time, lead to their inclusion among the explicitly recognized outputs. To be able to do so, we recommend that everyone follow good research data management (RDM) practices. Good RDM reduces the work required to curate and publish data, making it easier to continue to fulfil existing expectations from RPT committees. These suggestions, we think, are equally valid for

established researchers as they are for graduate students, whom we would already advise to follow good RDM practices and who are in a position to signal to more established colleagues that the next generation value working with data. Finally, for those who have the privilege to serve on RPT committees, we suggest that you familiarize yourself with efforts like DORA and the Leiden Manifesto so that you can lead a conversation with your colleagues on how to recognize the diverse range of activities that make up faculty work because, as it stands today, our findings show that faculty are left navigating an uneven landscape that simultaneously values and undervalues different aspects of what they do.

6. References

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