

Research Article

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Japanese national university faculty publication: A time trend analysis

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Abstract: The dominance of English in academic discourses is well established, with increased English publication used to evidence its increasing use at the expense of national language publication. However, while English publication frequency has increased over time, few studies have examined how university faculties outside higher education's Anglophone center have changed their language of publication frequency. Thus, in this investigation, we analyzed a Japanese national university's medical faculty's overall frequency of publication along with publication frequency by language medium, expanding on an earlier diachronic analysis of university publication reports. We previously found English language publications largely replaced Japanese language publications for journal articles and that overall publication frequency dramatically increased. However, that initial diachronic analysis did not show when those changes manifested. The current investigation explores this through a decennial time trend historical document analysis of publication reports from 1979 to 2020. This analysis elucidates how publication frequency, type, and language medium have changed. Specifically, we find that the largest change in the overall frequency of publication is between 1989–1990 and 1999–2000. These changes are primarily driven by conference papers and other publications, publication types not typically examined in analyses of journal citation databases. Our findings establish a foundation to discuss potential causes of the trends we identify in this Japanese national university's medical faculty's publications.

Keywords: language medium of publication, academic publication, Japan-based higher education, historical document analysis, internationalization of higher education, decennial time trend analysis

1 Introduction

When discussing scientific knowledge production, English is often, albeit controversially, discussed as the default, unmarked language medium of publication (Tardy 2004). This dominance of English in global knowledge production is not uncontested and neutral, as issues of author access to global knowledge production have been raised (Lillis and Curry 2010) along with concerns about the effect of English's dominance on local language use in writing for publication (Bennett 2014). One source of evidence for such discussions is journal citation reports (Fire and Guestrin 2019, Sandelin and Sarafoglou 2004). However, journal citation reports have been critiqued as unrepresentative of authors' academic writing output (Seglen 1997). One reason for this is that they are exclusive rather than inclusive and do not capture the entirety of faculty knowledge production. That is, they only include publications in indexed journals, which means that they tend not to include publications in more regional journals, papers not published in English, and papers published outside of journals, such as in books or proceedings (Garfield 1972, Muller 2012). Further, English language publication

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tends to be overrepresented in such indexes, especially the international indexes that tend to be used in bibliometric research (Muller 2012, Seglen 1997). The shortcomings of such bibliometric citation analyses were summarized by Fire and Guestrin (2019) as, “citation-based metrics are not beneficial for comparing researchers in different fields, or even in the same department” (p. 1). Bibliometric citation analysis nevertheless remains a preferred instrument for policy discussions, such as in a report produced by the Japan Ministry of Education, Culture, Sports, Science and Technology (MEXT) (2022) noting Japan’s falling ranking in the world for number of papers (second to fourth, p. 8) and “number of adjusted top 10% papers” (4th to 10th, p. 8). An alternative method of investigating author academic writing is surveys of writing practices, which have explored authors’ publishing practices outside higher education’s Anglophone centers, specifically Japan (Daizen 2015, Huang 2015) and Norway (Kyvik 1990, 2003). Contrary to bibliometric studies, these have found that Japanese faculty publication has not increased over time. However, surveys can be unreliable indicators of past actions, as people tend to not accurately recall their past actions, especially actions more than several months in the past (Beam 2012). In contrast, historical documents remain unchanged following their production and therefore may more accurately indicate faculty publishing practices than surveys that rely on individuals’ memories.

Thus, while there is some limited understanding of how publication language has changed, these trends have generally been explored through the relatively narrow perspective of journal publication, largely using bibliometrics or retrospective surveys that can yield unreliable data. To address this, here we explore how historical document analysis (Bowen 2009, Morgan 2022) can help elucidate publication trends for a Japanese national university’s medical faculty. Specifically, we conducted a decennial time trend analysis (Mandel and Semyonov 2016) of annual publication reports published by the university library between 1979 and 2020 that list all faculty publications from a given year.

Document analysis requires that researchers apply a reflexive lens, acknowledging historical documents do not represent objectively neutral points of view (Altheide 1996). In this investigation, it offers the advantage of using data independent of surveys of faculty publications and bibliometric analyses. As such, it facilitates examining the extent to which trends identified via other means also manifest in our analysis, providing the potential for confirmatory or contradictory findings relative to earlier bibliometric and survey research of faculty publishing practices. Further, it allows analyzing publication types other than original papers published in journals, contributing a richer picture to the publication practices of the faculty examined. Reiter (2017) explains, “The good social science question is never ‘what really happened?’” because this “depend[s] on the accounts of each participant” (p. 137). Rather, “a good question is one that is fruitful, because it allows us to explore hitherto unexplored aspects and possibilities of explanation and causation” (Reiter 2017, p. 137). As such, the document analysis presented here allows us to explore the extent to which earlier bibliometric analysis findings of increased publication over time are reflected in the publication practices of the faculty we examine. Further, survey findings that Japanese faculty publication has not increased are incompatible with bibliometric analyses showing increased faculty publication over time. Thus, the document analysis that we present here, as a method independent of these alternative methods, can further clarify what the publishing practice trends are for Japan-based faculty. Specifically, we examine whether they follow trends like those for global faculty publishing found by Fire and Guestrin (2019), whether Japanese faculty publication remains largely unchanged over the period examined (Daizen 2015, Huang 2015), or whether there is an increase followed by a plateau after the mid-2000s (MEXT 2022). Additionally, our investigation adds the perspective of language of publication trends, which have previously not been examined in detail for Japanese faculty. This foundational study will inform subsequent inquiries into the potential causes of these trends.

In the analysis that follows, we demonstrate that, for some publication types, English has replaced Japanese language publication, particularly in original papers published in journals. However, for other publication types, namely conference papers and other publications, both English and Japanese have increased in publication frequency. Moreover, the increases in overall publication frequency of original papers published in journals appear to level off after 1999–2000, consistent with bibliometric findings for Japanese higher education more broadly (MEXT 2022). However, publication frequency for English original papers showed a slight increase from 1999–2000 to 2009–2010 while in the same period, Japanese paper publication decreased. While historical document analysis is not ideal for identifying the causes of such trends, we discuss some possible explanations for our findings, namely changes to the funding structure for Japanese

national universities, with “continuous drop in the government budget for each [national university] corporation by nearly 1% every year since 2004” (Huang 2014, p. 1434). Moreover, as the Japanese HE faculty is largely Japanese (97% as of 2001, Yamanoi 2006) educated in Japan (94%, Yamanoi 2006), the pressure to publish in English, a foreign language for many, may limit their publication output because of the resources required to write and publish in a foreign language (Lillis and Curry 2010). Further, our findings perhaps suggest the limits of increases in faculty publication output to respond to faculty performance evaluation metrification trends.

In exploring these issues, the following research questions inform our analysis:

- How does publication frequency and language of publication change for this national university’s medical faculty between 1979 and 2020?
- How do these trends differ by publication type?

2 Review

One prominent issue is the trend of English language publication replacing regional language use, particularly in academic writing within higher education (Bennett 2014). Two prominent research methods used to investigate the frequency of faculty publication in higher education are the analysis of journal citation indexes (Sandelin and Sarafoglou 2004) and the examination of survey results (Daizen 2015, Huang 2015, Kyvik 1990, 2003). Concerning journal citation index analysis, Fire and Guestrin (2019) illustrate how (predominantly) English language publication frequency has steadily increased for authors publishing their first paper in the 1950s and authors publishing their first paper in the 2010s. They critique contemporary trends toward the increased use of metrification to evaluate faculty productivity in higher education. Despite critiques of the efficacy of bibliometrics for understanding research output, MEXT (2022) used it to conclude, “the number of papers published” by Japanese national universities “has decreased since the mid-2000s” (11). Thus, there is incongruity in the finding that publication frequency globally is increasing decade by decade (Fire and Guestrin 2019) and that, at least for Japan-based faculty, publication frequency has decreased since the mid-2000s (MEXT 2022).

Surveys have also been used to understand the writing for publication practices of authors outside higher education’s Anglophone center (Kyvik 1990, 2003). Such investigations have suggested relatively little change in the writing for publication frequency and languages of publication of Japan-based faculty, including medical faculty, between the 1990s and 2000s (Daizen 2015, Huang 2015). These conclusions from these different research paradigms, bibliometrics and population surveys, are mutually incompatible, as citation report analysis suggests publication frequency is increasing while survey analysis suggests it remains (relatively) unchanged.

To explore these dichotomies, in an earlier investigation, we diachronically examined a Japanese national university’s medical faculty’s publications between 1979–1980 and 2017–2018 to determine whether their publication frequency remained relatively unchanged or whether it was increasing (Muller and Gallagher 2021a). We found that “English language publication has increased for the more prestigious types of publication, original articles and books, at the expense of publication in Japanese” (Muller and Gallagher 2021a, p. 11). However, our diachronic analysis was limited, as when during this period these changes occurred remained unclear. Therefore, in this investigation, we examine the same faculty’s publications using a decennial time trend analysis (Mandel and Semyonov 2016) in an incremental expansion of our earlier analysis from 4 years to 10. This should reveal whether the faculty’s publications steadily increase, whether the changes predate the survey investigations reviewed previously, or whether they level off from the mid-2000s. Clearly understanding how faculty publication practices have changed is important to discussions of the dominance of English as a language of scientific publication, to policy decisions concerning faculty publication evaluation, and to government policy concerning research support.

3 Methods

This study investigates publication data for three subspecialties of a Japanese university’s medical faculty over a 40-plus-year period, between 1979 and 2020. Consistent with the methods used for our earlier preliminary

study (Muller and Gallagher 2021a), we utilize historical document analysis (Bowen 2009, Morgan 2022) to examine publication data. A benefit of using historical document analysis is that the data are based on archival records, arguably a more reliable source of past activities than survey data which can be subject to inaccuracies in reporting. Morgan (2022) describes document analysis as follows:

When researchers analyze newspaper articles for a study, they typically do not write the articles. However, when they conduct interviews, they participate in the creation of the data. In one case, the actions of the researchers lead to the creation of the data. In the other, the data exist without any actions by the researchers. In both cases, researchers are active in discovering, collecting, and making decisions about which materials will be analyzed and which will be ignored ... Using pre-existing data is similar to using data from observations and interviews. Books, articles, and other documents can be thought of as texts that are equivalent to the information a researcher collects during an interview. These sources reflect the beliefs of people in a similar way to the data a researcher would collect from observations and interviews. (65)

Our document analysis explores a valuable source of data, as “the authors of texts may no longer be alive or be unwilling to participate in interviews” (Morgan 2022, 65). Morgan (2022) also notes, “Another reason for using pre-existing textual data involves affordability and easy access” (65). In this case, the library publication reports are all freely downloadable from the university’s public repository. The examination of publicly archived documents partly allays ethical concerns associated with human subject research, as “public records are available for anyone to examine and are often anonymous. Authors of books and articles appearing in newspapers and journals are generally aware that anyone will be able to read their content” (69). While document analysis can be used to complement other research methods in triangulation, it can also serve as a standalone method of investigation (Morgan 2022). In this case, this document analysis is sufficient to answer the research questions posed and can potentially serve to present hypotheses that can then be explored through later investigations into, for example, authors’ reasoning behind their publishing practices (for example, Muller 2018).

Another advantage of this document analysis is that many international publication databases tend to over-represent journal and English language publications. However, academics outside of the Anglophone center of knowledge production have been described as producing as many as six different types of manuscript, only one of which overlaps with the English original papers generally examined in bibliometric research (Lillis and Curry 2010). Thus, the current investigation can disambiguate the following: (1) Whether findings that publication frequency increases over time are the product of a largely English language data set. (2) Whether Japan-based faculty publication frequency between the 1990s and 2000s indeed remains largely unchanged. (3) Whether research publication frequency levels off after the mid-2000s.

The data examined were library publication reports available through the university’s online repository (University of Toyama 2020). These annual reports contain a bibliographic record of academic publications for each medical faculty department categorized by publication type. When selecting documents for analysis, Morgan (2022) recommends considering their: authenticity, credibility, representativeness, and meaning (70). Authenticity refers to, “The extent to which a document is genuine” (71). In this case, the library reports were produced by the university’s library committee and have remained unchanged since their production. The original paper copies have been scanned and uploaded to the university’s public repository where they are free to download and view, thus establishing their authenticity. Credibility refers to, “The extent to which a document is free from errors” (71). In this case, full publication and presentation information is included in numbered listings, so it is likely that the faculty have accurately reported their publication output. Further, their representativeness or “how typical a document is” (71) suggests that they are sufficiently consistent to compare faculty publication numbers in aggregate over the period examined, as they use largely the same publication type categories between 1979 and 2020. Their meaning or “the significance of a document’s content” (71) is that they present the authors and titles of publications by type organized by faculty unit.

Consistent with our previous preliminary study (Muller and Gallagher 2021a), three units of the University of Toyama’s Faculty of Medicine are examined here: pathology, internal medicine, and biochemistry. We selected these units from the faculty’s 52 subspecialty units (as of 2020, see University of Toyama Repository 2020) based on the number of faculty within them, whether they were listed in the reports throughout the period examined, and to cover research and clinically oriented subfields. These units represented 43 of 182 faculty members in 1979–1980 (24%) and 61 of 310 faculty members in 2019–2020 (20%).

While we acknowledge that publishing trends in other specialties outside of medicine, such as the humanities, are also of interest, here we concentrate on medicine for the following three reasons: (1) As we are interested in contrasting our findings with earlier bibliometric analyses of trends in faculty publication, it is necessary to examine a field that overlaps with such analyses. As Yonezawa (2008) explains:

The position of the social sciences in quality assessment and assurance in higher education is uncertain. Most methodological debates for quality assessment, especially those regarding research activities, not only in Japan but also all over the world tend to focus more on the fields of engineering, medicine, and the natural sciences. (p. 70)

Thus, to facilitate the compatibility of our analysis with the bibliometric research reviewed previously, it is necessary to examine a field whose trends are likely to overlap with those of earlier investigations, in this case, medicine. (2) The national university in question began as a specialist Medical and Pharmaceutical Sciences University, later combining (in the mid-2000s) with other national universities in the prefecture. However, the library records in question only include data from the original Medical and Pharmaceutical Sciences University faculty. While there were and are faculty whose field of specialization is outside of medicine in the university (and included in the library publication reports), they are a small minority of its faculty compared to its medical and pharmaceutical sciences faculty. Thus, while publishing trends in fields such as the humanities would be of interest to investigate, the historical documents available for this investigation would not necessarily provide sufficiently rich data to inform such investigations. This points to one of the shortcomings of historical document analyses; they are limited in what can be investigated by what the historical documents available document (Morgan 2022). That priority has been given to such thorough documentation of the medical and pharmaceutical sciences university's faculty publications and not to other university departments potentially speaks to priorities in terms of resource allocation between different university units. (3) While we are interested in ultimately examining all the available publication data for this university, this is an incremental expansion of our earlier work examining the university faculty's publications (Muller and Gallagher 2021a) based on a conference presentation given at NatAcLang 2021 (Muller and Gallagher 2021b), the event that formed the basis for this special issue. Further, examining these three subspecialty units is sufficient to elucidate trends in their publishing practices over the period examined to answer the research questions posed.

Using decennial time trend analysis (Mandel and Semyonov 2016), faculty publications were investigated chronologically in 10-year time intervals starting with 1979–1980 and ending with 2019–2020, for a total of five intervals over the period examined. One of the purposes of this time trend analysis is to expand on our preliminary study which diachronically compared data from 1979–1980 and 2017–2018 (Muller and Gallagher 2021a). By analyzing more intervals over the period examined, we aim to better understand when the observed trends occurred and to elucidate more information about changes in publication practices. We analyzed the number of publications for each publication type, as well as for the language medium of publication using the language of the publication title according to whether they were Japanese, English, or another language. We preserved the original categories of publication type used in the reports, namely original papers, books, case reports and fast publication, reviews, conference papers, and other publications. Other publications include non-conference presentations, interest group talks, short articles, and public-facing publications such as newspaper articles. To present comparable data, we examined the number of publications per faculty member per year rather than the total number of publications. This also facilitates comparing the faculty across the timespan examined, as there was year-to-year variability within each department. For example, biochemistry exhibited a high of 13 faculty in 2019 (Toyamadaigaku fuzoku toshokan iyaku-gaku toshokan un'ei iinkai 2020), more than three times higher than its low of 4 faculty in 2009 (Toyamadaigaku fuzoku toshokan iyaku-gaku toshokan un'ei iinkai 2010). Further, to reduce inter-year variability, the publication numbers presented in our analysis are averaged across each 2-year time span, which facilitates examining trends as opposed to year-to-year variability in publication frequency. While year-to-year variability is of potential interest, the research questions we examine here focus on trends in the data over longer time spans, and so we present our data this way to facilitate answering those questions. Throughout our presentation of results and discussion of the data, all values have been approximated to one decimal place.

4 Results

Figure 1 shows publication frequency per faculty member per year by publication type and language medium for all three subspecialties in aggregate. Each publication type is grouped by color, with blue for original papers, green for books, orange for case reports and fast publication, pink for reviews, brown for conference papers, and teal for others (Figure 1). Within each publication type, color shading is used to differentiate between English and Japanese publication, with Japanese represented by the darker color and English by the lighter color (Figure 1).

Figure 1 illustrates how publication frequency per faculty member more than doubled over the approximately 40-year period, from 5.0 in 1979–1980 to 12.7 in 2019–2020. Further, conference papers and other publications in both English and Japanese increased the most. Original papers, the most prestigious publication type, appear relatively consistent when aggregated across Japanese and English. However, publication language shows original papers shifted from predominantly Japanese publications to predominantly English, which we explore in more detail later. As we are interested in the trends driving the changes illustrated in Figure 1, we next report on the results for original papers, conference presentations, and other publications. Original papers are of interest because they show a clear change in their language of publication. Conference and other publications are of interest because they appear to be the driver of the increase in overall publication frequency during the period examined, from 2.6 per faculty member per year in 1979–1980 to 10.2 in 2019–2020, a nearly four-fold increase.

Figures 2–4 focus on the frequency and language medium of original papers, conference papers, and other publications, respectively. In each figure, we chart Japanese, English, and total publication frequency per faculty member per year. While there were some publications in languages other than Japanese and English, they appeared infrequently and did not exhibit clear trends; therefore, here, we concentrate on Japanese and English publications.

Figure 2 shows the publication frequency of original papers for all three departments in aggregate. Examining the total for English and Japanese publication (the blue line in Figure 2), the overall publication frequency has remained relatively constant, starting at 1.2 per faculty member per year in 1979–1980 and finishing at 1.3 in 2019–2020, with a peak of 2.0 in 1989–1990. However, examining English and Japanese in aggregate is somewhat deceiving, as Japanese original papers decreased and English original papers increased during this period, suggesting that publishing original papers in English has largely replaced publishing original papers in Japanese. Specifically, in 1979–1980 and 1989–1990, about 0.8 Japanese original papers per faculty member were published, declining to 0.4 in 1999–2000 and then declining again to 0.1 in

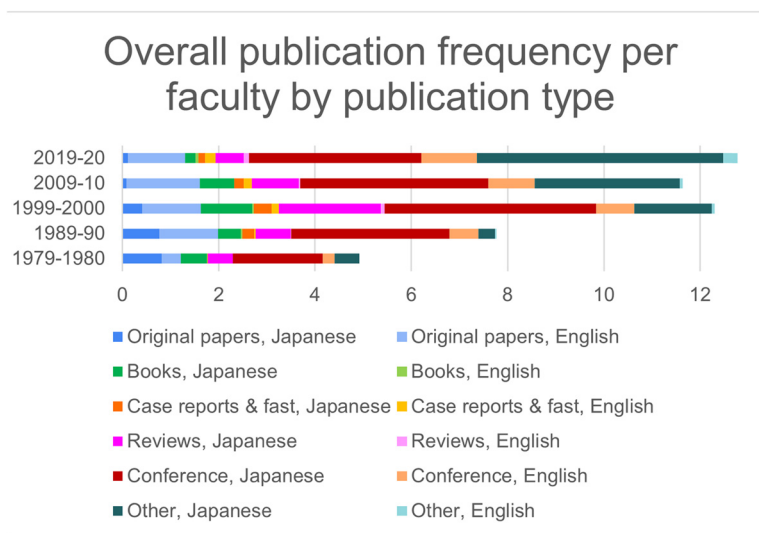


Figure 1: Overall publication frequency per faculty member per year by publication type and language from 1979–1980 to 2019–2020.

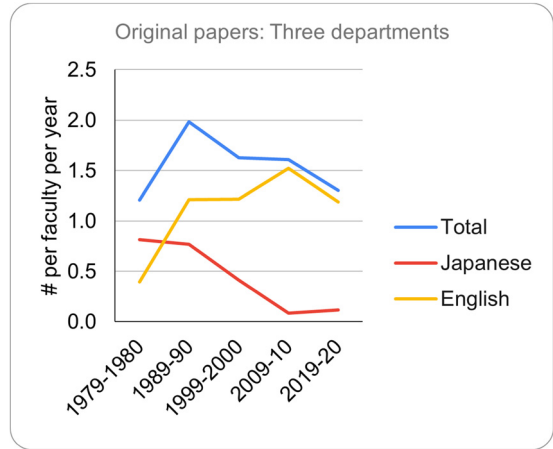


Figure 2: Publication frequency of original papers per faculty member per year from 1979–1980 to 2019–2020.

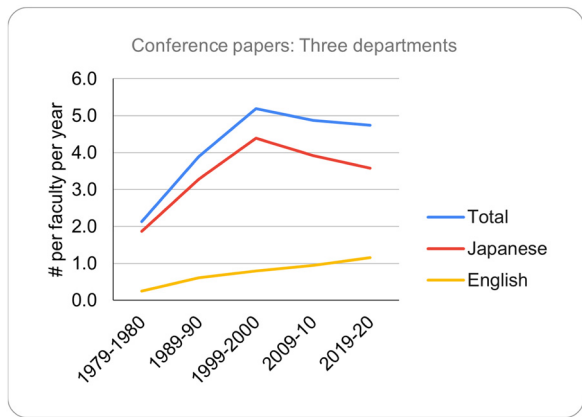


Figure 3: Publication frequency of conference papers per faculty member per year from 1979–1980 to 2019–2020.

2009–2010 and 2019–2020. In contrast, in 1979–1980, 0.4 English original papers per faculty member were published, increasing to 1.2 in 1989–1990 and 1999–2000, reaching a peak of 1.5 in 2009–2010, and then declining slightly to 1.2 in 2019–2020.

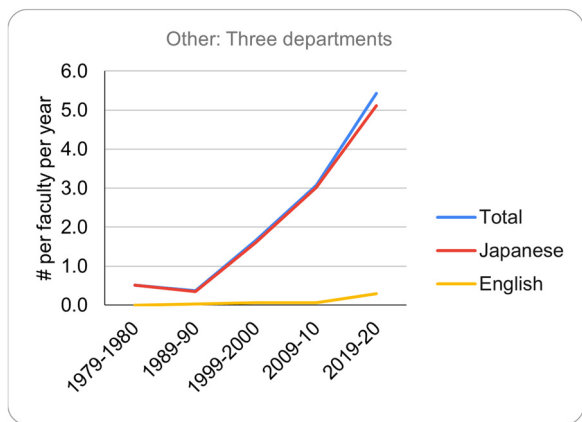


Figure 4: Publication frequency of other publications per faculty member per year from 1979–1980 to 2019–2020.

Figure 3 shows the publication frequency of conference papers per faculty member per year for all three units in aggregate. The publication frequency of conference papers in both English and Japanese (the blue line in Figure 3) more than doubled from 2.1 per faculty member in 1979–1980 to 5.2 in 1999–2000, after which it appears to level off, finishing at 4.7 in 2019–2020. For language of publication, there is a steady increase in English conference paper publication frequency, from 0.2 in 1979–1980 to 1.2 in 2019–2020, a six-fold increase. Japanese language conference paper publication also increases, from 1.9 in 1979–1980 to a peak of 4.4 in 1999–2000, and then decreases slightly to 3.6 in 2019–2020, still nearly double the 1979–1980s frequency.

Figure 4 shows the publication frequency of other publications per faculty member per year for all three departments in aggregate, illustrating how other publications were infrequently published in 1979–1980 and 1989–1990, 0.5 and 0.4 per faculty member per year, respectively (the blue line). However, there is a sharp increase of more than three times in publication frequency to 1.7 in 1999–2000. This increase continues in 2009–2010, to 3.1, reaching a peak of 5.4 in 2019–2020. As Figure 4 shows, almost all this publication type is in Japanese (100% in 1979–1980 and 94% in 2019–2020) with little publication in English (0% in 1979–1980 and 6% in 2019–2020).

Next, the implications of these results for our two research questions are discussed.

5 Discussion and conclusion

Here, we consider how our results answer our two research questions. The first question concerns how publication frequency and language medium of publication changed for this Japanese national university's medical faculty between 1979–1980 and 2019–2020. For the three subspecialties examined here, our analysis shows total publication frequency per faculty member more than doubled from 4.9 in 1979–1980 to 12.8 in 2019–2020, a 264% change, with most of that growth between 1979–1980 and 1999–2000, when the faculty published 12.3 times per faculty member per year, a 253% increase. In contrast, between 1999–2000 and 2019–2020, the additional increase was only 4% (12.3–12.8). This appears to confirm the MEXT (2022) findings that publication in Japan leveled, perhaps because of decreasing funding for its national universities year-over-year (Huang 2014), as they represent most of Japan's annual publications (MEXT 2022). There was also a discernible shift in the language of the original paper publication, with a decrease in Japanese and an increase in English (see previous discussion for Figure 2). This perhaps suggests that considering the considerable resources required for journal paper publication (Lillis and Curry 2010), the faculty are choosing to concentrate on relatively more prestigious English paper publication. However, in our data, the aggregate original paper publication leveling off (both English and Japanese) presents between 1989–1990 and 1999–2000, the decade before MEXT (2022) found a similar leveling off. The leveling off appears to come from decreases in Japanese publication, with English publication remaining relatively steady between 1989–1990 and 2019–2020. Growth was uneven between the different publication types, with conference papers and other publications showing the largest increase, from a combined 2.6 per faculty member per year in 1979–1980 to 10.2 in 2019–2020, a nearly four-fold increase. Conference papers showed an increase in both English and Japanese publications. The publication type that exhibited the largest increase, other publications, at a greater than tenfold change, involved almost exclusive publication in Japanese (see previous discussion for Figure 4). While author language preference is not the only factor that influences publication language, as the languages that journals publish in and the languages of conferences influence what languages it is possible to use in them, authors (and presenters) can to some extent choose where to submit their work based on their language preferences. In our data, it appears that authors are increasingly preferring English language publications for their original papers. In addition to this, they are pursuing increased English and Japanese language publication of conference papers. Further, their publication of other types of publication increased dramatically during the period examined, almost exclusively in Japanese, perhaps indicating the increased importance of meeting evaluation metrics (Khaitova and Muller 2022a,b) and the increased emphasis on the transfer of basic research findings to real-world applications.

Next, we turn to how our data help answer our second research question concerning how these trends differ by publication type, beginning with what is considered one of the most prestigious academic publication types, original papers (Li 2014). While the overall publication frequency of the three subspecialties more than doubled, original papers, consolidated across English and Japanese, remained relatively unchanged over the 40-year period. Another finding is that original paper publication in Japanese decreased by 90%, from 0.8 per faculty member per year in 1979–1980 to 0.1 in 2019–2020 (see previous discussion of Figure 2) while English publication increased three times to 1.2 in 1999–2000 from 0.4 in 1979–1980, peaking at 1.5 in 2009–2010 and then finishing at 2009–2010 levels in 2019–2020 at 1.2. This suggests that English original paper publication has taken priority over Japanese publication, resulting in English publication largely replacing Japanese, perhaps resulting from the Anglicization of the field due to the increasing dominance of English in its professional discourse. One possible explanation for this is that international (English) journals have come to be more highly regarded than domestic (Japanese) journals. This trend toward English publication of original papers is consistent with that of Bennett (2014), who describes English language publication as taking the place of publication in local languages.

In contrast, conference paper publication exhibits an upward trend in Japanese and English publications from 2.1 in 1979–1980 to a peak of 5.2 in 1999–2000, then leveling off to 4.7 in 2019–2020. The trend here is not as clear, as Japanese publication increases for these publication types along with English. Thus, for these publication types, English publication does not apparently come at the expense of Japanese publication (see previous discussion of Figures 3 and 4). This suggests that for these medical subspecialties at this university, publication trends are more complex than a simple narrative of English displacing local language traditions would imply. Broken down by language, we can see two trends. First, English conference papers were uncommon in 1979–1980 at a publication frequency of 0.2 but increased consistently until 2019–2020 to 1.2, suggesting their increasing importance and perhaps faculty's increasing access to the resources necessary for English conference publication, such as funds for international travel. However, the publication frequency of Japanese conference papers grew steadily from 1.9 in 1979–1980 to 4.4 in 1999–2000 and then gradually declined to 3.6 in 2019–2020. This suggests that while Japanese conference papers continue to play a prominent role, they may have been replaced in part by English conference papers. Further, publication frequency leveling off after 1999–2000 lends support to the similar findings of MEXT (2022), perhaps because of declining public funding for national universities over this same period (Huang 2014).

The final publication type we examine here, other publications, exhibits an interesting trend of rapid growth from 1989–1990 onward. In 1979–1980, 0.5 other publications per faculty are published exclusively in Japanese, which remains relatively flat until 1999–2000, when they sharply increase to 1.7, continuing to increase to 5.4 in 2019–2020, more than a 13-fold increase in publication frequency from 1989–1990 (when it was 0.4) of almost exclusively Japanese publications. While English other publications do increase by 2019–2020, they only represent 6% of the other papers published (see previous discussion for Figure 4), underscoring how this work is mainly in Japanese. One explanation for this expansive growth is the increasing metrification of higher education (Kuwayama 2017), including in Japan (Khaitova and Muller 2022a,b), which puts faculty under increasing pressure to publish. As other publications may represent a lower-stakes and more accessible publication type than more prestigious publication types like original papers, this perhaps indicates how researchers use other publications to increase the publications listed on their annual academic research reports. There is also increasing pressure to transfer basic research findings to real-world applications, which may also drive these changes.

Returning to the literature reviewed previously, our analysis contrasts with Fire and Guestrin's (2019) findings; original paper research output as measured by publication frequency remained relatively flat, with a slight spike around 1989–1990. However, Japanese original paper publication declined after 1989–1990, whereas English increased in 1989–1990 and then remained relatively consistent afterward, suggesting these changes are language specific. Our analysis further contrasts with Daizen (2015) and Huang (2015), who found little change between the 1990s and 2000s. In our analysis, this marks the period where there is the largest change in overall publication frequency, from 7.8 publications per faculty member per year in 1989–1990 to 12.3 in 1999–2000, largely driven by increases in conference papers and other publications. Finally, our findings most closely mirror those in MEXT (2022), which show steady increases in publication numbers until

the mid-2000s before they level off. However, original papers, the closest publication type to the bibliometric data analyzed in MEXT (2022), show an earlier leveling off in our data, perhaps due to our data including both English and Japanese publications, whereas bibliometric data tend to overrepresent English publications (Garfield 1972, Muller 2012). One possible explanation for the relative lack of increased overall publication frequency between 1999–2000 and 2019–2020 may be the funding environment of Japanese national universities. Since 2004, grants to national universities in Japan have been reduced by about 1% annually (Huang 2016), which may explain the peak in the original paper publication in 1989–1990 and the gradual decrease in conference publications after 1999–2000 in our data.

Regarding the limitations of our investigation, our decennial time trend analysis (Mandel and Semyonov 2016) examined 8 of the 41 years of data between 1979 and 2020, or about 20%. As with the analysis conducted by Fire and Guestrin (2019), examination of all the available data in aggregate would help to strengthen our conclusions regarding how faculty publications changed during this period. Further, while historical document analysis as a standalone method (Morgan 2022) was sufficient to answer the research questions posed here, incorporating elements of triangulation into our future investigations would help to better explain the trends we have identified. For example, interviews with Japan-based faculty could reveal their perspective regarding the trends we discuss here (Muller 2018). Also, here, we have discussed broad trends using data averaged over 2-year spans. However, there is considerable annual variability in publication practices that is also of potential interest, especially since research output tends to be evaluated on an annual basis at Japanese universities. Thus, analyzing year-on-year changes is a potential area for future investigation. Finally, there is an ongoing debate about whether increases in coauthorship can account for increases in publication frequency (Fanelli and Larivière 2016), so another potential topic for future investigation is the extent to which coauthorship among these faculty has changed. Nevertheless, despite these limitations, that our investigation mirrors the findings in MEXT (2022) suggests that the breadth and depth of the analysis that we present here was sufficient to answer the research questions posed.

To conclude, we found that overall publication frequency for this university's medical faculty increased between 1979–1980 and 2019–2020, more than doubling. However, this doubling is not consistent with increases in publication frequency identified by Fire and Guestrin (2019), whose data use journal publication indexes. This is because the changes we observe are mostly due to increases in conference papers and other publication frequency, with the overall publication frequency of original papers remaining largely unchanged, despite the language of publication of original papers shifting from Japanese to English. Further, Daizen (2015) and Huang's (2015) findings are not confirmed, as we see the largest change in overall publication frequency between 1989–1990 and 1999–2000, again driven largely by increases in conference papers and other publications. Our findings do confirm those in MEXT (2022), which show increasing publication until the mid-2000s and then a gradual decrease, although with the peak a decade earlier than that identified by MEXT (2022). We use three medical subspecialties from a single national university faculty as a proxy for Japanese higher education more broadly, so one possible explanation of these findings is that the forces driving the changes we observed are not common across Japanese higher education more broadly. Nevertheless, the picture of faculty publication trends outlined here shows that there is greater complexity at play than current narratives of faculty publication trends appear to account for. This suggests that greater attention to the quality of underlying data when investigating publication trends and the limitations of what is and is not being examined, should be better understood to more accurately describe how publication frequency and language of publication are changing. This is particularly true for faculty members based outside Anglophone centers of knowledge production, such as the Japanese medical faculty members examined here.

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Japanese language summary: 学術的な講演における英語の優位性はよく知られており、英語による出版物の増加が、各国語の出版物を犠牲にしていることの証明として用いられている。しかし、英語の出版頻度が時間とともに増加しているという証拠はあるが、高等教育の英語圏以外の大学の学部が出版頻度の言語をどのように変化させたかを調べた研究はほとんどない。そこで、本調査では、先に行った1979–1980年から2017–2018年までの大学出版報告書の通時的分析を発展させ、日本の国立大学医学部全体の出版頻度を、言語媒体別の出版頻度とともに時系列的に分析した。我々は以前、ジャーナル論文において英語による出版が日本語による出版に大きく取って代わることを発見した。しかし、その最初の通時的な分析では、その変化がいつ顕在化したのかはわかりませんでした。今回の調査では、1979年から2020年までの10年間の出版報告書の時系列文書分析を通じて、この点を明らかにした。この40年間のデータを分析することで、出版物の頻度、種類、言語媒体がどのように変化したかが明らかになった。具体的には、論文発表の頻度が最も大きく変化したのは、1989–1990年から1999–2000年の間であることがわかる。この変化は主に、ジャーナル引用データベースの分析では通常調査されない出版タイプである、会議論文やその他の出版物によってもたらされている。

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