

Original Article

Faculty Publication Trends in a Japanese National University's Medical Faculty

-A Preliminary Diachronic Comparison-

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This paper presents a diachronic analysis of publication frequency and language medium for a Japanese national university's medical faculty. Studies of trends in global writing for academic publication tend to implicate English language publication frequency increasing at the expense of publishing in national languages (Bennet, 2014). However, while increases in English language publication have been demonstrated (Fire & Guestrin, 2019), there remains little quantitative analysis of how the language publication practices of university faculty from outside the Anglophone center of higher education have changed, with Kyvik (1990, 2003), Daizen (2015), and Huang (2015) being notable exceptions. Here we diachronically analyze publication reports for a Japanese university's medical faculty, examining annual university publication reports across two time periods, 1979 to 1980 and 2017 to 2018 for three medical subspecialties; biochemistry, internal medicine, and pathology. Across the subspecialties, English language publication in the most prestigious publication type, original journal articles, has largely come at the expense of Japanese language publication, with Japanese publications and English publications switching places in terms of frequency of publication between 1979 to 1980 and 2017 to 2018. However, less prestigious publication types have increased for both Japanese and English, suggesting that professional communication in Japanese remains important.

1. Introduction: Investigating publication trends

Here we present a diachronic analysis of language medium of publication and frequency of publication between the years 1979 to 1980 and 2017 to 2018 for a Japanese national university's medical faculty. The increased publication of English language academic work is by now well-documented (Fire & Guestrin, 2019) and tends to be implicated as evidence of English language publication frequency increasing at the expense of publishing in national languages (Bennet, 2014). However, quantitative analyses of how the language of publication practices of university faculty from outside of

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the Anglophone center of higher education have changed over time are not well represented in the literature, with Kyvik (1990, 2003), Huang (2015) and Daizen (2015) being notable exceptions. To address this, we diachronically analyze publication reports for a Japanese university's medical faculty across two time periods, 1979 to 1980 and 2017 to 2018 for three different medical subspecialties; biochemistry, internal medicine, and pathology. Our analysis elucidates how publication frequency, type, and language medium have changed over the approximately 40-year period. Further, we examine questions such as whether overall frequency of publication has increased for both Japanese and English, or whether publication in English has come at the expense of publication in Japanese.

The specific research questions we address are:

1. How does the language of publication among Japanese national university faculty change between 1979 to 1980 and 2017 to 2018 within these three medical subspecialties?
2. What trends are there concerning types of publication?

We begin with a review of investigations into research publication frequency, particularly pertaining to the Japanese academy. This is followed by a description of our document analysis methodology (Bowen, 2009). Next our results are presented, followed by a discussion of the research implications of our findings along with some of the methodological implications of our investigation. Our conclusion summarizes our main findings and points a direction forward regarding how the current preliminary project can be further developed in the future.

2. Review of higher education's changing publication practices

As we are examining the changing publication practices of Japanese faculty working at a national university, here we review how analyses of publications and publishing trends have been presented previously in the literature. We use two broad categories to organize our review based on the underlying data that tend to be examined in the investigations reviewed. By far the most prevalent method used to examine writing for publication trends is citation analysis, or examining large databases of sets of journals, the manuscripts they have published, and the references cited in them. These studies are reviewed first below, considering their prominence in the larger literature. Another less common method used to examine the publications of scholars is surveys asking about faculty publication "outputs" (Daizen, 2015, p. 151). As these investigations are important to understanding publication trends among multilingual authors, particularly Japanese faculty (Daizen, 2015; Huang, 2015), they are reviewed second below. These reviews are then followed by a discussion of different issues arising from the two research methodologies discussed, along with how the current investigation was designed to address them.

Knowledge production represents an important aspect of higher education's contribution to society, and as such, there have been various efforts to quantify the knowledge produced by fields (Libaers, 2007), nations (Commonwealth of Australia, 2005), regions (Vasconcelos, et al., 2008), and departments within institutions (De Groote & Raszewski, 2012). The currently most prevalent method of analysis of publications involves the application of citation analysis to generate

quantitative representations of publication output. Citation analysis was originally conceived as a way for librarians to determine which individual journals within the field of chemistry were important to subscribe to using the “arbitrary standard” (Gross & Gross, 1927, p. 386) of counting citations across prominent journals. Garfield (1955) applied this technique within the budding field of data science, aided by the availability of automatic computing processes, to comparatively rank “all ‘significant’ and ‘important’ journals” (Garfield, 1972, p. 529). Interestingly, Garfield acknowledges what has become a criticism of the impact factor index in modern times; its lack of coverage of journals published in languages other than English, writing that this may have “adversely influenced the ranking of Russian and Japanese journals, for example” (p. 529). Despite criticisms of its fitness for purpose (Fire & Guestrin, 2019; Muller, 2012; Seglen, 1997), citation indexing has been used for a variety of analytical purposes, including evaluation of the relative importance of different journals within their fields (Garfield, 1972) and in the comparative evaluation of output between different fields and faculties (De Groote & Raszewski, 2012; Libaers, 2007). One finding from such studies is Fire and Guestrin’s (2019) observation that the “average number of coauthors by academic birth decade” (p. 10) has more than doubled for authors’ first publication year, from less than five in the 1950s and 60s to more than ten in the 2010s.

As indexes are limited to only the papers included in them, researchers interested in answering questions about overall faculty productivity, particularly in higher education settings where more than one language is used, such as in Norway and Japan, have turned to surveys of authors to answer these questions. Among such studies, Kyvik (1990, 2003), investigating the publications of Norwegian faculty, is important to review because similar methods of investigation were applied in the Japanese studies reviewed next. Kyvik (1990) examined survey data for Norwegian university faculty publications between the years 1979 to 1981, finding that during the period faculty published an average of about 1.6 articles per year, with half (0.8) published “in a non-Scandinavian language” (p. 43). Following up on this initial study, Kyvik (2003) examined the publications of Norwegian faculty across six fields, including medicine, for 1998 to 2000. Concerning Norwegian medical faculty, Kyvik found that they published about 2.7 “articles in scientific journals”, about 0.7 “articles in books and reports” (p. 38), and about 0.2 books and about 0.2 reports per year. Kyvik uses percentages for comparison across the three time periods, finding that in medicine the percentage of papers published in a non-Scandinavian language between 1979 to 1981 and 1998 to 2000 was unchanged at about 80 percent. Kyvik also shows that during the period, the percentage of “articles” (p. 39) published in medicine remained above 90 percent.

More immediately relevant to a study of publications in the Japanese academy, Daizen (2015) compared “research outputs by category according to academic discipline in 1992 and 2007” (pp. 151-2). More specifically, in those two years, there was a survey of Japanese faculty asking about their “scholarly contributions in the previous 3 years” (p. 150). Daizen’s data suggests faculty in the field of “health and medical sciences” (p. 151) in the three years prior to 1992 produced on average about one book per author per year, edited one book about every four years, about 5 research articles in books or journals per year, about one research report or monograph, about 5 papers presented at a conference, and about two other types of output. In the three years prior to 2007, according to the survey data Daizen analyzed, these numbers decreased slightly relative to 1992. Examining language of publication, Huang (2015), analyzing the same survey data as Daizen, found that among “medicine and dentistry” (p. 199), between the three years preceding 1992 and

those preceding 2007, faculty publications remained largely unchanged. Huang found faculty published about 0.2 “articles or books abroad” per year in 1992 and 2007, about 0.3 “articles or books written in foreign languages” per year in 1992, which rose to about 0.4 in 2007, and 0.8 “lectures provided for international students” per year in 1992 and 0.7 in 2007.

To summarize, the survey data examined, specifically by Daizen (2015) and Huang (2015), suggests that between 1992 and 2007 within the field of medicine publication output among the Japanese faculty was relatively unchanged, with the most frequent publication types being papers in books or journals and papers presented at a conference, both about five per year (Daizen), with a paper published in English once every three years and published abroad once every five (Huang). Among the Norwegian medical faculty analyzed by Kyvik (2003), there were about three articles published per faculty member annually in 2003, the majority of which were published in English. However, Fire and Guestrin (2019), using bibliometric data, find that the authors in their database do appear to be publishing more frequently over time, which raises some potential questions that we hope to address through the current investigation. Specifically, concerning the medical faculty examined here, is there a general upward trend in frequency of publication over time that can be found through examining a larger period of time, in this case between 1979 to 1980 and 2017 to 2018? Further, Daizen (2015), Huang (2015), and Kyvik (2003) appear to assume that the broad field of medicine can be analyzed in aggregate, averaging across subspecialties. However, Fire and Guestrin (2019) “observed that citation-based metrics are not beneficial for comparing researchers in different fields, or even in the same department” (p. 1). Therefore, by examining several subspecialties within medicine, we hope to reveal the extent to which the broader field can be treated as an aggregate of its various subspecialties.

A potential criticism of citation analysis is that it focuses almost exclusively on journal article publication, largely ignoring books and other publication types (Garfield, 1972; Muller, 2012). The potential shortcoming of a focus on only journal articles is highlighted by Huang and Chang (2008), who demonstrate that journal article publication can be as low as 11 percent (p. 1821) of faculty publications. This suggests that an exclusive focus on journal article publication may distort representations of the publication practices of some authors and some fields. The relative prestige of different publication types tends to be assumed rather than explicitly investigated in the literature. Lillis and Curry (2010) describe “the three most prestigious categories of publication” (p. 35) as books, book chapters, and journal articles. However, they are an exception, as much of the discussion of authors’ publishing practices takes a position closer to Li (2014), who argues that “publishing in high-prestige scholarly journals is what tenure, promotion, grants and other rewards hinge upon” (p. 42). While Li is writing about how “‘international’ journals enjoy a higher status than national journals” (p. 42), it is noteworthy that her discussion does not include other publication types, such as books, book chapters, and conference proceedings papers. By examining the publication reports of Japan-based faculty, our investigation can reveal the extent to which their ‘outputs’ are dominated by publication of journal articles, as opposed to other types of publications.

In addition, there are some methodological issues with the research reviewed here that our investigation addresses. First, as citation indexes exclude certain publication types, by examining the library produced listing of publications for a Japanese university, we hope to capture a fuller picture of the Japanese faculty’s writing for publication. Further, survey data as a source of information about the practices of individuals is notoriously unreliable, particularly when asking

individuals to reflect on their memories (Beam, 2012). Thus, the extent to which the survey data Daizen (2015) and Huang (2015) report, asking participants to recall their previous three years of publications, reflects actual faculty publication practices would benefit from verification via other means. An advantage of a library produced research report is that rather than presenting numbers in aggregate, every publication is listed, making memory errors less likely to be an issue, particularly relative to survey research, as the details of each entry are supplied.

However, we are unfortunately unable to address all the potential shortcomings of the research reviewed here. Specifically, increasing co-authorship in publications has been raised as a concern for the biomedical research field (Schaffer, 2014; Wislar et al., 2011). While in the citation index literature this is evidenced through Fire and Guestrin's (2019) finding that the number of coauthors more than doubled between the 1950s and the 2010s from less than five to more than ten, in the survey data reviewed co-authorship was not examined, and so is difficult to comment on. While there is the potential to examine questions such as this one through the library publication reports analyzed, doing so would require more resources than were available for the current project. Nevertheless, we feel this examination of publication trends, while by necessity not addressing all potential types of change in publication practices over time, makes a substantial contribution of relevance to issues concerning the publication practices of Japanese university faculty.

3. Methods

This investigation examines publication data for three subspecialties in the Faculty of Medicine at the University of Toyama, Japan through historical document analysis (Bowen, 2009). The term document analysis is used to differentiate the study of sets of documents within sociology from the study of individual documents, or semiotics, and other "qualitative methods such as participant observation and focused interviewing" (Altheide, 1996, p. 2). Altheide (1996) explains that "*document analysis* refers to an integrated and conceptually informed method, procedure, and technique for locating, identifying, retrieving, and analyzing documents for their relevance, significance, and meaning" (p. 2, italics in original). Importantly, "the meaning and significance of all documents is informed by the research perspective and act" (p. 2). Thus, "it is the *researcher's interest and relevance* plus the retrievable characteristic that produce a research document" (p. 2, italics in original). A document in this instance is "an artefact which has as its central feature an inscribed text" (Scott, 1990, p. 5) that "has an existence independent of the researcher, although its meaning and significance for the research act will depend on the researcher's focus" (Altheide, 1996, p. 2). Thus "the document will not be transformed into 'data' without the researcher's eye and question" (p. 2). As noted in the literature review, one advantage of this approach is its potential to circumvent the shortcomings of survey data, which can be prone to inaccuracies (Beam, 2012). Documents, while subject to their own biases, may provide a more reliable account of some past activities than survey responses.

Here our document analysis is presented as a standalone research project, relying on the library research reports examined to draw inferences regarding the data analyzed. While this is consistent with Scott's (1990) and Altheide's (1996) description of document analysis as a promising, distinct research method, Bowen (2009) notes its compatibility with "other qualitative research methods as a means of triangulation", or to "seek convergence and corroboration through

the use of different data sources and methods” (p. 28). Bowen points out that these “include interviews, participant or non-participant observation, and physical artifacts” (p. 28). While we acknowledge the potential of incorporating additional data analysis methods such as interviews with faculty about their publication practices, for the purposes of the current investigation, we present our document analysis as a standalone project, the findings from which may influence the research questions of future projects following on from the current investigation.

The subspecialties of biochemistry, internal medicine, and pathology were chosen for this initial, preliminary analysis based on the number of faculty, their international composition, compatibility within the available data over time, and to cover research and clinically-oriented fields. The data were analyzed using publication reports available on the university’s online repository (University of Toyama, 2020). They include publication data for each faculty member affiliated with the medical faculty, organized by department, annually (富山医科薬科大学附属図書館運営委員会, 1980, 1981; 富山大学附属図書館医薬学図書館運営委員会, 2018, 2019).

The information for the three selected fields in the reports was analyzed for the years 1979 to 1980 and 2017 to 2018, with the original categories for publication type used in the publication reports preserved (see Table 1). In addition to analyzing the number of manuscripts published by publication type as presented in the reports, we also analyzed language medium of publication according to whether the title of the publication was in Japanese, English, or another language (see Table 1). The annual data is compared diachronically, averaging across each two-year span, 1979 to 1980 and 2017 to 2018 by adding the total publications for both years then dividing by the number of faculty members.

4. Results

The average publication data for the three subspecialties and all three fields in aggregate is presented in Table 1, along with the changes between the period of 1979 to 1980 and 2017 to 2018 in the columns headed with the Δ symbol, which denotes change. Average publications per faculty was used to account for changes in faculty numbers between the two time periods while still making the data comparable.

Two striking trends from the data that we discuss are the increase in original paper publication in English at the expense of Japanese language publication and the increase in conference presentations in both English and Japanese for all three fields in aggregate. To make these trends more apparent, Figure 1 presents this data from Table 1 in a graphical format.

Examining original papers across all three fields in aggregate, English language publication increased while Japanese language publication decreased, suggesting English publication does appear to negatively impact Japanese publication frequency (Figure 1, left). Specifically, there was an increase of 0.8 English articles per faculty per year (0.4 per year to 1.2 per year, a 211% increase) and a decrease of 0.7 Japanese articles (0.8 per year to 0.1 per year, an 85% decrease) between 1979 to 1980 and 2017 to 2018. However, when looking within the subfields examined, this change is most apparent within internal medicine and pathology, which both exhibit a marked increase in English language publication and corresponding decrease in Japanese publication. Biochemistry, on the other hand, shows a decrease in original paper publication for the same period, both in Japanese and English. Thus, while the trend is clear for two of the three subspecialties examined, it is not clear across all three of the subspecialties. Concerning book publication, across all

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Table 1

Average publications per faculty and total publications (in parenthesis) for pathology, internal medicine, biochemistry, and all three fields combined for the periods 1979 to 1980 and 2017 to 2018, along with change data

Type	All 3 fields				Pathology				Internal Medicine				Biochemistry				
	1979-80	2017-8	Δ *	% Δ	1979-80	2017-8	Δ	% Δ	1979-80	2017-8	Δ	% Δ	1979-80	2017-8	Δ	% Δ	
# faculty	43	59	+16	+37%	10	12	+2	+20%	24	36	+12	+48%	9	12	+3	+28%	
Avg # books	Total	0.6 (24)	0.3 (18)	-0.3 (-6)	-45% (-25%)	0.3 (3)	-0.3 (-3)	-100% (-100%)	0.7 (18)	0.5 (17)	-0.2 (-1)	-33% (-3%)	0.4 (4)	0.1 (1)	-0.3 (-3)	-77% (-71%)	
	JP	0.5 (23.5)	0.3 (16)	-0.3 (-7.5)	-50% (-32%)	0.3 (3)	-0.3 (-3)	-100% (-100%)	0.7 (18)	0.4 (15)	-0.3 (-3)	-41% (-14%)	0.3 (3)	0.1 (1)	-0.2 (-2)	-73% (-67%)	
	Eng	0 (0.5)	0 (2)	0 (+1.5)	+192% (300%)					0.1 (2)		N/A	0.1 (1)			-100% (-100%)	
Other																	
Avg # original papers	Total	1.2 (52)	1.3 (79.5)	+0.1 (+27.5)	+11% (+53%)	1.2 (12)	1.2 (14)	+0 (2)	-3% (17%)	1.2 (29)	1.8 (63)	+0.6 (+34)	+47% (+116%)	1.2 (11)	0.3 (3)	-1 (-8)	-79% (-73%)
	JP	0.8 (35)	0.1 (7)	-0.7 (-28)	-85% (-80%)	1 (10)	0 (1)	-1 (-10)	-96% (-95%)	1 (24)	0.2 (6)	-0.8 (-18)	-82% (-74%)	0.2 (2)	0 (1)	-0.1 (-1)	-73% (-67%)
	Eng	0.4 (17)	1.2 (72.5)	+0.8 (+55.5)	+211% (+326%)	0.2 (2)	1.1 (14)	+0.9 (+12)	+463% (+575%)	0.1 (6)	1.6 (57)	+1.5 (+51)	+1138% (+927%)	1.1 (10)	0.2 (3)	-0.8 (-7)	-80% (-74%)
Other																	
Avg # case reports & bulletin	Total	0 (0.5)	0.4 (21.5)	+0.4 (+21)	+3034% (+4200%)		0.5 (6)	+0.5 (+6)	N/A	0 (1)	0.4 (16)	+0.4 (+15)	+1932% (+3000%)			0 (0)	
	JP	0 (0.5)	0.1 (8)	+0.1 (+7.5)	+1066% (+1500%)		0 (3)	+0 (3)	N/A	0 (1)	0 (6)	+0 (5)	+648% (+1000%)			0 (0)	

Type	All 3 fields				Pathology				Internal Medicine				Biochemistry				
	1979-80	2017-8	Δ^*	% Δ	1979-80	2017-8	Δ	% Δ	1979-80	2017-8	Δ	% Δ	1979-80	2017-8	Δ	% Δ	
Eng		0.2 (13.5)	+0.2 (+13.5)	N/A		0 (4)	+0 (4)	N/A		0 (10)	+0 (10)	N/A		0 (0)			
	Other																
Avg # review articles	Total	0.4 (19)	0.7 (43.5)	+0.3 (+24.5)	+67% (+129%)	0.1 (1)	0.1 (2)	+0 (2)	+67% (+300%)	0.7 (17)	1.1 (37)	+0.4 (+21)	+53% (+124%)	0 (2)	0.4 (5)	+0.4 (+3)	+72% (+125%)
	JP	0.4 (17)	0.6 (35.5)	+0.2 (+18.5)	+18% (+61%)	0.1 (1)	0 (1)	0 (0)	-17% (0%)	0.7 (17)	0.9 (31)	+0.2 (+15)	+27% (+88%)		0.3 (4)	+0.3 (+4)	0% (-20%)
	Eng		0.1 (7)	+0.1 (+7)	N/A		0 (1)	+0 (1)	N/A		0.2 (6)	+0.2 (+6)	N/A		0 (1)	+0 (+1)	N/A
	Other																
Avg # conf pres	Total	2.1 (91.5)	4.9 (289)	+2.8 (+197.5)	+130% (+216%)	0.9 (9)	3.1 (38)	+2.2 (+29)	+247% (+317%)	2.9 (70)	6.6 (230)	+3.7 (+161)	+129% (+231%)	1.4 (13)	1.9 (22)	+0.4 (+9)	+30% (+65%)
	JP	1.9 (80.5)	3.7 (218.5)	+1.8 (+138)	+98% (+171%)	0.9 (9)	3 (37)	+2.2 (+28)	+258% (+329%)	2.5 (61)	5.1 (179)	+2.6 (+118)	+104% (+193%)	1.2 (11)	0.3 (4)	-0.9 (-8)	-75% (-68%)
	Eng	0.2 (10.5)	1.2 (70.5)	+1 (+60)	+389% (+571%)		0.1 (1)	+0.1 (+1)	N/A	0.4 (9)	1.5 (52)	+1.1 (+43)	+311% (+506%)	0.2 (2)	1.6 (18)	+1.3 (+16)	+604% (+800%)
	Other	0 (0.5)		0 (-0.5)	-100% (-100%)	0.1 (1)		-0.1 (-1)	-100% (-100%)			0 (0)				0 (0)	
Avg # other	Total	0.5 (22)	5.6 (331)	+5.1 (+309)	+997% (+1405%)	1 (10)	1.7 (21)	+0.7 (+11)	+71% (+105%)	0.5 (12)	8 (281)	+7.5 (+269)	+1611% (+2339%)	0.1 (1)	2.6 (30)	+2.6 (+30)	+4611% (+5900%)

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Type	All 3 fields				Pathology				Internal Medicine				Biochemistry			
	1979-80	2017-8	Δ *	% Δ	1979-80	2017-8	Δ	% Δ	1979-80	2017-8	Δ	% Δ	1979-80	2017-8	Δ	% Δ
JP	0.5 (22)	5.3 (312)	+4.8 (+290)	+934% (+1318%)	1 ¹ (10)	1.7 (20)	+0.7 (+10)	+67% (+100%)	0.5 (12)	7.7 (271)	+7.3 (+259)	+1548% (+2252%)	0.1 (1)	1.9 (22)	+1.8 (+21)	+3268% (+4200%)
Eng		0.3 (18)	+0.3 (+18)	N/A		0 (1)	+0 (1)	N/A		0.3 (10)	+0.3 (+10)	N/A		0.7 (8)	+0.7 (+8)	N/A
Other		0 (1)	0 (+1)	N/A										0.1 (1)		N/A

All publication numbers are an average of the publication data for the two years examined.

* Denotes the change between 1979-1980 and 2017-2018

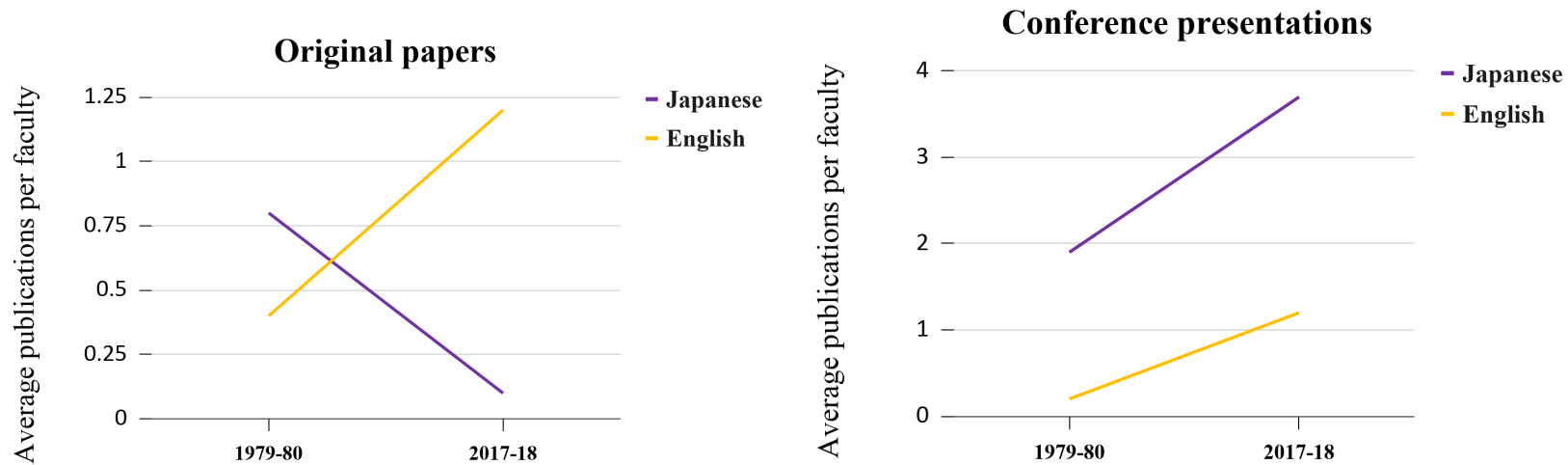


Figure 1. Differences in publication of original papers (left) and conference presentations (right) between 1979 to 1980 and 2017 to 2018

three fields it fell 0.3 books per faculty per year (a 45% decrease), with the majority of this being Japanese books at a decrease of 0.2 (0.5 to 0.3, a 50% decrease), a trend reflected across all three of the subspecialties examined.

However, examining review articles and other publications shows a marked increase in both English language and Japanese language publication across all three fields (Figure 1, right), albeit with some more pronounced than others. This is also true for case reports and bulletins for pathology and internal medicine. For example, the largest gains in publication output were found in others with an average increase of 5.1 publications per faculty (a 997% increase), followed by conference presentations with an increase of 2.8 per faculty (a 130% increase). The two types of publication, case reports & bulletins and review articles saw smaller increases of 0.4 publications per faculty (a 3,034% increase) and 0.3 publications per faculty (a 129% increase), respectively. While original papers showed a marginal increase of 0.1 publications per faculty (an 11% increase) and books a decrease of 0.3 publications per faculty (a 45% decrease).

The implications of these results for our research questions are considered next.

5. Discussion

Here we return to our research questions, addressing each in turn. The first question concerns how the language of publication of faculty working at a Japanese national university changes between 1979 to 1980 and 2017 to 2018 within three medical subspecialties. The diachronic analysis shows that there was an observable shift in the language of publication types for original papers and books across the two time periods, which exhibited a decrease in Japanese language publication and an increase in English language publication. However, the average for conference presentations in all three fields shows an increase for both Japanese and English. Next we discuss how our data helps us to answer our second research question, concerning the trends in type of publication observed, starting with what are typically considered more “prestigious” (Lillis & Curry, 2010) publication types: original papers and books.

When examining all three medical fields in aggregate, the publication of original papers in Japanese decreased by 88% and the publication of original papers in English increased by three times. This suggests that within these medical subspecialties there has been a shift in focus away from Japanese language publication towards English language publication between 1979 to 1980 and 2017 to 2018, with English language publication largely displacing Japanese publication. This increase in English language publication could be the result of global trends toward publishing research in English at “international levels” (Lillis & Curry, 2018, p. 55). However, examining trends within each of the three fields, they are not consistent across all three subspecialties. Specifically, within biochemistry, publication of original papers fell between 1979 to 1980 and 2017 to 2018. This suggests that while there are overall trends exhibited across these three fields, it cannot be taken for granted that all three are exhibiting similar changes. This resonates with Fire and Guestrin’s (2019) findings of variation across researchers’ citation metrics within fields. The publication of books also mirrors the trend mentioned above; of an increase in English language publication and a decrease in Japanese language publication, with the exception of a decrease in the overall publication frequency of books between the two time periods.

The remaining publication types included in our analysis; review articles, conference presentations, case reports and bulletins, and others, exhibit an increase in publication frequency for both Japanese and English for all three medical

subspecialties. However, conference presentations, review articles, and others showed a much more dramatic increase in frequency in Japanese language than in English language for pathology and internal medicine. This is a somewhat different finding from that of original papers where English language publication seems to come at the expense of Japanese language publication. Rather, it suggests that English language publication did not replace Japanese language publication, with Japanese continuing to play an important role in the academic discourse of these medical subfields. Notably, conference presentations in pathology and internal medicine increased more dramatically for Japanese language than English language, suggesting that spoken Japanese continued to play a prominent role in the Japanese academy for these subspecialties. On the other hand, conference presentations in biochemistry exhibit a different trend, with Japanese decreasing (by 75%) and English increasing (by 604%). These findings suggest that while it appears that academic researchers in these medical subfields increased their overall publication output, there was a more significant increase in less traditionally “prestigious” (Lillis & Curry, 2010, p. 35) publication types, with original papers showing only a marginal increase and books showing a slight decline in output. Despite conference presentations showing an overall increase across all three fields, within biochemistry there was a decrease in Japanese and an increase in English, making the trends exhibited more consistent with original papers within this subfield. Within the field of biochemistry, it seems that English at least partially replaced Japanese, and that biochemistry as a field may be experiencing different publication pressures or expectations than the other two subfields examined. This result again echoes Fire and Guestrin's (2019) findings that variability exists for citation metrics across fields.

Comparing these findings to other similar studies, such as Kyvick (2003) who examines the Norwegian context, and Daizen (2015) and Huang (2015) who examine Japanese faculty output, our investigation has shown clear upward trends in English language publication coming at the expense of Japanese publication for more prestigious publication types (books and journal articles). We have also found that the less prestigious types of publication showed even more dramatic increases in publication frequency, likely reflecting the increased use of publication metrics for faculty evaluation influencing how often faculty publish and in what languages they publish. This also illustrates that journal impact factor metrics, which tend to measure only journal article publications, are likely missing a large part of the publication outputs of the Japanese faculty, particularly if the publication trends observed here are reflective of the wider Japanese higher education faculty.

6. Conclusion

Through our examination of library publication data for medical faculty at a Japanese university between 1979 to 1980 and 2017 to 2018, we have demonstrated that for the three subspecialties examined, English language publication has increased for the more prestigious types of publication, original articles and books, at the expense of publication in Japanese. However, assumptions of the homogeneity of medical subspecialty fields have been shown to be problematic, as biochemistry exhibited different trends from pathology and internal medicine concerning original articles and conference presentations. Further, less prestigious publication types increased in frequency across the board, both in English and Japanese generally, although again there was some variation, particularly within biochemistry. These findings

of increased English language publication and increases in publication outputs contrast with Daizen (2015) and Huang's (2015) findings of few changes between the early 1990s and the first decade of the 2000s. It is likely that the longer period of time used for this investigation, spanning nearly 40 years, has helped to evidence the changes described here.

This preliminary investigation of a limited number of years of publication data and a limited subset of medical subfields has shown the considerable potential for expanding the current investigation further. As there is publication data available for all of the medical faculty at the university from its inception in 1977 until 2018, what remains is to increase the coverage of subfields examined and to expand the number of years analyzed. Further, the issue of changes in co-authorship practices over time could be examined through tracking the number of coauthors of the different texts analyzed here. There are also questions about year-on-year variability in publication frequency that could be answered through examining each year of the data separately rather than averaging across years as we have done here. Finally, the incorporation of other research methods beyond document analysis, such as interviews of faculty in different subspecialties could help to better elucidate some of the forces underlying the trends discussed here.

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