

AUTHORSHIP ON AND USAGE OF PUBLISHED PAPERS IN CURRENT SWEDISH BIOMEDICAL THESES

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Swedish publication-based biomedical doctoral dissertations examined since 1992 were compared with a sample from 1968–92. Theses in either group had an average of four published papers and one submitted manuscript. The average number of authors per paper was four in the 1992+ sample, an increase of one author on the 1968–92. The candidate was first or sole author on 77% of papers indicating that the same paper is not used for several theses. It is proposed that three papers should form the basis of a common European PhD if this is to be completed, including examined, within three years, and four papers if four years.

Introduction

The average number of authors per paper published in three premier biomedical journals, *Nature*, *J. Biol. Chem.* and *Biochem. J.*, doubled from a median of two in 1971 to four in 1991.¹ Two independent surveys of eight other major journals found an average of six authors per paper.^{2,3} This increase is at least partly owed to more collaborations and that many of the modern molecular biology techniques require much hands on work at the bench. On the other hand, *Epstein* has suggested that the Vancouver convention encourages authorship inflation because up to six names of authors on a paper can appear in the reference list.³ These increases in author numbers pose potential problems in attribution, crucial to operate publication-based doctoral systems. For example, papers forming part of Dutch biomedical doctoral dissertations between 1991–93 had an average of five authors⁴ whereas papers in Swedish doctorates between 1968–92 had an average of three.² As publication-based systems are candidates for common European degrees⁵ and as they are readily available on and even examined over the Internet,^{1,4} current Swedish practice would be a benchmark.

Results

To ascertain current Swedish usage, I randomly selected and inspected 72 Swedish biomedical doctoral theses from all the universities since 1992. The results are summarised in the Table 1. 47 out of the 72 theses (65%) had been examined since January 1, 1995 so the population reflected recent practice. 23 (32%) were written by women and 49 (68%) by men, a proportion similar to Dutch theses (25% v 75%).¹ 45 theses by men and 19 by women contained material identified as "manuscript submitted" (MS).

Table 1
Authorship characteristics of papers used to support Swedish doctoral theses

Authorship characteristics of papers	1992-	1968-92*
Number of theses	72	69
Papers per theses median (range)	4 (2-11)	4 (1-17)
Total number of papers	302	283
Total number of manuscripts	111	91
Authors per paper median (range)	4 (1-14)	3 (1-10)
Candidate first or sole author (%)	75	77

* Adapted from Ref. 2.

Four papers per thesis is still the rule in a Swedish dissertation

The mode and median number of papers per thesis was four with a range of 2-11 and an arithmetic mean of 4.2. 67% (48 theses) had four or more papers. In previous studies, Dutch and Swedish doctorates on average had four papers as did the British MDs when they contained papers although British PhDs had only two papers.⁴

31 theses had one manuscript (MS), 23 had two MS, 10 had three MS and one had four MS (data not shown). Thus, overall 90% (65/72) contained a MS compared with 74% (51/69) between 1968-92.² The mode and median number of MS was one and only 12% of theses had more than two MS. The most common configuration was four papers and one MS, the same as previously.²

One additional authors per paper

The average (mode and median) number of authors on papers and MS were four. The ranges were 1-14 and 1-16, respectively. Only 6% of papers or MS had eight or more authors. Thus, the average number of authors on papers forming part of Swedish biomedical doctoral dissertations have increased by one from three between 1968-92.²

The same paper is not used in several theses

The recognised premier positions of authorship are first and sole, and last when project leader. The candidate was the first author on 75% of papers and 89% MS. When the sole authors were included this proportion was 75% and 92%, respectively. Thus, the same papers are not used to support several theses. In the previous studies, these figures for Dutch and Swedish doctorates and British MD and PhD were 84%, 77%, 88%, and 66%, respectively.^{2,4,6}

Discussion

Publications are the life-blood of science. Scientists publish, if only to get and keep grants! Publication-based dissertations publically examined have many advantages.⁵ Indeed, one study in the UK has found that publishing the work correlated with submitting theses timely and successfully.⁷ Likewise, the International Union of Biochemistry and the International Union of Immunological Societies have issued guidelines that the work in a PhD thesis should have been published or be of a publishable standard.^{8,9} Concern about publications-based theses have primarily concentrated on the dangers of polyauthorship and problems of attribution: is the same work is used to underwrite the theses of several candidates? There was no evidence for this here, nor in previous studies.^{2,4,6} The only change between the two Swedish cohorts was an increase of one author per paper, from an average of three to four, which is in keeping with a general trend.¹ The original Swedish cohort had been chosen to match the time span of the British PhD cohort.²

A different concern is, that the Swedish and Dutch systems set too high a standard by requiring a dissertation to be based on four papers published or in press – and most also include submitted manuscripts, to boot! By contrast, in the UK the degree of PhD, the nearest equivalent to the Swedish and Dutch degrees, published works are not required. Nevertheless, one third of British PhD theses have papers included in support^{2,4} and the average number is two² but appears to be rising towards four.⁵

A PhD should be a basic training in science to be completed, including written up, in a reasonable time. For example, in the UK public funding is only guaranteed for three years. Candidates should not be sweated labour left to write up in their next job or, worse, while unemployed. A doctoral thesis based on three papers either published or in press but excluding manuscripts only submitted, could be optimal for a common European doctorate to be completed within three years. This should be an achievable target. In the current assessment of academic staff in the UK by the Higher Education Funding Council for England (HEFCE), staff can chose to be judged by their four best papers published over a period of 39 months. Alternatively, four papers in four years would continue the established standards.

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