The historical evolution of interdisciplinarity: 1900-2008

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Introduction

The question of interdisciplinarity has become a much discussed topic over the last decade (see among others, Weingart and Stehr, 2000; Rinia, 2008). The focus has been on the construction of a useful indicator based on addresses, references and citations as a possible measure of the degree of interdisciplinarity of papers (Porter and Chubin, 1985). Also measures of the link between scientific impact and interdisciplinarity have been proposed (Larivière and Gingras, 2010).

In this presentation, we will look at the evolution of interdisciplinarity as well as interspecialty over the entire 20th Century. The first indicator uses the proportion of references to disciplines different from that of the journal in which the paper is published, like references to chemistry or biomedical research in a physics paper, while the second uses the proportion of references to specialties different from that of the journal in which the paper is published but within the same discipline, as when a paper in nuclear physics cites a paper in optics. Distinguishing interspecialty from interdisciplinarity is useful since during the last century many specialties emerged inside the various disciplines, like, for example chemical physics in the 1910s and solid state physics and nuclear physics in the 1930s and 1940s.

Method

This paper uses data from Thomson Scientific's Web of Science (WoS). The classifications of journals used in this paper are those used by the U.S. National Science Foundation NSF). This classification categorizes each journal into one discipline and specialty. For the social sciences and humanities, the NSF categorization was complemented with our own classification – based on that of the WoS – for the humanities (not included in the NSF classification). The final classification includes 143 specialties, which can be regrouped into 14 disciplines. In this paper, these 14 disciplines have been regrouped into 4 broad domains: medical fields (MED), natural sciences and engineering (NSE), social sciences (SS) and arts and humanities (A&H). On the whole, about 615 million references made by about 25 million papers are analyzed here. A citation window of five years is used.

Results and discussion

Figure 1 shows preliminary results. The historical patterns differ greatly whether we look at natural, social or biomedical sciences. In all cases though, interdisciplinarity raises since the 1990s. Interestingly, the proportion of interdisciplinarity diminishes in the period 1945-1975 in the natural sciences. This suggest that the period of the "Thirty Glorious" where funding grew exponentially was accompanied by a concentration of activities within the disciplines. In medical sciences we see a growth of interspecialty in the first half of the 20th century, while

interdisciplinarity remains stable. A&H shows no evolution until the years 2000 which sees a significant growth of interdisciplinarity.

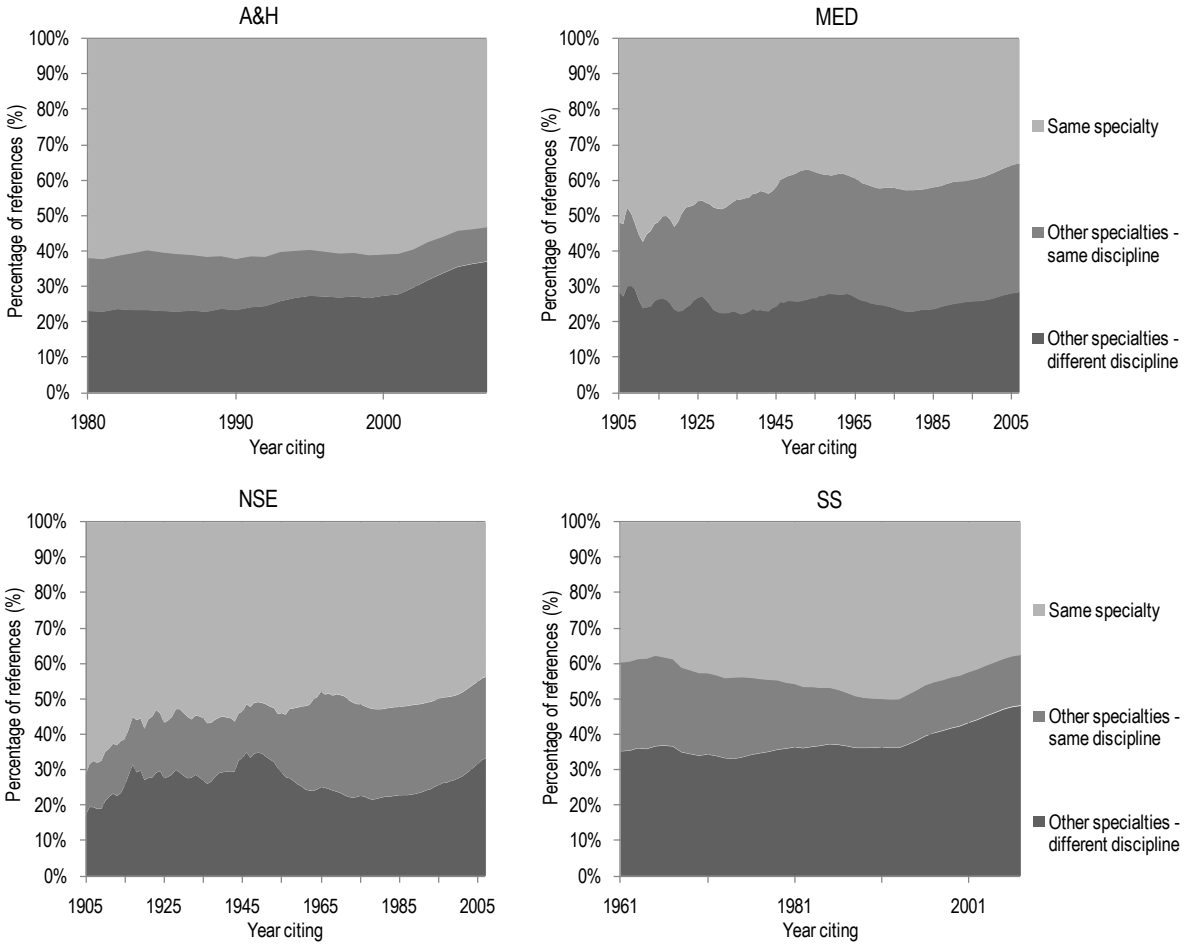

Figure 1. Percentage of references made to journals of the same specialty, in other specialties of the same discipline and in other specialties of a different discipline

After recalling that interdisciplinary talks have been recurrent in the 20th century with peaks in the 1930s-1940s, 1960s-1970s and 1990s-2000s, we will discuss other measures of interdisciplinarity based on an indicator of diversity instead of the proportion of references and compare the results.

References

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