Co-authorship Patterns within Large Collaborations: Identifying Researcher Profiles.

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1. Introduction

Co-authorship has been addressed from wide open points of view, like for assessing international collaboration patters (De Lange & Glaenzel, 1997), national research characteristics (Glaenzel, 2001) or its rewards mechanisms (Laudel, 2002). In this work we address the publication output of two Large Collaborations working on two major laboratories, one in Europe and another in the U.S., by analyzing the co-authorship profile of their members. Evaluating the performance of large collaborations continues an unsetled question discussed since the important studies by Ben Martin and Jorhn Irvine almost 30 years ago (Martin & Irvine, 1981) and (Martin & Irvine, 1984). We could not avoid noticing editorial biases different from what is observed in other large research facilities focused on other fields in Physics. We can identify by means of the co-authorship profile, a group of individuals whose role is highly technical, without an independent scientific life outside large collaboration, a scientific life characterized as a collective existence. On the other hand, leaderships show also clear bibliometric distinguishable fingerprints, as well as independent researches involved in different collaborations.

2. Methodology

The present investigation is based on publications indexed in the SCIE (Science scietation index expanded) of ISI (Web of Science) database. We chose two large collaborations, one at CERN (European Center per la Recherche Nucleaire) in Europe and another at FNAL (Fermi National Accelerator Laboratory - Fermilab) in the US. For each member in the collaboration we performed an analysis of the publications and draw a co-authorship profile. The aim is to focus on the tools offered directly by accessing the Web of Science search page. Within the search refining possibilities is the author list related to the results obtained for a given choice of key words. Hence, the co-authorship profile is the list of the most frequent authors from a set of papers of a chosen author or group of authors in a sequence of hits: from most to the last frequent, up to 100 co-authors.

3. Results

The results shown here are for members in large collaboration at CERN (The results for FNAL are qualitatively similar). Figure 1 shows representative examples of three different co-authorship profiles that could be identified.

Few researchers have a role of prominence, acting many times as team leaders. The main fingerprint of this kind of profile is a large peak at the first co-author, i.e. the author him(her)self: the “leadership-like profile” in Fig. 1. Indeed, the corresponding green triangles show a peak of 120 items for the most frequent co-author (the researcher considerer) and the second most frequent co-author shares only 85 papers, followed by a few others with similar numbers, but the majority of co-authors share a rather low ratio of published items. On the other hand, many authors present a co-authorship profile strongly tied to the group of researchers within the collaboration. In general, we can infer that the tasks performed by these researchers are highly technical, support or operational, the “technician-like” profile, which shows very wide “plateaus” of co-authorship. In Fig. 1, the corrsponding data are the red circles: almost all 55 published items are shared among the same group of co-authors. In a third case, researchers have a history of simultaneous participation in several different collaborations and in general are specialists in the field, developing their careers in collaboration with different groups: an “independent researcher”, showing a ladder with short steps in the co-authorship.

4. Conclusions

Further work is necessary in order to identify the role played by each group within the collaboration, or if the group participates in all stages of the task since its conception, or has their participation limited to technical tasks of support, assembly and calibration or at the end in analyzing the data. It should be noticed, together with the publication biases, that along the history, the CERN lab,

including all collaborations, shows a large distribution of publications within the research fields sampled by ISI. There are significant numbers of publications in dozens of fields, including behavior sciences or even psychology, which could indicate also spin-off activities (Martin & Irvine, 1981b). This publication distribution by research fields has also to be further explored, since changes in the fields reflect the achievement of objectives over time (Zhang, et al., 2008). The present discussion refers to one kind of great collaborations in High Energy Physics, particle accelerators labs, and could be extended to other collaborations, like in Cosmic Rays Physics, whose historical roots are completely different. Furthermore, the present approach could be also extended to comparable institutions (in number of research staff in other fields, like Condensed Matter Physics).

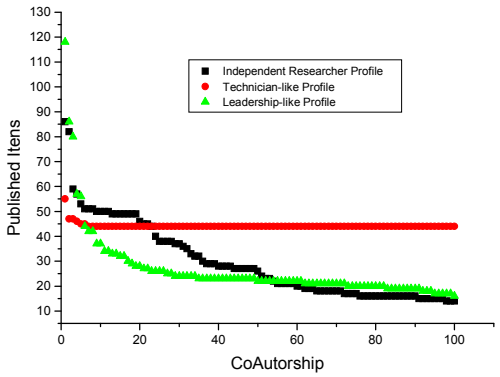

Figure 1. Examples of co-authorship profiles (most frequent co-authors of a given researcher) within a CERN collaboration: "leadership-like"(green triangles), "independent researcher" (black squares), and "technician-like" (red circles).

The expected discussions span from the validation of evaluation criteria for researches in different fields, as well as the construction of a complementary indexes for monitoring the authorship policies within large collaborations in different countries, different fields and also different times. The collaboration policies changes with time and co-authorship profiles may be a tool for identifying such changes from the point of view of bibliometric data.

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