UNDERSTANDING INSTITUTIONAL COLLABORATION NETWORKS: COMPUTER SCIENCE VS. PSYCHOLOGY

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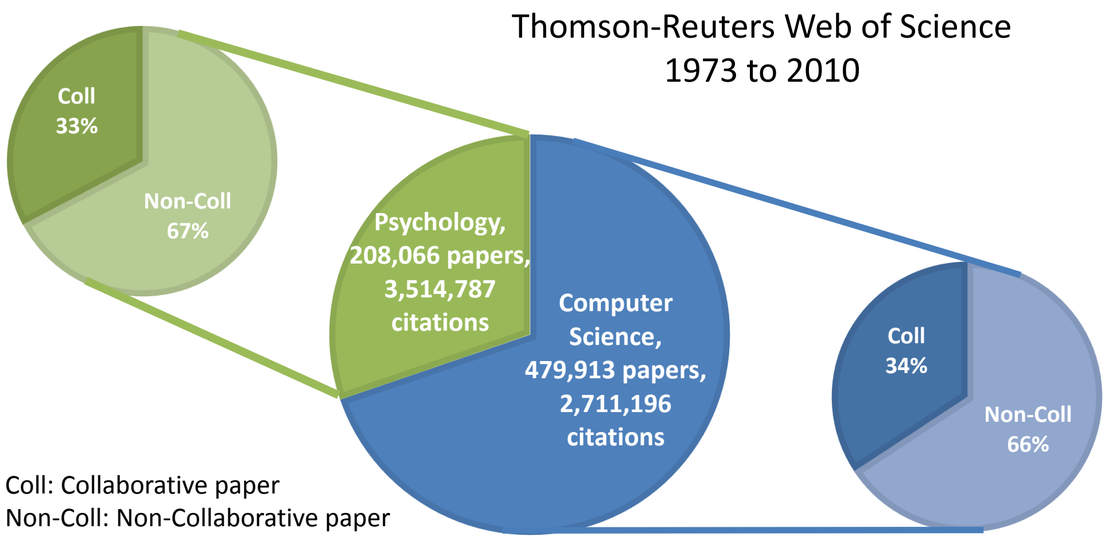
1 Introduction

Institutions assume that if they are more productive (i.e., publish more papers), they will produce more high quality research. They also assume that if they collaborate more, they will be more productive.

We tested these assumptions using nearly 30 years of world wide publication and citation data in Computer Science and Psychology.

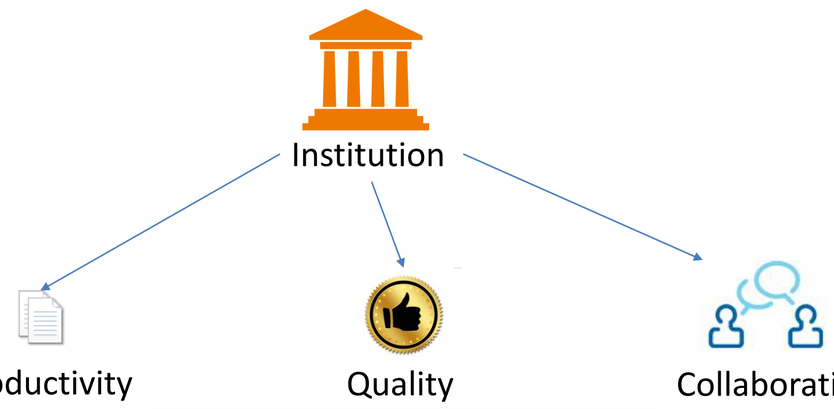
2 Data and Methods

➢**Dataset:**



Coll: Collaborative paper
Non-Coll: Non-Collaborative paper

➢**Institutional variables:**



Productivity	Quality	Collaboration
Number of papers (P)	1. Citation counts per institution (QC) 2. PageRank weighted citations (QPR) 3. Webometrics ranking, July 2010 (QW) 4. Institutions' citation per paper (QCP) **QCP = QC/P**	1. Number of collaborative papers (CN) 2. Size-weighted collaboration (CS) 3. Percentage collaboration (CP) **CP = CN/P**

➢Method: The **pairwise correlation** and **partial correlation** were applied across institutional variables. **Pearson** linear correlation and **Spearman** non-parametric correlations were both used.

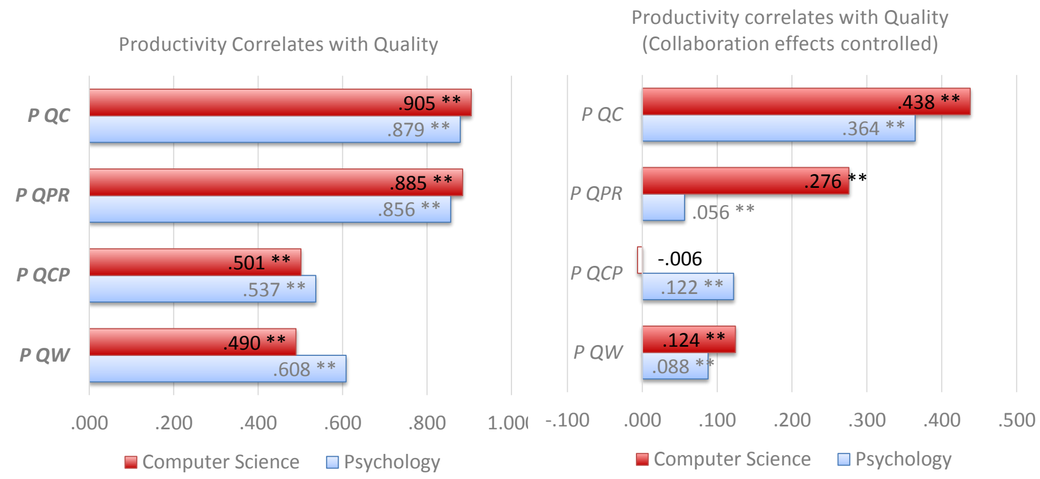
4 Conclusion

In computer science, the research of institutions with higher publication counts tends to be of higher quality; but institutions' citation per paper counts turn out to rise no higher with higher publication counts if the effects of collaboration are removed. In Psychology, with higher publication counts, institutional quality measured by citation counts tends to be higher; but when quality is measured by total PageRank-weighted citation counts, its correlation with publication productivity is weak.

Institutions that focus more on collaboration than single institution papers do not have a productivity increase. Hence increasing collaboration ratio alone is not a shortcut for increasing productivity. In Computer Science, collaboration was also found to be one of the main factors that affect institutional paper quality. Higher paper quality is a result of more collaborations, rather than more papers published.

3 Results

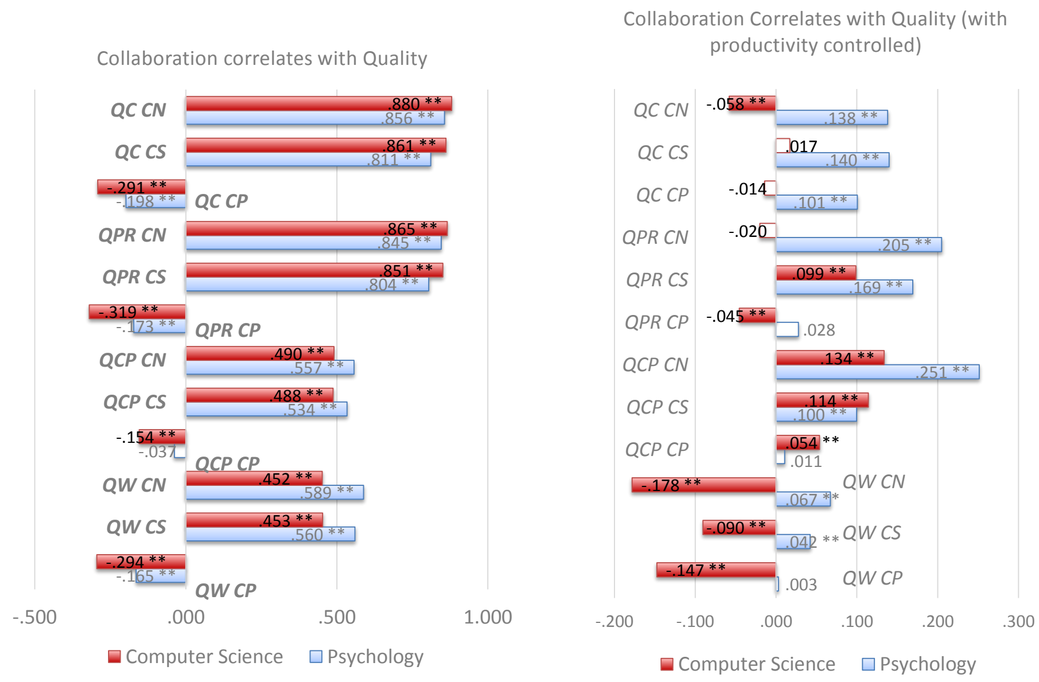
Institutional Productivity vs Quality



Computer science n=698, psychology n=414, ** indicates p<0.01

- Collaboration largely affected institutions' productivity and quality, once collaboration was controlled, large reductions were observed in all pairs of correlations.
- In computer science, with collaboration controlled, institution's paper number and institutions' citations per paper (*P QCP*) had no correlation (right Fig.), which it had high positive correlation (r=0.501) without collaboration controlling (left Fig.). This suggested that collaboration was more likely the cause of the better paper quality in computer science.
- In psychology, with collaboration controlled, the correlation of *P QPR* has reduced more than *P QCP,* indicating that collaboration affected the institutional quality more than institution's paper quality.

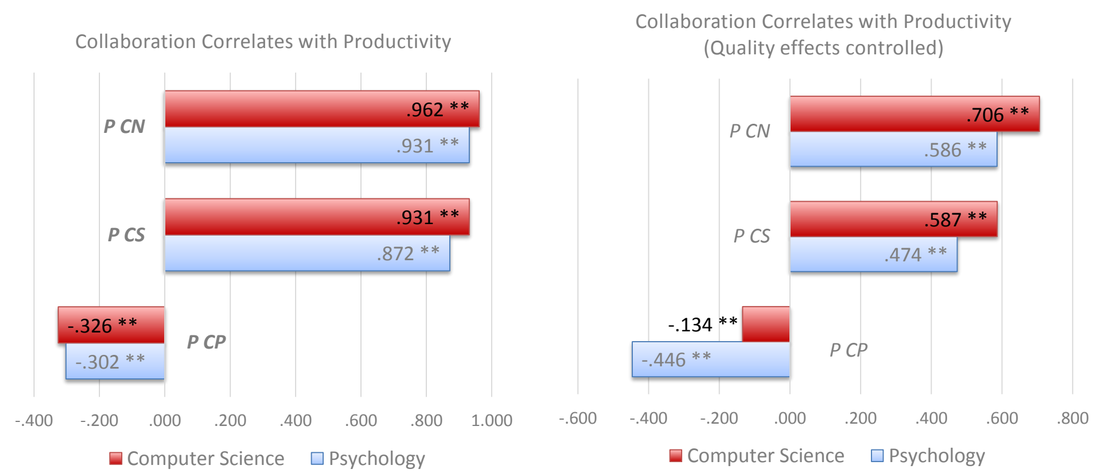
Collaboration and Quality



Computer science n=698, psychology n=414, ** indicates p<0.01

- In computer science, collaboration did not appear to directly affect citation counts of the institutions, large reduction of *QC CN, QC CS* and *QPR CN* was observed after controlling the productivity effect (right Fig.).

Institutional Productivity vs Collaboration



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- The percentage collaboration showed negative correlation with the number of papers (*P CP*), both before and after the quality effects were controlled in computer science and psychology. This indicates that higher productive institutions tend to publish more single authored papers.

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