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Exploring the bibliometric and semantic nature of negative results

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Background

Scientific progress in some disciplines is hampered by researchers' tendencies to bin negative results. However, their publication is beneficial in order to prevent duplication of effort, save public money and to facilitate and promote scientific communication and progress.

A bibliometric analysis of negative results literature was performed in order to identify their most important attributes, to study their outcome and to explore their hidden relationships, focussing on the distribution of publications openly declared as containing negative results and published in journals completely devoted to this kind of publications.
The Journal of Negative Results in BioMedicine (JNRBM) was used as a role model, since all the other relevant journals are not indexed in the largest citation databases.
In order to evaluate the prestige of this journal, the impact factor as well as the new alternative indicators SJR and SNIP were looked up for all assigned categories.
The complete article records of JNRBM, the number of citations and the citation percentiles & averages were retrieved from Scopus and Web of Knowledge to generate an impact profile.

Data analysis and visualization of relationships were performed using the software tool BibTechMon. A co-author and a co-affiliation map were produced in order to examine the plurality of communities based on the existing relationships between the authors publishing in JNRBM.

Furthermore two samples of "positive results" based on related articles containing the same number of items, either sharing the same descriptors or the same references (bibliographical coupling) were compiled in Scopus.

The first sample, obtained from Scopus by retrieving articles sharing the maximal number of references, was used to test if bibliographic coupling revealed other publications of negative results.
The second sample of "positive results", sharing the maximal number of descriptors, was used to enable a comparison with the sample of "negative results". Thereafter, their abstracts were subjected to assisted data extraction, in order to identify vocabulary characterising negative results publications.

Results

The unofficial impact factor of JNRBM is 1.64 based on the information gained from the official journal website. The median impact factor (IF) in the corresponding WoS category "Medicine, research & experimental" (to which biomedical science journals are assigned) is 2.023, and the aggregate IF is 3.474. Thus the IF of JNRBM is below these values and corresponds to quartile 3 (Q3). According to Scopus data, in SCImago Journal Rank JNRBM has a SJR of 0.124 and is assigned to the categories "Medicine" (Q1) and "Pharmacology, Toxicology and Pharmaceutics" (Q2), whereas in CWTS Journal Indicators a SNIP of 0.43 is reached in the category "Biochemistry, Genetics and Molecular Biology (all)" (Q2).

JNRBM publications (93% of them articles) are cited by a broad spectrum of journals rather than by specific titles. Journals exclusively devoted to their official publication like JNRBM have a rather low impact. Only 11% of their items are above citation average. However, only one third of the publications remain uncited.

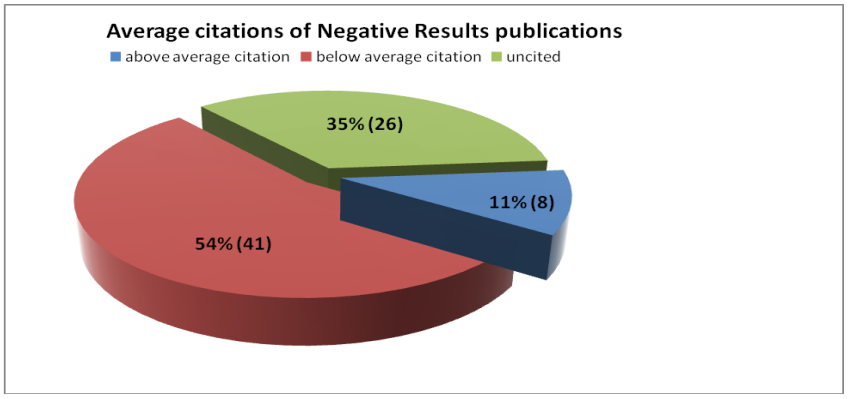

Figure 1. Average citations of publications in JNRBM (2002-2009)

Apart from single publications there is no specific community for the publication of negative results in devoted literature like JNRBM. Authorship is widely spread, with 95% of the authors contributing with a unique paper and the most active author publishing 6 papers.

Neither the co-author nor the co-affiliation analyses indicate a strong interconnectivity of authors or affiliations. There are only few clusters, whereas the majority of the publications have affiliations originating from a single country.

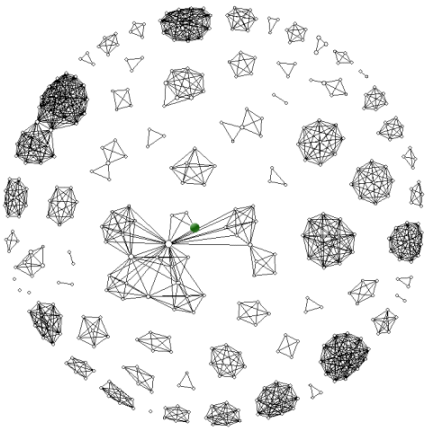

Fig.2a: Co -authors map, Articles: 75, authors: 377, edges: 1218; network density: 0.01718; source: Scopus, 2009, 11., *Journal of Negative Results in BioMedicine*

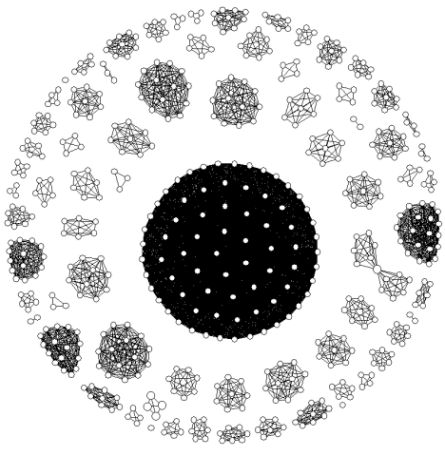

Fig.2b: Co -authors map, Articles: 75, authors: 528, edges: 4352, network density: 0.03128 source: Scopus, 2010, 2., *same descriptors as JNRBM* .

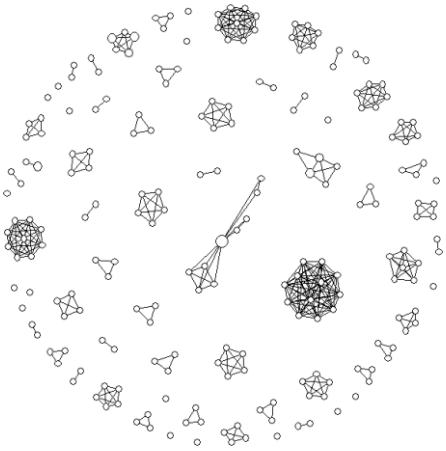

Fig.2c: Co -Affiliations map, Articles: 75, affiliations: 213, edges: 371; network density: 0,01643; source: Scopus, 2009, 11., *Journal of Negative Results in BioMedicine*

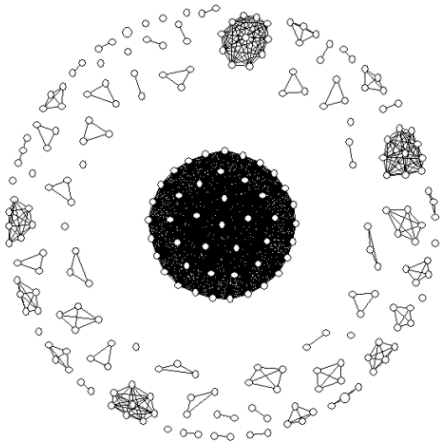

Fig.2d: Co -Affiliations map, Articles: 75, affiliations: 237, edges: 1253; network density: 0,0448; source: Scopus, 2010, 2., *same descriptors as JNRBM* .

Figure 2. Co-authorships and co affiliations of publications in JNRBM (2002-2009) and similar publications (high concordance in descriptors) in Scopus

Our first analysis shows that bibliographic coupling can be useful for the identification of other negative results, however, can only be regarded as a supplementary method.

A text mining approach was applied to the JNRBM publications and resulted in a list of around 50 terms expressing negative assertions. These were employed to query the database PASCAL. An indicator measuring the degree of negativeness of a publication is defined. This indicator can be then applied to both the PASCAL corpus and the JNRBM publications and the obtained results compared.

At this stage it is impossible to distinguish between the various possible negation meanings. This exploratory work opened a challenge in the refinement of mining techniques - not only to detect negative assertions, but especially to allow categorization by their real semantic meaning.

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