

# Selected Papers on Scientometrics and Grey Literature

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## **AUTHORSHIP PATTERNS**

### **The future of single-authored papers (2007)**

HELMUT A. ABT

The fractions of single-authored papers in four science fields (astronomy, physics, chemistry, and biology) were determined at five-year intervals during 1975–2005. In each case the distribution is best fitted with an exponential function that never reaches zero, implying that single-authored papers will continue to be published in the foreseeable future. This is contrary to the prediction that they would become extinct.

Scientometrics, Vol. 73, No. 3 (2007) 353–358

### **The publication rate of scientific papers depends only on the number of scientists (2007)**

HELMUT A. ABT

In the fields of physics, astronomy, geophysics, mathematics, and chemistry, the numbers of American papers published depend only on the membership numbers of their scientific societies and not upon improved facilities or instrumental breakthroughs, although those improvements have caused the scientific contents of those papers to be far better in recent decades. In the past 30–35 years there have been no increases in the average annual number of published papers per scientist in those fields.

Scientometrics, Vol. 73, No. 3 (2007) 281–288

### **The frequencies of multinational papers in various sciences (2007)**

HELMUT A. ABT

Multinational papers are defined here as ones written by authors who reside in different countries during the course of research. For each of 16 fields of science, I scanned the first 200 papers in 2005 in four major journals publishing original research papers. Those journals produced 40% of all the citations among those journals with Impact Factors greater than 1.0. The frequencies of multinational papers ranged from 13% in surgery to 55% in astronomy. Although one can list a dozen factors which might contribute toward multinational papers, I lack the data to test most of those. There are only minor correlations with team sizes and Impact Factors, inadequate to explain the range. There is a larger, but not convincing, dependence upon the fractions of single-author papers and its cause, if real, is unclear. However, the most prominent factor seems to be the nature of the objects studied; if they are usually local (e.g. in one hospital or in one laboratory), the papers tend to be domestic but if most of the objects are available simultaneously to scientists in many countries (e.g. the sky in astronomy or the oceans and the Earth's atmosphere in geosciences or widespread diseases in the area of infectious diseases or plants and animals widely distributed in biology), the papers are often international. Auxiliary results for 2005 are an average of  $5.5 \pm 0.3$  authors per paper and  $6.6 \pm 1.0\%$  one-author papers.

Scientometrics, Vol. 72, No. 1 (2007) 105–115

### **Authorship patterns in marine mammal science, 1985–1993 (1997)**

JE BIRD

Authorship studies in such disciplines as physics and economics show that with the passage of time there has been an increase in the number of authors per paper, indicating a trend toward more collaboration. In this study, a search was run on the Aquatic Sciences and Fisheries Abstracts database to identify marine mammal science papers published from 1985 to 1993. A total of 1308 papers published in scientific journals was examined. There were weak but statistically significant trends in the increase in the number of authors per paper as well as in the number of multi-authored papers written by authors from different institutions, with the passage of time. Possible reasons for these results include the increasing specialization of researchers

necessitating collaboration, more access to electronic means of communication, and more competition for research funds. Confounding factors in this analysis include the possibility that different journals have different publication patterns and regional vs. national/international journal differences.

Scientometrics Vol. 39, No. 1 (1997) 99-105

**Authorship Counts – Forty years of the *Physical Review* and *Physical Review Letters* (1995)**

Zora J Sampson

This paper measures the increase in the numbers of authors per article in one scientific journal over forty years. The rise in the complexity of science, to which some attribute this growth in multiple authorship, is reflected in the increasing complexity of this simple task over that forty year period. It also discusses the resulting decrease in single authored papers, papers with very large numbers of authors, and predicts future trends.

Scientometrics Vol. 32, No. 1 (1995) 219-226

## GREY LITERATURE

### **Scientific grey literature in a digital age: Measuring its use and influence in an evolving information economy (2009)**

GREGORY HUTTON

This paper outlines methodologies to improve understanding of the influence of grey literature published in print and digital formats. The study is based on analyses of citation data regarding the UN-based Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection collected from Web of Science, Google, and Google Scholar.

Proceedings of the 2009 Conference of the Canadian Association for Information Science.

### **Multi-stakeholder perspectives on the use and influence of "grey" scientific information in fisheries management (2011)**

SUZUETTE S. SOOMAI, PETER G. WELLS, AND BERTRUM H. MACDONALD

Scientific information on the shrimp and groundfish resources of the Brazil–Guianas continental shelf has been produced by the United Nations Food and Agriculture Organization (FAO) and the Caribbean Regional Fisheries Mechanism (CRFM), in collaboration with the national governments exploiting the resources, since the early 1970s. In spite of the availability of such information, largely as grey literature, there is limited evidence as to the extent it is being used in fisheries management in Trinidad and Tobago. The flow of information between multiple stakeholders – fishing industry, scientists, fisheries managers, policy makers, and fisheries advisory bodies – was studied based on responses to a survey of key individuals to document each of their roles in the creation, distribution, and use of fisheries information. Content analysis of responses was completed to determine the opportunities and barriers for using scientific information in fisheries management. Saliency, credibility, and legitimacy of the information were shadowed by barriers that decreased these attributes. Knowledge about the fishery has increased and technical capabilities have been strengthened through research. At the same time, advances in digital technology have made information more accessible. Yet, the high technical content of fisheries information reduced its usefulness to some stakeholders and formal systems do not exist for distributing or measuring the use and influence of such information in decision making. Communication strategies to promote awareness of the scientific information and aligning scientific information with fisheries policy could increase its use and influence. Institutional support for partnerships and education to encourage stakeholder involvement could also facilitate increased influence of scientific information.

Marine Policy 3(1):50–62

### **Grey literature in the life of GESAMP, an international marine scientific advisory body (2004)**

BERTRUM H. MACDONALD, RUTH E. CORDES, AND PETER G. WELLS

GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), an international marine scientific advisory group sponsored by several UN bodies, has published significant reports on marine pollution and marine environmental protection since it was established in 1969. GESAMP serves as an exceptionally good organization to test for access to and uses of grey literature. Although thoroughly reviewed and refereed, many of GESAMP's publications fit within the internationally-accepted definition of grey literature. Since grey literature can be difficult to identify and locate, are GESAMP's publications ever used? Through an analysis of its publications this paper shows that even when an organization relies on grey literature as its primary means of output, the publications can receive extensive use. Nevertheless, problems of identification and access remain, and these are not fully addressed by digital publication. Recommendations for improving access to GESAMP publications are in the paper.

Publishing Research Quarterly 20(1)

**Assessing the Diffusion and Impact of Grey Literature Published by International Intergovernmental Scientific Groups: The Case of the Gulf of Maine Council on the Marine Environment (2007)**

MACDONALD, B. H. CORDES, R. E. WELLS, P. G.

Although many governmental and intergovernmental organizations publish vast quantities of grey literature, the importance of the diffusion and impact of this literature are rarely studied. Evidence from an investigation of the grey literature output of GESAMP, the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (sponsored by the UN and several of the UN-family of organizations), indicated that the literature reached scientific readers and was cited. To determine whether that evidence was representative of international intergovernmental bodies, another intergovernmental organization devoted to marine environmental issues, namely, the Gulf of Maine Council on the Marine Environment (GOMC) was studied. GOMC, an American-Canadian partnership, has been working since 1989 to maintain and enhance environmental quality in the Gulf of Maine. Through its own publications and others resulting from studies conducted under contract or in cooperation with other organizations, GOMC provides a complex publishing history for investigation. Over 300 publications were identified and over 500 citations were located after extensive searching using several citation tools. Citation patterns for GOMC publications mirror the findings of the study of GESAMP; grey literature is cited over lengthy periods, but grey literature tends to be cited primarily by other grey literature. Although digital alerting and access tools are increasing in number and coverage, a reliance on grey literature as the primary means of publication continues to pose hurdles for influencing scientific research, public policy, and public opinion. While grey literature is common to organizations such as GOMC and GESAMP, the impact of this literature can be muted because of the limitations of its dissemination and perceptions of its quality.

Publishing Research Quarterly 23 (1): 30-46

**The use and influence of information produced as grey literature by international, intergovernmental marine organizations: Overview of current research. (2010)**

MACDONALD, B.H., WELLS, P.G., CORDES, R.E., HUTTON, G.R.G., COSSARINI, D.M., &amp; SOOMAI, S.S..

Ch 11 in Farace and Schöpfel. Eds. (2010) Grey literature in library and information studies

**Bibliometric study of grey literature in core veterinary medical journals (2003)**

NL PELZER AND WH WIESE

**Objectives:** Grey literature has been perceived by many as belonging to the primary sources of information and has become an accepted method of nonconventional communication in the sciences and medicine. Since little is known about the use and nature of grey literature in veterinary medicine, a systematic study was done to analyze and characterize the bibliographic citations appearing in twelve core veterinary journals. **Methods:** Citations from 2,159 articles published in twelve core veterinary journals in 2000 were analyzed to determine the portion of citations from grey literature. Those citations were further analyzed and categorized according to the type of publication. **Results:** Citation analysis yielded 55,823 citations, of which 3,564 (6.38%) were considered to be grey literature. Four veterinary specialties, internal medicine, pathology, theriogenology, and microbiology, accounted for 70% of the total number of articles. Three small-animal clinical practice journals cited about 2.5–3% grey literature, less than half that of journals with basic research orientations, where results ranged from almost 6% to approximately 10% grey literature. Nearly 90% of the grey literature appeared as conferences, government publications, and corporate organization literature. **Conclusions:** The results corroborate other reported research that the incidence of grey literature is lower in medicine and biology than in some other fields, such as aeronautics and agriculture. As in other fields, use of the Internet and the Web has greatly expanded the communication process among veterinary professionals. The appearance of closed community email forums and specialized discussion groups within the veterinary profession is an example of what could become a new kind of grey literature.

J Med Libr Assoc 91(4) October 2003

## **BIBLIOMETRIC STUDIES OF FISHERIES LITERATURE**

### ***Communication and cohesion in aquatic science literature (2009)***

MARGARET R. NEFF and DONALD A. JACKSON

In 1982, Frank Rigler challenged limnologists and fisheries biologists to address gaps in theory, experimental research, and management practices that have limited the advancement of both fields. We followed up on Rigler's concerns using a literature study to determine the objectives and methodologies of studies across a range of subdisciplines within aquatic science. We surveyed both recent and historical literature from five leading journals that range in emphasis to include a broad array of subjects in aquatic science. Literature from 1982 was compared with recent publications to determine how communication and integration within aquatic science has changed. We found limited changes in the breadth of coverage provided by any journal. We further analyzed contemporary literature according to subject matter, methods of analysis, location of the research, and scale of study. We used correspondence analysis to identify the differences and associations across these fields and to uncover those particular research areas that have more clearly bridged some of these gaps previously identified. Our findings indicate that there are still clear divisions within modern aquatic science literature and that the journals considered typically show specific emphasis in the types of questions posed, methods of analysis, and the geographic representation of authors.

Can. J. Fish. Aquat. Sci. 66: 701–712 (2009)

### ***Analysis of publications on sturgeon research between 1996 and 2010 (2012)***

I Jaric´ and J Gessner

Sturgeon species are among the commercially most valuable and the most endangered groups of fish. To assess the existing literature published within the field of sturgeon research over the past 15 years (1996–2010) we applied a bibliometric approach, in order to identify patterns and trends of the published research in this field. The analysis was performed based upon articles obtained from the ISI Web of Knowledge online database. The results revealed that although all 27 sturgeon species have been objects of the research, species that are endangered or facing a high probability of extinction have received disproportionately less attention. White sturgeon (*Acipenser transmontanus*) was the most frequently studied species, but it was recently surpassed by Persian sturgeon (*A. persicus*). Early life phases have been among the central objects of the research, and genetics, especially the use of microsatellite DNA, is becoming increasingly popular and had the highest impact. Research related to aquaculture was prominent, while the research related to hybrids (as a commodity of aquaculture production) was decreasing in popularity. Papers dealing with conservation issues were most frequently focused on European sturgeon (*A. sturio*). A steady increase in the number of published articles over time was observed. However, the overall citation rate declined significantly over time. During the period reviewed, the sturgeon research published in peer reviewed journals dominantly originated from the USA and EU. Nevertheless, considering the current trend in output, it is very likely that the Asian countries, mainly Iran and China, will surpass them within the next 5–10 years. International and inter-institutional collaboration both tended to increase the impact of the research. Stimulation and improvement of the international cooperation should be considered as future priorities.

Scientometrics (2012) 90:715–735

### ***Bibliometric analysis of diadromous fish research from 1970s to 2010: a case study of seven species (2011)***

N NIKOLIC, J-L BAGLINIE`RE, C RIGAUD, C GARDES, ML MASQUILIER AND C TAVERNY

The aim of this study was to explore the research trends and the evolution of publications covered on diadromous fish from 1970s to 2010. We conducted a bibliometric analysis on seven patrimonial species: Atlantic salmon (*Salmo salar*), Brown and Sea trout (*Salmo trutta*), Allis shad (*Alosa alosa*), Twaite shad (*Alosa fallax*), Eel (*Anguilla Anguilla*), Sea lamprey (*Petromyzon marinus*) and River lamprey (*Lampetra fluviatilis*). We used bibliometric techniques on the total number of research (articles, books, and conferences) in all country in function of main fields such as growth/age, reproduction, migration, habitat, aquaculture, diseases, diet, abundance, fisheries, climate change, toxicology, dams/fishways, genetics, taxonomy, modelling, resource management, and stocking. The results revealed a clear difference in the

evolution of scientific studies by species and by countries. The analysis comparisons showed the intensity of certain topics by species with the emergence of new ones, the economic impact on sciences and the increased support of conservation plan management for certain species, such as salmon and lamprey in France. This study also emerged that French research is not always consistent with the international trend which suggests the dominance of management systems on scientific studies.

Scientometrics (2011) 88:929–947

## OTHER

### ***Negative results are disappearing from most disciplines and countries (2012)***

DANIELE FANELLI

Concerns that the growing competition for funding and citations might distort science are frequently discussed, but have not been verified directly. Of the hypothesized problems, perhaps the most worrying is a worsening of positive-outcome bias. A system that disfavors negative results not only distorts the scientific literature directly, but might also discourage high-risk projects and pressure scientists to fabricate and falsify their data. This study analysed over 4,600 papers published in all disciplines between 1990 and 2007, measuring the frequency of papers that, having declared to have "tested" a hypothesis, reported a positive support for it. The overall frequency of positive supports has grown by over 22% between 1990 and 2007, with significant differences between disciplines and countries. The increase was stronger in the social and some biomedical disciplines. The United States had published, over the years, significantly fewer positive results than Asian countries (and particularly Japan) but more than European countries (and in particular the United Kingdom). Methodological artefacts cannot explain away these patterns, which support the hypotheses that research is becoming less pioneering and/or that the objectivity with which results are produced and published is decreasing.

Scientometrics, Vol. 90, No. 3 (2012) 891-904

### ***Is bigger necessarily better for environmental research? (2009)***

RENÉ VAN DER WAL, ANKE FISCHER, MICK MARQUISS, STEVE REDPATH, SARAH WANLESS

In restructuring environmental research organisations, smaller sites generally disappear and larger sites are created. These decisions are based on the economic principle, 'economy of scale', whereby the average cost of each unit produced falls as output increases. We show that this principle does not apply to the scientific performance of environmental research institutes, as productivity per scientist decreased with increasing size of a research site. The results are best explained by the principle 'diseconomies of scale', whereby powerful social factors limit the productivity of larger groupings. These findings should be considered when restructuring environmental science organisations to maximise their quality.

Scientometrics, Vol. 79, No. 3 (2009) 541-546

### ***Does the human capital of teams of natural science authors predict citation frequency? (2009)***

PAUL F. SKILTON

This study examines the relationship between citation frequency and the human capital of teams of authors. Analysis of a random sample of articles published in top natural science journals shows that articles co-authored by teams including frequently cited scholars and teams whose members have diverse disciplinary backgrounds have greater citation frequency. The institutional prestige, the percentage of team members at U. S. institutions and the variety of disciplines represented by team member backgrounds do not influence citation frequency. The study introduces a method for evaluating the extent of multidisciplinaryity that accounts for the relatedness of disciplines or authors.

Scientometrics, Vol. 78, No. 3 (2009) 525-542

### ***Population modeling of the emergence and development of scientific fields (2008)***

LUÍS M. A. BETTENCOURT, DAVID I. KAISER, JASLEEN KAUR, CARLOS CASTILLO-CHÁVEZ, DAVID E. WOJICK

We analyze the temporal evolution of emerging fields within several scientific disciplines in terms of numbers of authors and publications. From bibliographic searches we construct databases of authors, papers, and their dates of publication. We show that the temporal development of each field, while different in detail, is well described by population contagion models, suitably adapted from epidemiology to reflect the dynamics of scientific interaction. Dynamical parameters are estimated and discussed to reflect fundamental



characteristics of the field, such as time of apprenticeship and recruitment rate. We also show that fields are characterized by simple scaling laws relating numbers of new publications to new authors, with exponents that reflect increasing or decreasing returns in scientific productivity.

Scientometrics, Vol. 75, No. 3 (2008) Pages 495-518

### **Growth cycles of knowledge (2009)**

MAREK SZYDŁOWSKI, ADAM KRAWIEC

We have developed a way of describing the increase with time of the number of papers in a scientific field and apply it to a data base of about 2000 papers on symbolic logic published between 1666 and 1934. We find (a) a general exponential increase in the cumulative total number of papers, (b) oscillations around this due to the appearance of new ideas in the field and the time required for their full incorporation, and (c) exogenously caused fluctuations due to wars and other non-scientific events.

Scientometrics, Vol. 78, No. 1 (2009) 99-11

### **Citation Statistics from 110 Years of Physical Review (2005)**

Sidney Reder

Publicly available data reveal long-term systematic features about citation statistics and how papers are referenced. The data also tell fascinating citation histories of individual articles.

Physics Today June 2005

Available on-line at <http://physics.bu.edu/~redner/pubs/pdf/PT.pdf>