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# MULTIAUTHOR PAPERS: ONWARD AND UPWARD

BY CHRISTOPHER KING

When ScienceWatch last visited the topic of multiauthor papers back in 2007, the signs were unclear as to whether the trend of reports listing untold hundreds of authors was perhaps showing signs of leveling off in the middle of the last decade.

With this latest update, we can now answer with a resounding “No!” In fact, recent years have seen a steep increase in the number

of papers with authors in excess of 50, and a particularly notable spike in reports whose author counts exceed 1,000 and more. To borrow a term credited to Indiana University information scientist Blaise Cronin, “hyperauthorship” would seem to be flourishing—driven in particular, as we’ll see, by an international undertaking in high-energy physics that recently made world headlines.



Graph 1 tracks papers indexed by Thomson Reuters for each year between 1998 and 2011, showing the number of papers with more than 50, 100, 200, 500, and—a final benchmark not even required for the '07 survey—1,000 authors. (The numbers are cumulative, in that papers in the respective groupings above 100 authors are included in the statistics for papers with 50 or more.)

From the late 90s to the mid 00s, the lines are relatively flat, rising to the mid-decade peaks and then falling off slightly in 2006, as was discussed in the previous ScienceWatch examination. Thereafter, the trend is clearly upward, with the 50-plus cohort rising steeply in recent years. In 2010, as the graph shows, more than 1,000 papers surpassed the 50-author threshold, and the line continues to rise.

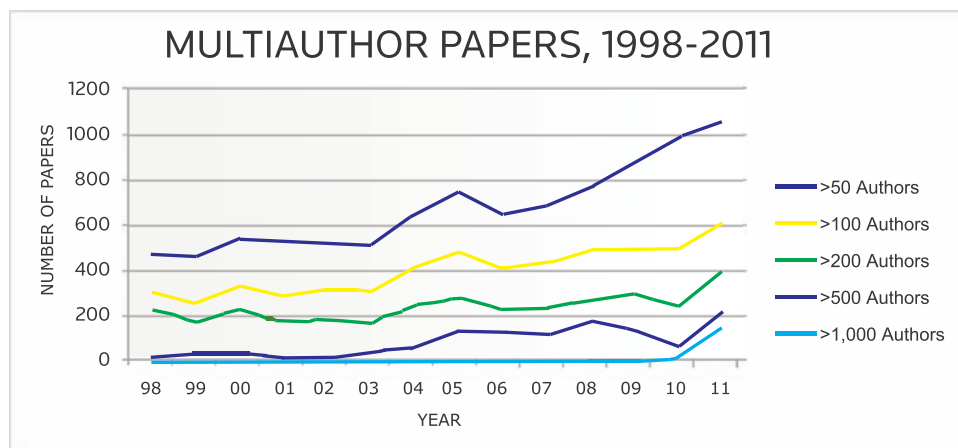
In fact, all the groupings in Graph 1 display a notable surge from 2010 onward. This is particularly striking on the bottom-most line denoting 1,000 or more authors. Aside from a few blips through 2009, this line was flat—until 2010, when Thomson Reuters indexed 17 papers with author counts above 1,000. The next year, 2011, this number increased nearly 10-fold, with more than 140 papers registering above the 1,000-author mark.

## BIOMEDICINE VERSUS THE PHYSICAL SCIENCES

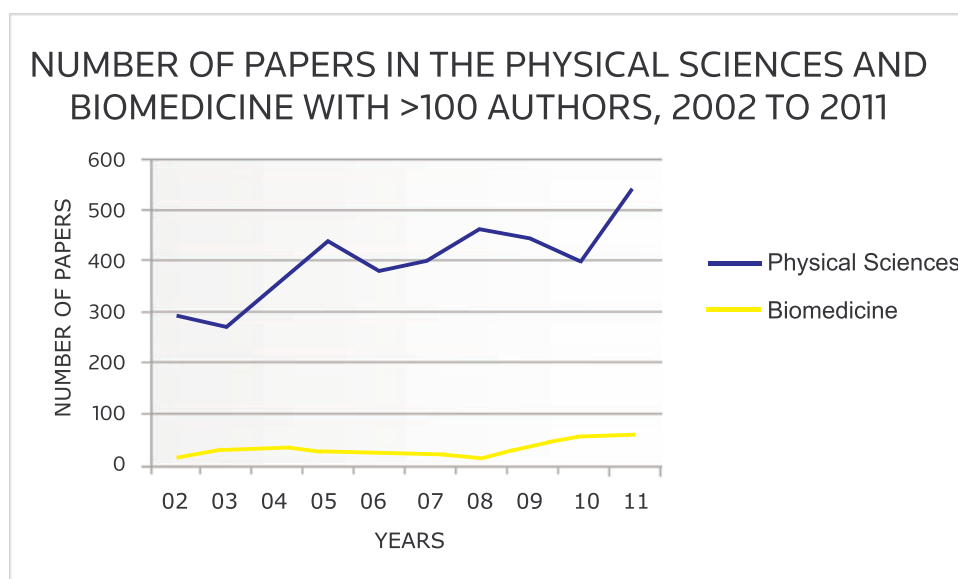
Graph 2 provides a broad breakdown of papers with more than 100 authors indexed for each year from 2002 through 2011, grouping them into the biomedical and physical sciences. The biomedicine group consists primarily of large studies in journals indexed under the heading of Clinical Medicine, with smatterings from Molecular Biology & Genetics, Neurology, Immunology, and a few other fields.

As the graph shows, the biomedicine group maintains a comparatively low profile, with far fewer than 100 papers per year listing more than 100 authors, and the number not even reaching 50 papers until 2010, with 51 recorded in 2011.

By contrast, the physical-sciences grouping for 100-plus authors starts near the 300-paper mark in 2002 and, despite a few dips, ascends to nearly twice that number by 2011. Broken down by sub-



GRAPH 1 — PAPERS INDEXED BY THOMSON REUTERS



GRAPH 2 — BROAD BREAKDOWN OF PAPERS

ject area, papers indexed under the main field of Physics account for the greatest proportion (for example, 271 of 293 overall papers in 2002, 347 of 380 in 2006, and 421 of 541 in 2011). Space Science displays the second-highest representation, with its share rising in recent years: 6 papers in 2002, 80 in 2009, 102 in 2010, and 74 in 2011. Engineering is next, averaging roughly a dozen papers per year, with Chemistry appearing late in the decade and posting numbers comparable to Engineering but finishing on an upswing, with 32 100-plus-author papers indexed in 2011.

For a more specific look at “hyperauthored” papers, Graph 3 covers 1992 through 2011 and tracks each year’s single paper with the highest author count. In the graph, the line sticks fairly close to the 500-author mark for the first decade, with no single paper exceed-

ing 1,000 authors until 2004, when the threshold was resoundingly surpassed. As ScienceWatch reported five years ago, the paper in question was a study from *Circulation Journal* examining the efficacy of pravastatin in Japanese subjects with mildly elevated cholesterol levels; the published report includes more than 2,400 authors.

New peaks were to come: the 2,500-author boundary was topped in 2006, with the 3,000-author mark surpassed in 2008 and after.

Following the 2004 report on pravastatin and a 2005 paper on tuberculosis among European patients receiving anti-HIV therapy (a

report with “only” 859 authors), high-energy physics subsequently moved in to displace biomedicine in securing the upper tiers of science’s most mega-authored papers. The physics upsurge was striking. In 2010, Thomson Reuters indexed 16 papers in the main field of Physics with more than 1,000 authors each; in 2011, the figure was 120 such papers, with 44 Physics papers listing more than 3,000 authors.

Table 1 lists the *Circulation Journal* paper and all the other the mega-authored blockbusters for each year between 2002 and 2011.

TABLE 1: THE “MOST-AUTHORED” PAPERS OF THE LAST DECADE, BY YEAR  
PAPERS WITH HIGHEST NUMBERS OF AUTHORS, BY YEAR, 2002-2011

Year	Paper	Number of authors
2011	ATLAS Collaboration (G. Aad, et al.), “Search for quark contact interactions in dijet angular distributions in pp collisions at root s=7 TeV measured with the ATLAS detector,” <i>Phys. Lett. B</i> , 694(4-5): 327-45, 2011	3,179
2010	ATLAS Collaboration (G. Aad, et al.), “Charged-particle multiplicities in pp interactions at root s=900 GeV measured with the ATLAS detector at the LHC ATLAS Collaboration,” <i>Phys. Lett. B</i> , 688(1): 21-42, 2010.	3,221
2009	LIGO Sci. Collaboration, Virgo Collaboration (B.P Abbott, et al.), “An upper limit on the stochastic gravitational-wave background of cosmological origin,” <i>Nature</i> , 460(7258): 990-4, 2009.	657
2008	CMS Collaboration (S. Chatrchyan, et al.), “The CMS experiment at the CERN LHC,” <i>J. Instrumentation</i> , 3: No. S08004, 2008.	3,101
2007	CMS Collaboration (G.L. Bayatian, et al.), “CMS physic technical design report, volume II: Physics performance,” <i>J. Phys. G.-Nucl. Part. Phys.</i>	2,011
2006	ALEPH, DELPHI, L3, OPAL, and SLD Collaborations (S. Schael, et al.), “Precision electroweak measurements on the Z resonance,” <i>Phys. Reports</i> , 427(5-6): 257-454, 2006.	2,517
2005	Antiretroviral Therapy Cohort Collaboration (D. Costagliola, et al.), “Incidence of tuberculosis among HIV-infected patients receiving highly active antiretroviral therapy in Europe and North America,” <i>Clin. Infect. Diseases</i> , 41(12): 1772-82, 2005.	859
2004	MEGA Study Group (H. Nakamura, et al.), “Design and baseline characteristics of a study of primary prevention of coronary events with pravastatin among Japanese with mildly elevated cholesterol levels,” <i>Circulation J.</i> , 68(9): 860-7, 2004.	2,459
2003	D. Acosta, et al. (CDF II Collaboration), “Measurement of the mass difference $M(D(s^{+})-m(D^{+}))$ at CDF II,” <i>Phys. Rev. D</i> , 68(7): No 072004, 2003.	818
2002	B. Aubert, et al. (BABAR Collaboration), “The BABAR detector,” <i>Nucl. Instr. Meth. Phys. Res. Sect. A</i> , 479(1): 1-116, 2002.	824

Source: Thomson Reuters Web of Science

Table 1 lists the *Circulation Journal* paper and all the other the mega-authored blockbusters for each year between 2002 and 2011.

## THE LHC: MANY HANDS

A glance at the top of Table 1 conveys a central observation on the recent upswing in multiauthor papers: the main driver has clearly been the Large Hadron Collider (LHC), the CERN particle accelerator located on the French/Swiss border. Given the sheer numbers of international scientists, engineers, and technicians involved--upwards of 3,000 for the LHC's ATLAS Collaboration, with a comparable number at the facility's other main detector, the Compact Muon Solenoid (CMS) experiment--the extreme multiplicity of authors is hardly surprising.

In 2008, prior to the LHC's actual startup, a preliminary report on the CMS experiment's instrumentation became the first paper to surpass 3,000 authors, with 3,101 listed.

In Table 1, the papers for 2011 and 2010 represent the high mark, to date, for current hyperauthorship. Both derive from work by the ATLAS Collaboration, and both exceed 3,000 authors, although the 2010 paper manages to take top honors, with its 3,221 authors just edging the 3,179 recorded in the 2011 report.

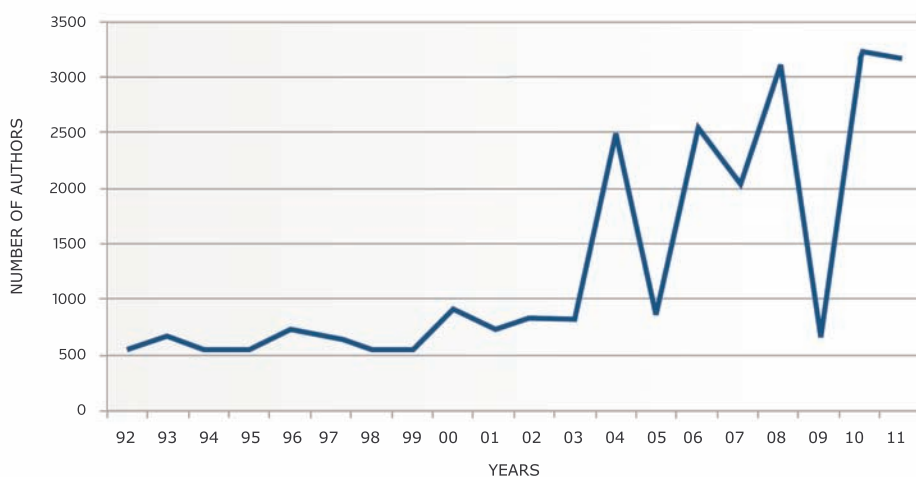
In 2009, both in Table 1 and in the precipitous dip for that year in Graph 3, the LHC is conspicuously absent. That year's mega-authored paper derived not from high-energy physics but from the astronomical search for gravitational waves and their clues to cosmological history. The paper, from the US-based LIGO (Laser Interferometer Gravitational Wave Observatory) Scientific Collaboration, lists a mere 657 authors, yet still qualified as 2009's "most-authored" paper--bracketed in Table 1 by two LHC reports above and below.

RECENT YEARS HAVE SEEN A STEEP INCREASE IN THE NUMBER OF PAPERS WITH AUTHORS IN EXCESS OF 50--AND A PARTICULARLY NOTABLE SPIKE IN REPORTS WHOSE AUTHOR COUNTS EXCEED 1,000 AND MORE.

the facility offline for more than a year. So, although the LHC effectively "missed" 2009, the reports would start up again the next year and accelerate in 2011, with correspondingly high author counts: of 146 papers indexed in 2011 by Thomson Reuters and listing more than 1,000 authors, 110 included the term "LHC" in their abstracts.

As it happened, that same period in 2009 coincided with the interval following the September, 2008 "magnet quench" incident at the LHC, when a section of the accelerator's super-colliding magnets suffered an electrical failure, taking

MAXIMUM NUMBER OF AUTHORS ON A SINGLE PAPER,  
BY YEAR, 1992 TO 2011



GRAPH 3 — AUTHORS ON A SINGLE PAPER

Late-breaking developments suggest that these innumerable LHC authors have not labored in vain. On July 4th, 2012, after poring over data from recent collisions at the facility, LHC team members grabbed headlines around the world by announcing evidence of a particle whose characteristics are consistent with the LHC's most-prized quarry, the particle called the Higgs boson. This long-sought puzzle piece holds the promise of confirming the fundamental framework of physics theory known as the standard model, although much work remains in determining the particle's precise properties. Thus, another round of mega-authored reports is certain to follow.

In 1981, the highest number of authors on any paper indexed by Thomson Reuters was 118; by 1989, the annual number regularly surpassed 500. This progression, continuing right up to today, has provoked much discussion about the multiauthor phenomenon and the very nature of authorship itself. Some have called for the term "contributor" as a distinction from the role of "author" (e.g., D. Rennie, et al., JAMA, 278(7): 579-85, 1997). As yet, however, no such official shifts have occurred.

In the 2007 report, ScienceWatch noted that the figure representing the average number of authors on a Thomson Reuters-indexed paper stood at 3.8. As of 2011, it had edged up to 4.5.

Do further thresholds await beyond the 3,000-author mark? ScienceWatch will have to watch.

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