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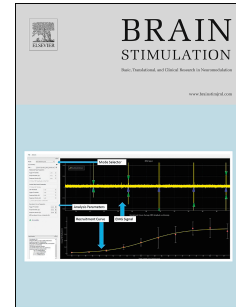


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Response to “Response to Hoy, ‘Gender imbalance and brain stimulation conferences: We have a problem and it is everyone’s problem’”

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Letter to the Editor

TITLE: Response to “Response to Hoy, ‘Gender Imbalance and Brain Stimulation Conferences: We Have a Problem and It is Everyone’s Problem’”

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Dear Editor

In a Letter to the Editor [1], Associate Professor Hoy identified the gender imbalance at *The International Brain Stimulation Conference*, both with respect to the program from 2015 and the preliminary program for the upcoming 2017 meeting; in their recent response, Professors George and Sackeim [2] alluded to the fact that the issue of gender balance does not stand alone, and is interwoven with other concerns such as providing a balanced program with respect to presenters’ career stage and geographical location, together with a diversity of clinical and basic research. Here we act on Prof George and Sackeim’s call for a possible solution to provide a more balanced program at the conference, both in terms of gender and career stage, while critically maintaining high standards of scientific merit.

The conception and support of *The International Brain Stimulation Conference* by the Editorial Board of the *Brain Stimulation* journal provides a unique opportunity for the selection of invited speakers for the upcoming conference. Specifically, invitations to speak could be offered to authors of the most highly cited recent research in *Brain Stimulation*. While we acknowledge that this method does not consider high-quality brain stimulation research published in other world-class journals, it represents a first step in acknowledging, and rewarding, high-quality research publications in our field. We audited research articles published in *Brain Stimulation* from 2014 - 2016 (n=321) (data obtained from Web

of Science on 3/11/2016), identifying the gender of the first and senior (last) authors¹. Overall, 29% of first and senior authors were female; when we selected the most highly cited papers from each year (2014 papers with ≥ 15 citations, $n=20$; 2015 papers with ≥ 10 citations, $n=18$; 2016 papers with ≥ 4 citations; $n=5$), 35% of first and senior authors were female. It is apparent, however, that the gender imbalance is greater for senior (22% and 26% female for all and highly cited papers, respectively) than for first authors (37% and 44% female for all and highly cited papers, respectively).

These data are largely consistent with a 24% (range 17-30%) base rate of females within neuroscience departments [3]. Furthermore, the greater percentage of female first, compared to last, authors is consistent with the loss of female scientists in mid-to-senior career stage as highlighted by Hoy [1]. However, these data are inconsistent with the gender balance in oral presentations selected from abstracts at the *First International Brain Stimulation Conference* held in Singapore, 2015 (5% female) and the preliminary program (keynotes only) for the *Second International Brain Stimulation Conference* to be held in Spain, 2017 (0% female). Taken together, it is clear that female scientists are publishing highly cited original research in the premier journal for brain stimulation but this contribution is not reflected in invitations or selections for oral presentations at our international conference.

Here we present a practical and effective strategy to promote gender and career stage diversity at the *International Brain Stimulation Conference*, using an objective method to quantify the quality and impact of recent *Brain Stimulation* papers. First, we ranked papers (original research, review, meta-analysis) published in *Brain Stimulation* according to citation count; second, we selected the top five ranked papers for each year (2014-2016); and third, we obtained the field-weighted citation impact (FWCI, [4]) for the period 2011-2016 for the first and senior authors of these top-ranked papers (see Table 1). Our rationale was that highly cited papers reflect the impact of the study, and the FWCI reflects an individual's citation performance in recent years irrespective of their career stage. To calculate the FWCI, the number of citations for individual's papers is presented as a ratio of the

¹ Gender was identified via online means: 3.17% of authors could not be identified and therefore are not included in the results below. The last author was assumed to be the senior author, which is convention for most neuroscience disciplines.

average number of citations for all comparable publications indexed in Scopus. Therefore, a FWCI of 1.5 indicates that the individual's publications have been cited 50% more times than expected. FWCI is a useful objective metric to benchmark researchers across different disciplines and career stages. Of the 30 authors presented in Table 1, 33% are female (7/15 first authors; 3/15 senior authors).

We suggest that first-author data could be used to organise a specific symposium for early- and mid-career researchers, in which the first authors of highly cited papers are invited to present (not selected from abstracts). The data presented here suggest that such a symposium could be gender balanced (47% female). While conceived as a short-term solution to achieve gender balance at the conference, this approach will likely generate a positive spiral and lead to longer term benefits in achieving gender balance in our discipline. Indeed, invited presentations facilitate career development through promotion of cutting-edge research, and greater collaborative outreach will empower scientific leadership and provide greater access to academic promotion. This will ultimately lead to greater female representation at senior levels. Those researchers who appear in our senior author list are clearly some of the leaders in our field, and warrant invitations for keynote addresses or symposia organisers/presenters. Indeed, a number of these researchers gave invited talks at the 2015 meeting (two males as keynotes; one male and one female as session speakers) and two appear on the preliminary program as keynote speakers for the 2017 meeting (both male).

We have presented, for consideration, an objective, empirical method for fostering broader recognition of the significant contributions of female researchers at our conference. The approach could easily be extended by auditing brain stimulation research in other high-quality journals and by expanding the metrics used to assess researchers' track records. More broadly, the data we present raise the question of why, if female scientists are publishing high-quality original research, are they underrepresented at conferences, on editorial boards, and in other senior positions? Indeed, there is growing evidence for widespread, systematic gender bias in the sciences [5]. It is imperative that effort is required by the entire scientific community to address such issues, which can only enhance scientific advancement and discovery.

Table 1.

First and senior authors' gender and research profiles between 2011 and 2016

| Year | Name | Gender | Citations | FWCI | Total publications |
|-----------------------|-----------------------|--------|-----------|------|--------------------|
| <i>FIRST AUTHORS</i> | | | | | |
| 2014 | Wiethoff, S | F | 97 | 2.99 | 19 |
| | Tremblay, S | F | 32 | 1.83 | 14 |
| | Seagrave, R | F | 30 | 1.31 | 15 |
| | Hinder, M | M | 25 | 1.25 | 24 |
| | Bunse, T | M | 25 | 1.40 | 14 |
| 2015 | Lopez-Alonso, V | F | 88 | 3.04 | 10 |
| | Vossen, A | F | 31 | 3.64 | 4 |
| | Krishnan, C | M | 26 | 1.15 | 26 |
| | Gill, J | M | 22 | 9.29 | 1 |
| | Bakker, N | M | 18 | 7.51 | 2 |
| 2016 | Hill, A | M | 8 | 1.97 | 9 |
| | Labruna, L | F | 6 | 3.06 | 14 |
| | Bauer, S | M | 4 | 1.72 | 32 |
| | Ho, K | F | 4 | 3.06 | 9 |
| | Chhatbar, P | M | 4 | 3.04 | 14 |
| <i>SENIOR AUTHORS</i> | | | | | |
| 2014 | Rothwell, J | M | 97 | 2.20 | 171 |
| | Theoret, H | M | 32 | 1.76 | 43 |
| | Fitzgerald, P | M | 30 | 1.81 | 174 |
| | Summers, J | M | 25 | 1.54 | 38 |
| | Hasan, A | M | 25 | 2.12 | 90 |
| 2015 | Fernandez del Olmo, M | M | 88 | 1.15 | 49 |
| | Thut, G | M | 31 | 2.92 | 47 |
| | Ehinger, M | F | 26 | 6.84 | 1 |
| | Hamilton, R | M | 22 | 2.91 | 47 |
| | Downar, J | M | 18 | 2.35 | 34 |
| 2016 | Hoy, K | F | 8 | 2.56 | 44 |
| | Nitsche, M | M | 6 | 3.44 | 129 |
| | Hamer, H | M | 4 | 1.59 | 86 |
| | Loo, C | F | 4 | 2.03 | 106 |
| | Feng, W | M | 4 | 1.90 | 32 |

Note: data were obtained from Web of Science and SciVal on 3/11/2016), FWCI: field-weighted citation impact

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