

Open Science, Communal Culture, and Women's Participation in the Movement to Improve Science

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ABSTRACT

Science is undergoing rapid change, with the movement to improve science focused largely on reproducibility and open science practices. This moment of change, where science turns inward to examine its methods and practices, provides an opportunity to address its historic lack of diversity and non-inclusive culture. Through network modeling and semantic analysis, this article provides an initial exploration of the structure, representation, and emerging cultural frameworks in the open science and reproducibility literatures (N = 2,926 scientific articles and conference proceedings) and examines whether these approaches spontaneously improve on past homogeneity. Network analyses revealed few common papers or authors between the two, suggesting that the open science and reproducibility literatures are emerging relatively independently of each other. We next examined whether open science (compared to reproducibility) tends to incorporate interdependent and collaborative ideals, which have been shown in past work to engage members of underrepresented groups more than independent, winner-takes-all approaches. Network analyses revealed that open science has a more collaborative structure, where a greater proportion of papers share authors. Consistent with the literature suggesting the diversity benefits of communal and prosocial purposes, we found that women publish more frequently in high-status author positions (first or last) within open science compared to reproducibility. Finally, semantic analyses of paper abstracts revealed that these literatures appear to be adopting different cultural practices and frames as open science includes more language reflecting communality and prosociality than does reproducibility. We conclude with actionable suggestions for cultivating a more collaborative and diverse culture of science.