



The reward (eco)system of science: More than the sum of its parts?¹

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ABSTRACT

In the 1990s, Blaise Cronin and his collaborators established a “reward triangle” of science, which consisted of authorship, citations, and acknowledgements. However, in the last decades, the landscape of scholarly communication and recognition has changed immensely. The use of social media in scholarly communication has generated a new set of indicators, dubbed altmetrics. The proliferation of indicators and the strong tendency to rely on quantitative measures is a fait accompli. Needless to say, the ubiquity of measurement and evaluation creates new forms of pressure and affects scientific behavior. This event will be presented as a twist on an open fishbowl. Out of five chairs, four will be occupied by a first set of participants and each member will represent one of four elements of the reward system of science to open the discussion: authorship, citations, acknowledgements, and social media. A fifth chair will be left empty for audience members to participate. To involve remote audiences, the fishbowl will be live-tweeted. The Twitter feed will be displayed and used as a backchannel. Audience members who may not wish to take a chair will also be able to

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participate via Twitter. One of the organizers will monitor the Twitter feed, taking the empty chair to relay what Twitter users are saying, in order to address the feed and further the exchanges. During the final 15 minutes of the fishbowl, participants will be asked to come forth and make recommendations pertaining to the initial target topics and any emerging topics. They will be asked to formulate these in short sentences, so that they can be relayed on Twitter; the recommendations will also will be made available for further use as one document on etherpad (<http://etherpad.org/>).

PURPOSE AND INTENDED AUDIENCE

In the 1990s, Blaise Cronin and his collaborators established a “reward triangle” of science (Cronin and Weaver-Wozniak, 1993), which consisted of authorship, citations, and acknowledgements. This can be seen as a take on the traditional pillars of scientific endeavors: to research, discover, and disseminate; to have some impact on further research and society; to account for the collaboration, supervision, assistance, review, and infrastructure without which the system would crumble.

However, in the last decades, the landscape of scholarly communication and recognition has changed immensely. Hyperauthorship has boomed (Cronin, 2001), blurring the lines of scientific accountability (Wray, 2006; Mongeon and Larivière, 2014), and causing certain journals to ask for contributorship statements (PLOS, n.d.). The notion of credit has also been brought forth to solve the oft-debated question of who should get authorship or a simple “thank you” (Birnholtz, 2006; Cronin, 1991; Ngai, Gold, Gill and Rochon, 2005; Rennie, Yank and Emmanuel, 1997). Along the same lines, 45 years of acknowledgements research has not yielded clear guidelines on the value and role of this paratext (Genette, 1997) in scientific evaluations (Desrochers, Paul-Hus and Pecoskie, 2015). Citations and derived indicators, which were once the exclusive domain of proprietary citation databases such as the Web of Science and Scopus, are now being ubiquitously displayed by Google and on various publishers’ websites. Originally thought of as “World Brain” and created as a retrieval tool for scholarly literature (Garfield, 1955, 1964), citation indexing has played a major role in transforming the scholarly community into an evaluation society (Dahler-Larsen, 2012). Trends such as the need for swift rises in publication and citation counts have had many pervasive effects, such as the demise of national languages in science (Desrochers and Larivière, in press). The use of social media in scholarly communication has generated a new set of indicators, dubbed altmetrics, that comprise a range of metrics based on online events that were not recorded in previous times (Priem 2014; Haustein, Sugimoto and Larivière, 2015); however, their heterogeneity has led to discussions regarding their meaning and their validity as symbolic capital (Haustein, Bowman and Costas, 2016). Moreover, social media use has introduced boundary issues between the scientific field and the personal realm (Bowman, 2015).

The proliferation of indicators and the strong tendency to rely on quantitative measures is a *fait accompli*. Needless to say, the ubiquity of measurement and evaluation creates new forms of pressure and affects scientific behavior. However, more and more voices are rising within the ranks of the bibliometric and altmetric communities to warn all agents against the Pandora effect the toolbox we are building may unleash. The calls for contextualization made by the Leiden Manifesto (Hicks, Wouters, Waltman, de Rijcke and Rafols, 2015) echo analyses showing the necessary complementarity of quantitative and qualitative measures for the

understanding and adequate evaluation of research (Traag and Franssen, 2016); and the parting editorial of Blaise Cronin (2015) for the *Journal of the Association for Information Science and Technology* revealed only too well some of the effects the pressures of the current system have on the production and dissemination of science.

In order to discuss the various aspects of scholarly communication today, Desrochers et al. (2015) espoused a conceptual framework based on the ideals put forth by Merton's work on the reward system of science (1973) along with Bourdieu's (1975; 1996) conception of academia as a highly codified field, and identified four main elements of the scientific reward system: authorship, citations, acknowledgements, and social media. This brought together the concepts of recognition and symbolic capital, fundamental to the work of the scientific community and its *illusio*, which defines the rules and stakes of the field (Bourdieu, 1996).

The proposed fishbowl is an attempt to further the discussion on how the various elements of the reward system of science combine to create an ecosystem where the symbolic capital associated with each act is understood and valued. Thanks to audience participation, the hope is that it will bring together varied conceptual viewpoints, whether Bourdieusian, Mertonian, Latourian, or other. These can help build critical outlooks on the indicators related to science, its rewards, and the relation of individual indicators to the whole system. Therefore, all agents of academia can—and perhaps should—be part of this discussion; this fishbowl would be a step towards engaging them from the perspective of understanding what the various indicators create as an ecosystem of science.

EVENT FORMAT AND PROCESS

Set up

The event will be presented as a twist on an open fishbowl. Out of five chairs, four will be initially occupied by a first set of participants (“Team 1”) and each member will represent one of the four elements of the reward system of science identified in Desrochers et al. (2015) to open the discussion: authorship (Elise Smith), citations (Cassidy R. Sugimoto), acknowledgements (Adèle Paul-Hus), and social media (Juan Pablo Alperin). A fifth chair will be left empty for audience members to participate.

To involve remote audiences, the fishbowl will be live-tweeted. The Twitter feed will be displayed and used as a backchannel. Audience members who do not wish to take a chair will also be able to participate via Twitter. One of the organizers will monitor the Twitter feed, at times taking the empty chair to relay what Twitter users are saying, in order to further the exchanges.

Introduction

The moderator (Nadine Desrochers) will give a 10-minute introduction to present the format of the fishbowl and briefly introduce the four elements of the reward system.

Position statements (Team 1)

The moderator will then invite each member of Team 1 to give a 3-5 minute statement on their target topic, the role and place of related acts in the system, the indicators that measure the presence and impact of these acts, and their relationship with the other topics and elements of the reward system of science.

Discussion and position statements (team 2)

After this, the fishbowl will open to the audience. Each attendee will be free to take the empty chair, which will then push a member of Team 1 to retire to the audience. Members of Team 2 (Adrián A. Díaz-Faes, Timothy D. Bowman, Stefanie Haustein, Vincent Larivière, Philippe Mongeon, Anabel Quan-Haase) will be waiting to give their statements during any lull in the discussion, allowing for a dynamic mix of prepared and improvised interventions. The moderator will ask all participants to keep their contributions to 3-5 minutes.

Recommendations

During the final 15 minutes of the fishbowl, participants will be asked to come forth and make recommendations pertaining to the initial target elements and any emerging topics. They will be asked to formulate these in short sentences, so that they can be relayed on Twitter; the recommendations will also be made available for further use as one document on etherpad (<http://etherpad.org/>).

Participants will be guided by asking to focus on three points:

1. The scientific activity and its place (or not) in the reward system of science (e.g.: Should acknowledgements be taken into consideration in evaluations?)
2. The relationship between different scientific activities (e.g.: What is more valuable, a patent or a reader count? 10 papers co-signed with 5 authors, or 2 papers as single author?)
3. The relationship between scientific activities and the indicators used to measure them (e.g.: Many indicators are based on the Web of Science and other hard sciences datasets; what are the effects of this on our perceptions and evaluations of research in the Arts & Humanities?)

Rundown of timing is as follows, with maximum times indicated:

- Introduction - 10 minutes
- Team 1 statements - maximum 20 minutes
- Discussion, including Team 2 statements and Twitter-based discussion - 45 minutes
- Final recommendations - 15 minutes

RELEVANCE TO THE CONFERENCE

The discussion points, both for the prepared statements and as put forward by the moderator throughout the event, will touch upon the following aspects of indicators and their uses, of interest to the STI-ENID community:

- Disciplinary differences and practices
- Existing and changing relationships between quantitative indicators and the qualitative nature of peer review
- Social media presence, acts, and policies
- Biases in underlying data
- Challenges in data quality
- Misuses and adverse effects such as misreadings, gaming, or behaviors catering to the indicators in place

However, the overarching questions are the following ones, self-evident perhaps, yet overdue:

- How do—and how can—the various indicators we use to measure, discuss, and evaluate the value and impact of research come together? In other words,

- What is the current ecosystem of science?
- How do its various forms of symbolic capital coexist? And,
- How do these forms of symbolic capital shape research agendas?

NOVELTY

By bringing all aspects of the reward system of science together in one discussion space, by inviting people in and outside the room to engage through speech or social media, this fishbowl should create a forum that looks beyond the singularity of indicators. Colliding and complementary perspectives can then emerge and we can see (and perhaps confront) the perceptions of the scientific field we are currently shaping. The use of Twitter and etherpad will make the event interactive beyond the walls and duration of the conference, as well as create an outcome for further use.

Preferred length: 60-90 minutes, depending on how dynamic the discussion becomes

Preferred number of participants/attendees: 30-40

Special requests/equipment needs: A projector and screen for the introductory PowerPoint slides, Twitter-feed, and etherpad display. The room does not need to be set up in a round per se, but it should allow for up to 6 people to be seated and seen at once, preferably not at a desk, and it should be easy for people from the audience to leave their seat and come to the presentation area.

THE ORGANIZERS/PARTICIPANTS:

Nadine Desrochers holds degrees from Western University and the University of Ottawa. She is an assistant professor at the École de bibliothéconomie et des sciences de l'information, Université de Montréal. Her research on scholarly communication focuses on the reward system of science, information behavior, and paratextuality.

Stefanie Haustein is a postdoctoral researcher at the Université de Montréal. She holds a Master's degree in History, American linguistics and Literature and Information Science and a PhD in information science from Heinrich Heine University Düsseldorf. Her current research focuses on altmetrics, bibliometrics, and scholarly communication.

Juan Pablo Alperin is an assistant professor at Simon Fraser University, Canada. He holds a Master's degree in Geography from the University of Waterloo, and a PhD in Education from Stanford University. He is a multi-disciplinary scholar who uses computational techniques, surveys, and interviews to investigate ways of raising the scientific quality, global impact, and public use of scholarly work.

Timothy D. Bowman holds a Ph.D. in Information Science from Indiana University, Bloomington. His interests include scholarly communication, data science, altmetrics, and web programming. Currently he is a postdoctoral researcher at the University of Turku, Finland, examining large amount of data to determine how scholars communicate and represent themselves online.

Adrián A. Díaz-Faes is a member of the ACUTE group at the Spanish National Research Council (CSIC). He holds a Master's degree and a PhD in Multivariate Applied Statistics from the University of Salamanca. His research focuses on novel approaches to the study of collaboration in science and the development of new bibliometric indicators.

Vincent Larivière holds the Canada Research Chair on the Transformations of Scholarly Communication at the Université de Montréal. He is also the scientific director of the *Érudit* journal platform, and associate scientific director of the Observatoire des sciences et des technologies (CIRST-UQAM).

Philippe Mongeon is a doctoral candidate in Information Science at the École de bibliothéconomie et des sciences de l'information, Université de Montréal. His research focuses on the reward system of science, and more specifically on authorship and inventorship attribution practices in research teams.

Adèle Paul-Hus is a doctoral candidate in Information Science at the École de bibliothéconomie et des sciences de l'information, Université de Montréal. She holds Master's degrees in Information Science and Anthropology from the Université de Montréal. Her research focuses on acknowledgement functions within the scholarly communication system.

Anabel Quan-Haase is an associate professor of Information and Media Studies and Sociology, Western University. She is the author of *Technology and Society: Social Networks, Power and Inequality* (Oxford University Press, 2013; 2nd ed. 2016). Her research focuses on social media, social networks, social capital, and innovation.

Elise Smith recently completed a PhD in the Applied Social Sciences Programme (Bioethics Option) at the Université de Montréal. Her doctoral research focuses on the fair distribution of authorship in multidisciplinary collaborations. She is broadly interested in publication ethics and bias in research linked especially to gender, power, and seniority.

Cassidy R. Sugimoto is an associate professor in Informatics at Indiana University's School of Informatics and Computing. She is the president of the International Society for Scientometrics and Informetrics. Her research focuses on the formal and informal ways in which scholars communicate to each other and to the broader public.

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