Proposal to The Changing Frontier Conference

The changing nature of scientific credit

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The disclosure of scientific knowledge through scholarly publication is shaped by three intersecting elements: (i) the organization of the work that produced the knowledge (i.e. team size and composition), (ii) the timing norms of journals or other platforms for disclosure, and (iii) the nature of scientific credit that arises from being associated with publication. Over the past fifty years, each of these three elements has changed and with it the nature, timing and authorship of scientific publications. Considerable attention has been paid to the increasing size of research teams (Wuchty, Jones & Uzzi, 2007), however, publishing norms have been less well analysed. This is a critical omission because it is difficult to infer that the organization of research has changed simply based on publication data without accounting for changing norms of publication timing, authorship and credit.

To begin, it is broadly understood that scientists have high incentives to disclose completed research results in order to establish credit and priority; nonetheless, concern has developed regarding the disclosure of other knowledge. In particular, some have argued that scientists should be compelled to disclose interim research findings (all the way to publicly available scientific notebooks) in order to open up the extension and completion of those results to others (Nielsen, 2012). Others have argued that there is insufficient incentives to disclose results of failed experiments or otherwise scientifically uninteresting results. Put simply, developments in the institutions and technology for disclosure have spurred discussions as to why the nature of what has disclosed has not changed to the same extent.

We propose to study the nature of these changes and to understand what might drive consequent changes in practice. Our approach has two steps. In the first, we propose to document and study the changing practices associated with disclosure, specifically the landscape of non-traditional venues for disclosure such as arXiv (an ePrint archive founded in 1991 at Los Alamos for astrophysics) of which High Energy Physics Experiment (hep-ex) is among the most active, the NIH working paper platform, SSRN for social science working papers etc. These venues can be thought of as allowing for the early disclosure of interim results, results prior to peer review, or disclosure of more tentative and less robust findings. In addition, there have been a number of attempts to encourage the disclosure of so-called "negative" results or "non-results" in order to increase the efficiency of scientific progress.

This empirical overview will serve as the foundation for the second part of our project: a more theoretical treatment of the impact of the allocation of scientific credit on the scientists' incentives to author and disclose research results. In cases where there is concern that new tools for disclosure have not been adopted, while there is some rationale regarding the benefits of such disclosures – encouraging diverse research paths and avoiding duplication – little attention is paid to potential costs – specifically, on the incentives of scientists to undertake research. In addition, if the reasons why scientists do

not disclose such results are not well understood there is a risk that they will take even more costly action to keep such results secret – either explicitly or through lack of interest in making them available.

To deepen our understanding of these issues, we link disclosure to the mechanisms available for allocating scientific credit. We will use our wide-ranging qualitative empirical evidence and to motivate theory that focuses on the possibility that scientists receive insufficient credit for interim results; are there imperfections in the market for scientific attribution that allow others to appropriate more than their optimal share of credit for certain disclosures?

To achieve this we will build on current theory (Gans and Murray, 2012) demonstrating the imperfections in market for scientific attribution. In that environment, we focus on the challenges associated with linking contribution, authorship and attribution credit) and the changing role of scientists working in research laboratories for leading researchers as authors on papers. That paper does not consider the issue of the timing of and incentives for interim disclosures. Specifically, it does not take into account, a variety of another issues associated with interim results – that they may not be peer reviewed, that they are not robustly proven, that they may not be of interest (particularly if they are negative results). Thus, a scientist considering disclosing these runs a risk that the results will be potentially damaging to the scientist's reputation – in particular, damage in terms of not taking care. This means that a complete theory needs to consider the full mechanism by which credit impacts on a scientist. While a scientist might like to be acknowledged for contributions to knowledge ('good' attention) that same scientist may be concerned about being seen to take insufficient care ('bad' attention).

We propose to consider this carefully by considering the microfoundations of credit in a more detailed manner. We will take two broad approaches. In the first, we consider scientists motivated by receiving 'good' attention and facing a sanction for 'bad' attention. In the second, and possibly isomorphic approach we consider a model of career concerns where 'good' attention is a favourable signal of scientist's type whereas 'bad' attention is the reverse. It is our belief that a model with these characteristics will be able to evaluate the welfare properties of policies designed to compel early disclosures.

In summary, we aim to match the changing nature of scientific institutions (and technologies) for disclosure with pressures to change the nature of disclosure itself. We will outline these changes and developments before developing a theoretical approach to analysing potential trade-offs and imperfections in the allocation of scientific credit that may impede voluntary changes in disclosure. This will provide an insight into the costs as well as benefits of policy proposals to compel certain disclosures.

References

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Wuchty, S., B.F. Jones and B. Uzzi (2007), "The Increasing Dominance of Teams in the Production of Knowledge," *Science*, 316: 1036-9.

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