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# Professional social networks among Italian astrophysicists. Prospective changes in validation and dissemination practices?

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**Abstract.** In recent years, the influences of the main web 2.0 tools on the scholarly communication cycle have been at heart of significant surveys. Awareness and/or adoption rates of these tools were a relevant aspect of this subject.

In a very similar perspective, the present study addresses the Italian astrophysical research community. An online questionnaire was created in late September 2014 for the researchers working at the Italian National Institute for Astrophysics. 117 astrophysicists have revealed their attitudes and behaviour towards some major professional social networks (ResearchGate, LinkedIn, Academia) as well as their opinions about aspects of the main validation practices. The results show that professional social networks have been adopted widely (~66%). ResearchGate results to be the most popular tool, followed by LinkedIn. The respondents' opinions about different types of peer-review show this community is only partly satisfied with single-blind peer-review; nevertheless, the set of scholarly values and communication practices remains rather traditional and social networks result to be used chiefly for enhancing research output dissemination and researchers' availability on the web.

**Keywords:** Scholarly communication, web 2.0, social networks, astrophysics, peer-review

## 1. Introduction

In recent years, the influences of the landmark web 2.0 on the scholarly communication cycle have been at heart of significant studies. The core aim of this research was investigating whether and, to greatest extent, how interactive internet tools affect the modes of the scholarly practices, especially for as much as validation and dissemination practices are concerned. Relevant literature includes [1–5,7–12], based upon the results of surveys among researchers.

In the same perspective, the present study addresses the Italian astrophysical research community, with a special attention to that crucial mode of validation which is peer-review. To this purpose, an online questionnaire was created in late September 2014 for the researchers working at the Italian National Institute for Astrophysics.

## 2. The questionnaire

The questionnaire was made up of nine questions, plus a final question for respondents' self-classification in three age tiers: 25–44 years of age; 45–55 years; >55 years. The link to the questionnaire

was posted through one of the Institute's mailing lists, which is dedicated to researchers, on October 1st, 2014.

The survey was kindly answered by 117 researchers working at INAF – with an estimated response rate of  $\sim 23\%$ . In addition to its size, this sample of respondents results to be representative with respect to the age features of the actual open-ended-contract INAF researchers. The correspondence is particularly noteworthy in the youngest age tier: INAF researchers aged until 45 result to be 30.12% of the total, and 31.62% among the respondents to the survey (25–44 years of age); for the 46 to 55 years age tier, the percentages are 44.75 and 47.86% respectively. Astrophysicists older than 55 years of age are 25.12% at INAF and 20.51% in the survey.

Thus, this sample is expected to be particularly satisfying for getting an insight into the subject.

### 2.1. Questionnaire composition

The first three questions in the present survey were about the respondents' opinions concerning aspects of the peer-review.

(#1: “What's your opinion on the traditional type of peer-review (author's name is known/reviewer's name is unknown?)” #2: “What's your opinion on the peer-review where the name of the reviewer is known as well as the name of the author (if you have never experienced it: how much do you think it might be useful?)” #3: “What's your opinion on the peer-review where the name of the author(s) and those of the reviewer(s) are reciprocally unknown (double-blind peer-review)?”)

Questions #4 and #5 were aimed at casting some light onto the present role of ArXiv as a scholarly communication hub.

(#4: “On average, how often do preprints you have posted to ArXiv receive comments from other researchers?” #5: “Does this frequency change for papers published in postprint or in accepted version?”)

The aim of the multiple-answer and scaled question #6 was helping to depict the respondents' scale of values as for their papers' means of validation (broadly understood).

(“After posting the text of a paper, I generally consider: very important/rather important/not very important/not important at all: a) comprehensive comments or a peer-review; b) comments on single aspects (not publicly visible); c) comments on single aspects (also publicly visible); d) “Likes”, tweets or other expressions of interest on social networks/social media”.)

In question #7 researchers were asked to indicate which channels they use when looking for comments about their papers, and how often. Also this question was a multiple-answer and scaled one.

(“If you wish an opinion on a paper of yours, which channels do you usually use? a) conversations or email exchanges with colleagues; b) scientific mailing lists or forums; c) professional blogs or social networks; d) the journals' referees, at the moment of submission. // Always/often/sometimes/never.”)

Questions #8 and #9 were about researchers' use of three major professional social networks: ResearchGate, LinkedIn and Academia, and the expectations about this use.

(#8: “On which social network do you have a professional social network? a) ResearchGate, b) LinkedIn, c) Academia, d) none; #9: “If you have one: what do you expect from your professional social network profile?” a) better visibility of my research activity; b) better availability of my papers; c) opportunity to broaden my network of collaborations; d) other.) For both questions, multiple answers were possible.

### 2.2. Interpretation pathway

In order to interpretate the survey's results, three research questions have been posed:

- a) Is there any room in researchers' opinions for new internet 2.0 tools to enhance their experience of the scholarly communication cycle? Particular attention was for validation practices.
- b) Is professional SNs diffusion reaching a critical mass among the Italian astrophysicists?
- c) If so, are professional SNs renovating the main scholarly communication practices – with special focus on validation?

### 3. Main results

#### 3.1. Do researchers feel a need for web 2.0 professional tools?

The answers to question #6 provide a significant picture of the respondents' scale of values as for the preferred means of feedback to their research papers. This is a reference point for the subsequent analysis.

The great majority of the respondents' beliefs appears to be placed within a traditional framework. For 73.59% of the astrophysicists in our sample, comprehensive comments or a peer-review are “very important” and for 71.47% “likes, tweets or other expressions of interest on social networks/social media” are “not important at all” (average of all age tiers). In fact, nevertheless, lower-granularity kinds of feedback – which have a fast-track mode of provision through the social media – are being appreciated by a considerable amount of researchers. 31.4% of respondents report that comments on single aspects of their contributions are “very important” and about 50% mark them as “rather important” (average among age tiers). These percentages are higher in the two lower age tiers, with “rather important” being chosen by 54% of the respondents in both age tiers – provided that comments are not publicly visible. This is an interesting clue: the attribution of importance to publicly visible comments on single aspects of research papers is lower, compared to comments which are not publicly visible. This occurs especially among researchers in the two higher age tiers (“rather important” gets 49.06% and 54.72% respectively, among respondents 45–54 years old; 44.44% and 50% among those in the >54 years old).

Low-granularity feedback provision is electively related to the web 2.0 paradigm: thus, we might hypothesize that there is in fact some room in researchers' expectations for a growing role of social networks as for providing new kinds of validation marks.

Another possible motivation for this outcome is ArXiv's present capacity to sufficiently work as a communication hub for feedback to researchers' posted contents. When asked how often their papers posted to ArXiv receive comments from other researchers (q. #4), 53.67% of the respondents answered “in less than 20% of cases” and a further ~12% answered “never” (average among age tiers; the differences among the different age groups are significant, with senior researchers receiving more feedback and the youngest scholars being more frequently neglected). Little difference is reported as to whether comments are received by articles in preprint stage or in accepted/postprint version (average among age tiers: 91.86% do not notice any difference, for 6.48% the latter receive less comments).

#### 3.2. Diffusion of social network(s) profiles

The respondents to the present survey who said they have a profile on at least one of the three professional social networks considered – ResearchGate, LinkedIn or Academia – have resulted to be 66.54%, vs. a 33.46% of researchers who answer they do not have one (q. #8). This outcome might be in line with the widely-based RIN and CIBER studies [10,11] inasmuch they both depict researchers in physics

as the third disciplinary group by intensity of use of web 2.0 professional tools in general, although in fact [10] maintains that use of SNs and use of other web 2.0 tools are not necessarily correlated.

The previous literature examined has sometimes focused on web 2.0 tools at large; in other cases, surveying the frequency of use or the awareness of specific tools among scholars was preferred to determining researchers' actual adoption of social networks. The choice of the tools to survey has been uneven, in relation to the progressive changes in presence and popularity of the various tools. For all these reasons, putting the data from the present survey into context must be made cautiously.

The internationally-based and multidisciplinary CIBER study [11], published in 2010, surveys a 21.5% of researchers using social networks; those who simply "are aware" of them account for a further 66.5%; respondents who "do not know anything" about the subject are 12%.

The wide, UK-based RIN study [10] (July 2010) indicates a 13% of "frequent users" of web 2.0 tools in general, 45% of occasional users and a 39% of non-users, which induces authors to claim that "current levels of take-up are relatively low". Scholars in physics who use web 2.0 tools either frequently or occasionally are estimated at a 60% overall.

In their multidisciplinary survey based upon 345 respondents and conducted in mid 2010, Ponte and Simon [9] (2011) have numbered a 34.8% of social networking European researchers.

The survey conducted by Calvi and Cassella [3] in April 2012 shows that "for research activities, most respondents ( $n = 8$ ) use web 2.0 tools regularly". LinkedIn results to be "the most used social networking platform"; this outcome is shared by the much wider survey later conducted by Mas-Bleda et al. [5] – 1517 highly-cited researchers who found the highest web 2.0 "web presence" for LinkedIn (18.4% in the physical sciences). Bar-Ilan et al. [2] notice a level of popularity for LinkedIn as high as 70%. ResearchGate is not included among the tools examined by these three studies.

The outcomes of the present survey seem to depict a generally higher degree of involvement with social networks from researchers, thus supporting the hypothesis of a growing usage trend which has been pointed out by [11].

Van Noorden [12], which is entirely focused on researchers' professional use of social networks as at 2014, highlights the large adoption of these tools. While distinguishing between "being aware and visit regularly" and "being aware but not visiting regularly", he outlines the leading position of RG among researchers in various disciplines, shortly ahead of LinkedIn, which is confirmed by the present study. He figures that "just under half said that they visit ResearchGate regularly", with a further ~40% who "are aware but do not visit regularly"; for LinkedIn, the two percentages are respectively ~40% and slightly more than 50%; Academia is confirmed to be a niche with its ~5 and ~25% respectively. From the raw data made available on FigShare [6] you can deduct that according to this survey *at least* 46.46% of the respondents have a profile on RG.

Arcila-Calderón et al. [1] (2015) observe an adoption rate of web 2.0 tools at ~50% among communication scholars and recall previous findings of 62% as adoption rate of "social networks like Facebook and Twitter" in the same disciplinary context in Latin America.

### 3.2.1. Age tiers' behaviour

Within the present survey, age tiers' behaviour with respect to the choice of having or not a profile on a professional social network shows interesting features. The age group which is most frequently equipped with a profile on a professional SN at present is that of the astrophysicists between 45 and 55 years of age, with slightly more than 70% of owners of a profile. The youngest researchers come second (67.56%). About the most established researchers (>55 years old), although they result to be the least active group by profile ownership in general (~61%), they result to be the first group by ownership of more than one profile on different SNs (~39%). This is in line with the part of the previous literature

which excludes a simplistic, direct relation between lower age and higher adoption of the social media in the scholarly environment [10,11].

### 3.3. Profile distribution

The majority of the total respondents (i.e., including those who answer they do not have a SN profile) owns a profile both on ResearchGate and on LinkedIn (36.55%, as average among age tiers; with a peak of ~39% among researchers >55 years old). A single profile on ResearchGate is owned by a further 20.05%, which makes this professional social network the most widespread among the astrophysicists in our survey. The choice in favour of RG as a single SN is predominant among the two younger age tiers (~21% in both cases); researchers between 45 and 54 years of age are the most numerous owners of LinkedIn single profiles (11.53%). Academia turns out to be a very small niche, which is in line with [5,7,12]. No researcher has chosen this tool as his/her single professional SN; small percentages of researchers, all aged between 45 and 55 years, have adopted it in combination either with LinkedIn (3.84%) or with both RG and LinkedIn (less than 2%).

### 3.4. Opinions on traditional and on more innovative types of peer-review

On average among age tiers, the traditional type of peer-review – i.e. single-blind peer-review – is considered to be optimal by only 15.34% of the respondents; on the other side, 9.65% consider it to be inadequate. 75% of the astrophysicists who answered this question place themselves in a sort of vast grey area in-between, with this kind of peer-review being appraised as “sufficiently adequate”. This percentage results to be identical across the three age tiers.

It is interesting to notice how age tiers affect this result. The highest level of consensus for single-blind peer-review is reached among the most established researchers: 25% of the respondents >55 years old believe it is optimal and 0% think it is inadequate. Researchers 25–44 years old who chose “optimal” are 13.90%, whereas scholars from 45 to 55 years old represent the most critical group. They express the lowest level of satisfaction with this configuration of the peer-review (7.14% “optimal”), and consistently show the highest level of dissatisfaction (17.86% consider it to be “inadequate”).

We may recall that this age tier has the highest percentage of SN profile ownership – although this outcome does not per se establish a direct relation between the two phenomena.

Astrophysicists’ opinions about kinds of peer-review which be alternative to single-blind model provide other interesting results.

The double-open option (both author’s and reviewer’s name are mutually disclosed) is not considered to be a valid alternative by the majority of the respondents at present, but it is rather widely represented. 55.46% of the respondents think it is “inadequate or useless” and slightly more than 44% think it is useful, in different shades. The youngest age group is the most well-disposed one, with only a 50% of skeptical respondents.

By far more inclined to a new approach is the sampled community when it comes to deciding about the double-blind peer-review. All age groups predominantly believe that the double-blind option is “useful” (44.76%, average) or “very useful” (20.77%, average). This outcome is in line with [9]. Although the percentage of “very useful” decreases with the growing of researchers’ age, it was unexpected that the choice “useful” be increasingly popular with growing age tiers (from ~35% of the 25–44 group to 54.55% of those aged >55). In fact, these answers seem to reveal that astrophysicists are ready for a more extended experience at least with double-blind peer review on the main journals in the discipline.

### 3.5. Actual use of social networks in astrophysicists' scholarly practices

The use researchers actually make of their social network profiles in their scholarly activity is a turning point for one of the research questions at the basis of this study.

When asked which channels they usually use for getting opinions from peers about their papers (q. #7), the astrophysicists in our sample answer they predominantly use “conversations or email exchanges with colleagues” (“always”, 52.21%; “often”, 40.56%). Online and partly more interactive means of communication such as “scientific mailing lists or forums” have niches of users (“sometimes”, 23.56%; “often”, 7.99%); the journals' referees are being rather widely employed with respect to this (45.94% “always”, although 25.51% “never”).

The most revealing outcomes, anyway, are the answers about “professional blogs or social networks”. 98.64% of the respondents answer they “never” use them for opinions exchange on papers; the percentage reaches 100% both among the youngest age tier (25–44) and among scholars >55 years old, whereas researchers in the 45 to 55 age tier use them for this purpose “sometimes” (4.08%). Thus, somehow unexpectedly, this group strengthens its appearance as the subset more inclined to innovation in this particular setting of its activity.

As it has been stated, “it is clear that [scholarly] social network users see informal tools as a complement to the existing system of scholarly publishing, not as a replacement” [11]; this claim is widely shared within the literature considered [7,8,10,12].

## 4. Conclusion

The most prominent professional social networks seem to have reached an impressive diffusion among Italian astrophysicists and significant expectations for new models of validation of research results, certainly with different types of peer-review, can be detected within this scientific community. In theory, this might represent a very favourable combination at the basis of an innovative use of the social networks in the scholarly communication practice.

Nevertheless, the present survey shows that the main goal for the respondents who have adopted a professional social network seems presently to consist in being more easily reached and read throughout the global research community, rather than being actively engaged in scholarly social networking. In fact, for the astrophysicists in our sample it does not seem that the use of the social networks is the key for exploring new paradigms in scholarly validation and communication, at least at present.

This confirms the more general previous statements according to which, although the traditional scholarly communication model has entered a crisis, it is far from being overcome ([4,11]).

Astrophysicists seem anyway to be rather keen on experimenting new internet tools and the situation might evolve unpredictably in the future.

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