

Are Lay-Summaries Useful for the Diffusion of Research on Social Platforms?

Fereshteh Didegah^{1&2} – Juan Pablo Alperin² – Stefanie Haustein^{2&3}

¹School, University of British Columbia, Vancouver BC Canada – f.didegah@ubc.ca

²Scholarly Communications Lab, Simon Fraser University, Vancouver BC Canada

³School of Information Studies, University of Ottawa, Ottawa ON Canada

Introduction

This study aims to evaluate scholarly articles with lay summaries in terms of their text simplicity and to further investigate their usefulness to increase public engagement with research. Lay summaries were mainly proposed to enhance visibility, impact, and transparency of research outputs (Kuehne & Olden, 2015). Some journals encourage authors to submit a plain-language abstract together with their manuscript in order to publish them with their original article or to promote publications to a broader audience through press releases or journal news feeds.

The British Psychology Society¹ was the first scientific society that published newsletters for its research digest in 2003 to make the psychological research simpler to read for high school students. In health and biomedical areas, lay summaries help to communicate research findings to patients. For example, the journal *Autism*² and *the Annals of the Rheumatic Diseases* are the two journals that use lay summaries to target the non-academic public, in particular patient communities. Other journals, such as the *Proceedings of the National Academy of Sciences (PNAS)* published the summaries to attract attention of academic readers from other disciplines (Shailes, 2017).

The motivation for assessing the usefulness and effectiveness of lay summaries to communicate research findings to a broader public derives from a pilot survey, which we conducted to assess the readability of lay abstracts of ten articles published in *Autism*. Participants were a group of 40 university students from the Business School at Aarhus University in Denmark who were asked to evaluate the simplicity of lay abstracts in comparison to regular abstracts. Participants were provided with both lay and regular abstracts and asked to rate their simplicity and readability on a Likert scale between 1 to 5, where 1 stands for ‘very simple’ and 5 stands for ‘very difficult’ abstracts. To our surprise, the survey results demonstrated no significant difference of simplicity between the lay and regular abstracts, as perceived by the Danish students. This suggests that lay summaries are not necessarily written in a simpler language and are not easier to read for a lay audience.

¹ www.bps.org.uk

² <http://journals.sagepub.com/home/aut>

As the initial survey was based on 40 business students only, results are not generalizable to all journals that provide lay summaries with their articles. Therefore, this study aims to conduct an additional survey including a larger set of lay abstracts from various journals and fields and a more dispersed group of participants.

In addition to this qualitative phase, we apply a quantitative approach to test the effectiveness and usefulness of lay summaries by analyzing social media activities related to research articles including these additional abstracts. The study further assesses the extent to which the impact of these texts written for non-academic audiences compares to the effect of open access to the underlying research articles because open access is also an important factor for increasing accessibility of research outputs especially for the audience who cannot pay journal subscriptions. Lay summaries aim to increase research impact and visibility (Kuehne & Olden, 2015). Likewise, the open access movement was developed to increase visibility of research publications by providing unrestricted access to scientific publications for all readers (Budapest OA initiative, 2002). This study will analyze which of these two factors leads to greater research impact and public engagement with science.

Methods

Shailes (2017) identified a list of 61 journals through their author guidelines that encourage or ask authors to submit a plain-language abstract of their work; for some journals, she directly contacted the journals about their lay summary policy. A subset of 16 of these 61 journals was identified for this study, because they included lay summaries for all their articles. One of the entries, *Cochrane Library*, is not a journal but a network of researchers, so it was removed from the list (see Table 1).

In the quantitative phase of the study, we retrieved the bibliographic information of all articles from the remaining 15 journals that are published between 2012 to 2017 in the Web of Science, accounting for 45,530 articles of which 45,498 (99.92%) had a DOI. We then matched the DOIs with social media and news activity captured by Altmetric LLP between 2012 and 2017 (i.e., tweet counts, Facebook posts, news counts, blog posts and Wikipedia citations). Of the 45,498 DOIs, 36,805 were mentioned on at least one of the five social media and news platforms (Table 2).

Table 1. Journals including lay summaries in all their articles

Journal	Name (if applicable)	Display location
ACS Chemical Neuroscience	Lay summary	Published in press
ACS Combinatorial Science	Lay summary	Published in press
ACS Infectious Diseases	Lay summary	Published in press
ACS Medicinal Chemistry Letters	Lay summary	Published in press
Autism	Lay abstract	Separate issues from the original article
Autism research	Lay abstract	Separate issues from the original article
Behavioural Ecology	Lay summary	Within research article (Under the title)
Functional Ecology	Lay summary	Separate issues from the original article
PLOS Biology	Author summary	Within research article
PLOS Computational Biology	Author summary	Within research article

PLOS Genetics	Author summary	Within research article
PLOS Medicine	Author summary	Within research article
PLOS Neglected Tropical Diseases	Author summary	Within research article
PLOS Pathogens	Author summary	Within research article
Proceedings of the National Academy of Sciences	Significance Statement	Within research article

Results

This is a work-in-progress study and only some preliminary results for the quantitative phase are available. The articles from the 15 journals listed in Table 1 were searched in altmetric database using their DOIs. Above 50% of DOIs in most of the journals including PNAS, PLOS family journals, functional ecology, behavioral ecology, autism research, autism, ACS infectious diseases, and ACS chemical neuroscience have at least one altmetric mention. Around 30% of DOIs in the other two journals including ACS medicinal chemistry and ACS combinatorial science were mentioned at least once in the altmetric platforms (Table 2). Twitter is the dominant platform for all the journals except for the ACS Combinatorial Science that is more visible on Facebook than on Twitter (Table 3).

Table 2. Number of DOIs and alt DOIs from the 15 journals

Journal	Total articles	Total DOIs	Total alt DOIs	% alt DOIs
ACS Chemical Neuroscience	1158	1156	623	53.89
ACS Combinatorial Science	549	549	170	30.97
ACS Infectious Diseases	274	274	161	58.76
ACS Medicinal Chemistry Letters	1481	1481	517	34.91
Autism	516	516	496	96.12
Autism research	509	509	485	95.28
Behavioral Ecology	1223	1223	992	81.11
Functional Ecology	1033	1033	923	89.35
PLOS Biology	1277	1277	1192	93.34
PLOS Computational Biology	3146	3145	2768	88.01
PLOS Genetics	4123	4122	3642	88.36
PLOS Medicine	1129	1129	1026	90.88
PLOS Neglected Tropical Diseases	4099	4097	3452	84.26
PLOS Pathogens	3635	3634	3152	86.74
Proceedings of the National Academy of Sciences (PNAS)	21378	21353	17206	80.58
Total	45530	45498	36805	-

Table 3. Altmetric counts of DOIs in the 15 journals

Journal	%DOIs mentioned in:					Average no. of mentions per DOI in:				
	Twitter	Facebook	blogs	news	Wikipedia	Twitter	Facebook	blogs	news	Wikipedia
ACS Chemical Neuroscience	45.24	8.39	3.03	12.63	3.81	2.48	0.25	0.06	0.28	0.09
ACS Combinatorial Science	12.93	20.22	0.55	1.09	0.18	0.23	0.21	0.01	0.01	0.00
ACS Infectious Diseases	54.01	6.57	3.65	6.20	1.09	2.50	0.11	0.06	0.57	0.01
ACS Medicinal Chemistry Letters	28.36	3.04	4.93	2.09	1.28	0.99	0.05	0.07	0.20	0.01
Autism	94.96	65.50	19.77	11.24	0.78	23.73	1.75	0.34	0.48	0.01
Autism research	94.30	40.86	20.24	15.91	0.98	15.67	1.15	0.38	0.85	0.01
Behavioral Ecology	77.51	20.03	9.40	10.71	3.11	8.36	0.36	0.18	0.54	0.04
Functional Ecology	87.71	18.39	10.26	9.78	2.13	20.52	0.33	0.19	0.68	0.02
PLOS Biology	92.87	55.91	43.07	29.21	7.28	65.53	2.44	1.38	2.47	0.12
PLOS Computational Biology	85.98	28.55	16.25	12.02	3.15	18.27	0.63	0.32	0.64	0.04
PLOS Genetics	83.28	35.03	13.83	14.56	4.44	9.50	0.65	0.28	0.79	0.07
PLOS Medicine	90.61	71.21	39.24	55.27	5.05	58.35	3.43	1.03	5.04	0.07
PLOS Neglected Tropical Diseases	79.89	36.93	8.74	11.03	2.61	8.47	0.79	0.16	0.60	0.03
PLOS Pathogens	82.11	32.14	15.33	15.63	3.16	10.72	0.69	0.26	0.86	0.04
Proceedings of the National Academy of Sciences (PNAS)	75.77	27.79	26.23	29.05	5.84	15.58	1.04	0.81	2.95	0.09

Future outlook

Future research will include an expanded survey with a larger set of journals and articles with lay and regular abstracts. The survey results will allow us to generalize whether lay summaries are easier to understand by non-expert and non-academic audiences than regular article abstracts and if this affects the social media visibility of the underlying articles. Linguistic and complexity measures will be also applied for measuring the similarity between the lay and regular abstracts and the complexity of abstract texts.

The impact of different types of open access (gold and green) on the altmetric counts of articles published in the 15 journals will be also examined to answer the question that which factor, lay-language or open access, more associate with a broader impact of research items.

References

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