Scientometrics (2014) 101:781–791
DOI 10.1007/s11192-014-1296-5

A descriptive study of inaccuracy in article titles on bibliometrics published in biomedical journals

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Received: 17 October 2013 / Published online: 24 April 2014

Abstract In a bid for an eye-catching title, many writers use devices such as interrogation and exclamation marks, metaphors, double meanings and vague expressions which do not comply with accepted standards in style manuals of scientific writing. The purpose of this article is to analyse the lack of accuracy of titles in articles on bibliometrics published in biomedical journals and to discuss the effect this may have on the reader. A corpus of 1,505 titles included in PubMed and Web of Science between 2009 and 2011 and retrieved under the MeSH major topic "bibliometrics" and other related terms was analyzed. Different types of inaccuracy were identified and a classification was developed and used for this particular study. 23.4 % of the titles contain inaccuracies of some kind. Editorial titles show a higher percentage of these (11.43 %) than original articles (8.83 %) and letters (3.2 %), the most frequent being the inclusion of a question in the title (seen in 30.9 % of the papers), followed by vague and imprecise expressions (17.8 %), acronyms (16.4 %) and double meanings (14 %). Many titles fail to comply with the conventions of scientific writing. A descriptive title accurately reflecting the content of an article would give readers a better idea of its content, help them to decide more rapidly whether they want to read it and facilitate retrieval from bibliographic databases.

Keywords Research articles · Accuracy of titles · Writing style · Bibliometrics · Biomedical journals

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Background

Despite being a very small part of a research paper, the title plays an important role and, as the first point of contact between writer and potential reader, fulfills certain pragmatic functions: to provide a brief general description of the content of the article, to attract attention, to inform, and sometimes, to surprise, provoke or challenge the reader (Haggan 2004). Readers generally decide whether or not to read an article by reading the title first. Good titles of research articles often catch the eye of researchers before the content of the articles is actually read (Cheng et al. 2012). For this reason, titles in science mirror a set of requirement that are crucial to the construction, communication, and progress of new knowledge (Soler 2007).

The title has a variety of aims and functions. For the author, the most important aim is to attract the interest and attention of the editor, the reviewers, and ultimately the readers. The title forms the basis of the initial impressions of the editor (and, by extension, reviewers) and can influence decisions about whether or not to consider the paper for publication. For the reader, the title is the critical element in the first stage of deciding what to read (Goodman et al. 2001). To impress readers most favorably, titles must be written carefully and writers must choose syntactic structures that can effectively represent the distinctive content of their articles (Haggan 2004; Sing 2008; Soler 2007). They must include informative and descriptive key words that accurately represent the content of the article. Titles are subject to the constraints of limited space and the resulting need to be brief (Haggan 2004; Wang and Bai 2007).

These wise words not withstanding, it is clear that authors often prioritize attention-grabbing and use unconventional words and expressions, metaphors, questions, exclamations, puns, colloquial language and so forth to achieve this. Titles may be emotive or judgmental, flippant, humorous or confrontational or use linguistic devices which deviate from the norms of scientific communication.

In recent years there has been a growing interest within biomedical sciences in the use of bibliometric indicators that show how scientific publications have contributed to the advancement of knowledge in given areas of inquiry, diseases, or countries. An example of the extensive use of bibliometrics in health sciences is provided by PubMed. In June 2013 it contained 5,369 records under the MeSH (Medical Subject Headings) descriptor "bibliometrics", having grown from 189 articles in 2001 to 636 in 2011.

Our purpose in this article is twofold. On the one hand, we aim at quantifying the presence of shortcomings in article titles on bibliometrics and related topics published in biomedical journals. On the other hand, we wish to carry out a descriptive analysis of these shortcomings and provide examples and recommendations that can guide author when considering and writing titles.

Methods

We carried out the bibliographical searches in PubMed and Web of Science, which are the most frequently used and preferred resources by researchers in health sciences (Evans 2002; Costas et al. 2008). The search in PubMed was carried out using the term "bibliometrics" in its thesaurus MeSH (Medical Subject Headings). This allowed us to enhance the search automatically to the narrower term "journal impact factor". In addition, the MESH bibliometrics was used as major topic in order to ensure the highest degree of relevance of the results. In WoS we used the following search strategy in the "topic" field: bibliometr* OR scientometr* OR "impact factor" OR citation OR co-citation OR h-index

OR eigenfactor. The results we obtained from the search in WoS were limited to the categories involving biomedical sciences.

The search was restricted to the period 2009–2011 and no limitation was applied as far as type of article is concerned. 1,110 records were retrieved from PubMed and 1,328 from WoS. Once we had removed the duplicate outcomes—produced by the overlap between the two databases—the final sample of outcomes was of 1,505 articles. All records were analyzed by three researchers specializing in medicine and linguistics.

Table 1 shows the operative definitions of each of the potentially misleading features found: acronyms, exclamations, metaphors, puns, questions, length, and vagueness. The section "Other" includes slash and suspension points. The classification of shortcomings is based on the categories used in previous studies by Whissell (2004), Soler (2007), Sagi and Yechiam (2008), Singh et al. (2008), and Cheng et al. (2012). These studies include the following categories: titles with emotional connotations of words, amusing titles, questions in titles, acronyms or abbreviations, sensationalization, metaphors and brevity or excessive length.

Results

Out of the 1,505 records that were retrieved, 353 (23.4 %) contained some kind of inaccuracy. The percentage of shortcomings was higher in editorial articles (11.43 %) than in original articles (8.83 %) and letters (3.2 %) (Table 2).

The commonest shortcoming was found to be the title as a question, which was present in 109 (30.9 %) of the papers. Next categories down are vagueness—which appears in 63 papers (17.8 %)—, presence of acronyms ($n = 58$; 16.4 %), and attempts at wit ($n = 49$; 14 %). Other less frequent shortcomings were metaphoric expressions ($n = 30$; 8.5 %), excessive length ($n = 28$; 7.9 %), exclamations ($n = 9$; 2.5 %), and the use of slash and suspension points ($n = 7$; 2 %).

We have observed some differences regarding types of article. For example, questions in titles are more frequent in original articles and letters, whereas vagueness is more frequent in editorial articles. In the following sections we provide some examples of defective titles.

Examples of defective titles

Metaphors

Metaphors	Reference
Watching the river flow	Rev Port Pneumol. 2011;17:197–8
The journal impact factor-a stable currency	Psychother Psychosom Med Psychol. 2011;61:3–5
Impact factor: vitamin or poison?	Sao Paulo Med J. 2010;128:185–6
Staying on the cutting edge	Augment Altern Commun. 2010;26:223–5
The race for the impact factor	J Sleep Res. 2009;18:283–4
The journal impact factor: navigating between Scylla and Charybdis	Clin Chem Lab Med. 2009; 47:315–6

Table 1 Working definitions of different defects identified in the titles

Shortcomings	Working definitions
Acronym	Title including abbreviations formed from the initial components in a phrase or a word. E.g. "Introducing SNIP to the Journal of Sexual Medicine". J Sex Med. 2010;7:2661–2
Exclamation	Phrase that expresses strong emotion, such as surprise, pleasure, or anger, and followed by an exclamation mark. E.g. "Impact factor: let's be unreasonable!" (Epidemiology. 2009;20:932–3)
Metaphor	A metaphor can be described as a comparison that shows how two things that are not alike in most ways are similar in another important way. E.g. "Watching the river flow". (Rev Port Pneumol. 2011;17:197–8)
Wit	The keen perception and cleverly apt expression of those connections between ideas that awaken amusement and pleasure." E.g. "The impact of the impact factor". (Can J Urol. 2009; 16:4445–6)
Question	An interrogative expression often used to test knowledge. E.g. "Are studies reporting significant results more likely to be published? Am J Orthod Dentofacial Orthop. 2009;136:632.e1–5
Excessive length, Verbosity	Title too long, with more than 20 words. E.g. "Counting citations in texts rather than reference lists to improve the accuracy of assessing scientific contribution: citation frequency of individual articles in other papers more fairly measures their scientific contribution than mere presence in reference lists." (Bioessays. 2011;33:724–7)
Vagueness, imprecision, brevity	Lack of clarity in what the authors want to say. E.g. "A time of change". (J Hum Nutr Diet. 2011;24:1–2)
Other	Titles including slashes or suspension points. E.g. Research and bibliometrics: a long history…. Clin Res Hepatol Gastroenterol. 2011;35:336–7

Extracted from: Merriam-Webster Dictionary (http://www.merriam-webster.com/dictionary/) and http://dictionary.reference.com/)

Table 2 Shortcomings by type of article

Type of shortcomings	Type of document				
	Original article	Editorial	Letter	Total	%
Acronyms	26	28	4	58	16.4
Exclamations	2	5	2	9	2.5
Metaphors	3	25	2	30	8.5
Attempts at wit	7	29	13	49	14
Question titles	61	31	17	109	30.9
Excessive length	20	7	1	28	7.9
Vagueness	11	44	8	63	17.8
Other[a]	3	3	1	7	2
Total	133	172	48	353	100

[a] Use of slash, suspension points

Questions titles

Questions in titles	Reference
H-index: a good measure of research activity?	Tidsskr Nor Laegeforen. 2011;131:2494–6
What are we reading now? An update on the papers published in the orthodontic literature (1999–2008)	J Orthod. 2011;38:196–207
How to judge a book by its cover? How useful are bibliometric indices for the evaluation of "scientific quality" or "scientific productivity"?	Ann Anat. 2011;193:191–6
Ranking hepatologists: which Hirsch's h-index to prevent the "e-crise de foi-e"?	Clin Res Hepatol Gastroenterol. 2011;35:375–86
What does the Journal's impact factor mean to you?	J Am Diet Assoc. 2011;111:41–4
Does the impact factor have too much impact?	SAMJ South Afr Med J. 2009;99:226–228

Quotations from the Bible and titles of films

Expressions	Reference
"But many that are the first shall be last, and the last shall be first"	FASEB J. 2009;23:1283
"Impact factor wars: Episode V-the empire strikes back"	J Child Neurol. 2009;24:260–2
"Looking back to the future"	Worldviews Evid Based Nurs. 2009;6:1–2
"The impact factor for evaluating scientists: the good, the bad and the ugly"	Clin Chem Lab Med. 2009;47:1585–6

Attempts at wit

Attempts at wit	Reference
The impact of the impact factor	Can J Urol. 2009;16:4445–6
Love thy lab neighbor	Nature. 2010;468:1011
The first and the last will become the best	Orv Hetil. 2010;151:1236–7
Impact factor: does it have an impact?	J Ayub Med Coll Abbottabad. 2009;21:180

Acronyms

Acronyms	Reference
Introducing SNIP to the Journal of Sexual Medicine	J Sex Med. 2010; 7:2661–2
The highly cited SARS research literature	Crit Rev Microbiol. 2010;36:299–317
GAPs in the study of zoo and wild animal welfare	Zoo Biol. 2009;28:561–73
The use of Cochrane Reviews in NICE clinical guidelines	Cochrane Database Syst Rev. 2011;12:ED000032
Is SIGAPS score a good evaluation criteria for university departments?	Prog Urol. 2012;22:195–6

Exclamations

Exclamations	Reference
It's the data!	Mol Biol Cell. 2010 Jan 1;21(1):4–6
The impact of 2011!	Forensic Sci Med Pathol. 2012 Mar;8(1):1–3
Impact Factor steadily rising and now 3.123!	Oral Oncol. 2010 Sep;46(9):629
Thorax 2009: another great year!	Thorax. 2009 Dec;64(12):1017–8
Our journal's progress-indexing!	Klin Neuroradiol. 2009 Aug;19(3):177

Titles excessively brief and vague

Titles excessively brief and vague	Reference
Impact and scholarship	J Nurs Scholarsh. 2010 Sep 1;42(3):233
Journal Impact Factor: it will go away soon	Clin Chem Lab Med. 2009;47(11):1317–8
Spreading the word	Nurs Stand. 2009;23:22–3
Ideas with impact	Nurs Inq. 2011;18:277
A time of change	J Hum Nutr Diet. 2011;24:1–2

Discussion

Our study has some limitations. First, our purpose was not to conduct a thorough linguistic and terminological analysis, but to understand how authors involved in biomedical bibliometrics express their concerns through the titles they choose.

Second, we have analyzed tiles only in a 3 years period. A larger corpus containing titles from a wider range of years in the same topic would offer more convincing results.

The article's title has the challenging task of triggering the curiosity of readers by inviting them to appraise the article and perhaps use it as a reference for new research. Thus, the title is the most important summary of a scientific article. It is generally the first—and sometimes the only—information obtained from the published article (Paiva et al. 2012). Editors emphasize that primary purposes of the title are to provide a clear message of the content, to assist audiences with searches, to help readers make rapid decisions about what they are likely to find as a basis for deciding what they will read, and to attract the attention of audiences and encourage them to read the article (Goodman et al. 2001).

Choosing titles for scientific articles is a challenging task. And yet, no agreement seems to have been found on the standards and good title writing practices in different scientific disciplines and genres. Contradictions between what writing norms state and what real instances of scientific titles show can be problematic. A number of academic writing textbooks and style manuals have proposed the elements of good titles for research articles (Cheng et al. 2012). For example, Swales and Feak (1994) indicated three: "(1) The title should indicate the topic of the study. (2) The title should indicate the scope of the study. (3) The title should be self-explanatory to readers in the chosen area" (p. 278). Day and Gastel (2006) defined a good title as "the fewest possible words that adequately describe the contents of the paper" (p. 15).

Journals rarely provide rules for writing the titles in their guidelines for manuscript submission. Moreover, the guidelines known as the Uniform Requirements for Manuscripts submitted to Biomedical Journals, or Vancouver style—which are followed by most biomedical research journals—also provide limited information about how the titles of papers should be written. The requirements include the following statement: "Concise titles are easier to read than long, convoluted ones. Titles that are too short may, however, lack important information, such as study design (which is particularly important in identifying randomized controlled trials). Authors should include all information in the title that will make electronic retrieval of the article both sensitive and specific" (Sing et al. 2008). However, in a study of 420 titles published in biomedical journals, Goodman et al. (2001) showed that 40 % of the titles included no information beyond the topic of the article. This pattern calls into question the effectiveness of current authorial and editorial practices regarding two primary purposes of titles: the role of titles in informing readers about the content and achievements of articles, and the ability of titles to attract potential readers ("marquee appeal").

Metaphors

According to Lakoff and Johnson (2003), human thought processes are largely metaphorical. Many of our experiences and activities (arguing, solving problems, budgeting time, etc.) are metaphorical in nature and much of our conceptual system is structured by metaphor. Metaphorical titles are particularly interesting. Medical language often uses metaphors—such as Eustachian tube, aqueduct of Sylvius, tibial plateau—and this usage may explain the metaphors used in bibliometric subject matters (Cheng et al. 2012), reflecting the writer's attempt to use linguistic strategies to attract readers to read complete articles. A metaphor is usually used to refer to a rhetorical figure of speech, denoting the use of an implied analogy between two objects or ideas to achieve a powerful effect of comparison. Since the use of a metaphor can greatly arouse readers' curiosity, the

juxtaposition of a metaphor with the real research topic in a compound title seems a clever construction that can attract readers to think about the association between them. For instance, when readers read the title "The race for the impact factor" (J Sleep Res. 2009;18:283–4.), they may be puzzled, and at the same time attracted by the metaphorical expression of "the race". As they move on and they read the other part of the title, "the impact factor", which reveals the research topic, they realize what is implied in the metaphor.

Questions in titles

As with metaphorical titles, questions in titles can also stimulate the reader's interest. Consider this title: "H-index-a good measure of research activity?" Upon reading such a title, readers may have their curiosity aroused and wish to read the contents to find an answer to the question. The use of the question form is another well-known rhetorical device to draw the reader's attention by identifying the topic (Kane and Peters 1966). The question fulfills the role of raising expectations concerning the content of the article.

Lack of face-to-face communication between writer and reader is somehow counterbalanced by written interaction based on the reader's expectation that the writer will provide the answer to the question expressed in the title. The fact that readers might start to look for answers for the question mentally as soon as they read the title may stimulate their curiosity to read the full article and find out the writer's position on that particular issue (Hyland 2002).

The question title construction seems to allow authors the possibility of posing questions on such subject matter as an indication that, in spite of the current state-of-the-art about it, there are, still, queries in need of reply, interpretation, and conclusion (Soler 2007). Nonetheless, question titles are not optimal in terms of effective indexing and retrieval from databases since no explicit reference to the object of study is made.

Long versus short titles

No consensus has been found in the scientific literature regarding the length of titles. Some authors suggest that titles in all disciplines should be short, whereas others indicate that length depends on the discipline, implying that in some cases good titles may be long (Anthony 2001). Day and Gastel (2006) state that long titles or hanging titles appear pedantic, place emphasis on general rather than on more relevant terms, need punctuation, scramble indexes, and could be seen as complex or boring. They have the same opinion of titles phrased as questions. They also state that a title should contain the smallest number of words that adequately describe the content of the paper. The problem here is how to adequately describe the content of the paper. One way to keep titles short is to avoid using empty words, as well as unnecessary articles at the beginning of the title.

Readers need to know as early as possible in the reading process whether or not the paper contains information relevant to their own work. Therefore, the pragmatic aim must be to inform quickly. If this is not achieved readers may decide not to read beyond the title. However, short titles of three or four words are so brief that it is very difficult to get the gist of the whole article through them (Paiva et al. 2012; Vintzileos and Ananth 2010). In addition, one should bear in mind that the vast majority of searches are restricted to title or keyword searches. Therefore, titles containing more words should have a higher probability of being found using such searching strategies.

Journal editors and experienced authors frequently suggest the use of a short, concise, and informative title (Neill 2007; Vintzileos and Ananth 2010). Some scientific journals impose a maximum limit on the number of words or characters in titles (*Archives of Internal Medicine* 2011). The journal *Annals of Internal Medicine* suggests that authors "use titles that stimulate interest, are easy to read and concise (12 words or fewer), and contain enough information to convey the essence of the article". In a study conducted by Haggan (2004), literature and linguistics titles were of about the same length, averaging around nine words per title, whereas science titles, were nearly half as long again, averaging almost fourteen words per title.

Biblical quotations and titles of films

The use of humor in scientific titles makes sense if we take the point of view of the title as a persuasion device for attracting readers. But in general, the use of humor in titles may harm the attractiveness of scientific articles (Hartley 2007). In particular, the use of humor may give the impression that the content is shallow and lacks gravitas. Sagi and Yechiam (2008) have addressed the question whether the use of amusing titles is indeed associated with the subsequent success of the article, as measured by the citation index. They found that this usage was associated with a considerable "penalty" of around 33 % of the total number of citations.

Humorous titles, then, may lead the reader to interpret the content of the article as trivial or of low quality and thus could damage the credibility of the paper (Armstrong 1989). Papers with amusing titles could be more difficult to find in bibliographic databases because they include fewer technical keywords used by professionals. In addition it could be that authors try to hide the low quality of some of these papers and improve their chance of success by means of vagueness (Sagi and Yechiam 2008). Sometimes, the writer makes an attempt to engage the reader by presenting a witty title which catches the attention and acts as a lure into the article itself.

Comparisons, attempts at wit, derivations and quotation marks

The construction of titles involving comparisons and puns has similar aims and effects to the ones mentioned above: attracting the readers' attention and building up involvement with them. These types of constructions are common in the titles of articles on bibliometrics, in particular, those dealing with impact factor. For example, the title "The impact of the impact factor" is used in several articles (J Clin Nurs. 2009;18:2537–8. Singapore Med J. 2009;50:752–5. Can J Urol. 2009;16:4445–6). A similar construction is "Does the impact factor have too much impact?" (S Afr Med J. 2009;99:226–8). On other occasions, scientific impact is compared with clinical impact, as in the title "Scientific impact and clinical impact (J Adhes Dent. 2009;11:171–2). The consideration of the impact factor as a game—and the elements involved in the game—has also drawn the writers' attention, as for example in the title "The impact factor game: the rising impact factor of the British Journal of Radiology -a success story?" (Br J Radiol. 2010;83:93–8). Another common device is the use of derived words, such as "Impactomania" (J Pak Med Assoc. 2009;59:424), and the use of the word "impact" in inverted commas. In both cases it is clear that the writers intended to generate intrigue. The main problem in these cases is that if readers cannot understand a title, there is only a small chance that they will read the abstract or the full paper (Paiva et al. 2012).

Conclusions

When writing on bibliometric topics, authors of scientific articles use a variety of methods to make the titles of their papers more effective. Writers, aiming to catch the reader's attention, resort not only to the traditional approaches of using questions and exclamation marks. As has been shown in this study, they also employ puns based on the polysemy of the word "impact", biblical quotations, and titles of films, among other devices. The pragmatic aim of attracting the reader to read the whole article sometimes involves ignoring the scientific convention of packing in as much information as possible within the confines of a title.. There is a risk that, where no explicit mention is made of the content of the paper, the paper may be 'lost' in bibliographic databases.

While some manuals of scientific style state that the title of an article is not the place to show humor or stylistic creativity (Day and Gastel 2006), other authors take a different view and even recommend some degree of creativity by means of the rhetorical resources of the language involved. However, it should be stressed that when readers scan titles of scientific articles, they actually look for keywords. In this reading process there is no time to appreciate details of literary creativity.

The purpose of the present work was not to say that possible imprecisions made papers inferior, but to point out that writing titles more carefully is likely to serve the cause of science and its readers better.

It would be useful in future research to ask authors about their practices in choosing titles when writing papers singly or with others. It would also be interesting to know more about how journal editors, referees and readers respond to titles in different formats.

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