

## **Tell Me Why Bob Dylan and the Beatles Song Titles Are Used in Biomedical Literature**

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*Received August 22, 2017; Accepted December 25, 2017*

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### **Abstract**

How often and why do scientists refer to music titles in their papers? There has been a growing trend of using popular music titles in scientific literature since the 1990s. We have investigated the extent to which songs by Nobel Prize winner Bob Dylan, and by The Beatles are used in titles of biomedical scientific publications. The Beatles appear more popular than Dylan (in 589 and 211 publications, respectively): they are used more often in the titles and work with Beatles inspired titles also appear to be cited more often than work using Dylan titles. The Beatles' hit used most often is *The long and winding road*; for Dylan it is *The times they are a-changing*. There are also geographical and gender-related preferences. This interdisciplinary study used

specialist search engines and web-based tools to conduct bibliometric analysis and to visualize the results. While on the face of it, the study is slightly tongue-in-cheek, it does have a serious aim, namely to explore the reasons for the interplay between popular culture and the more traditional realm of biomedical science.

## Keywords

Bibliometric analysis; Popular culture; Web of Science; Medline; Citations

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## Introduction

Sensational headlines in newspapers and websites are more likely to attract readers, hence the success of click-baiting where shocking words or popular search terms are used in real or pseudo news and in sponsored content to ‘lure in’ audiences and encourage them to share the stories (Kivak 2017). In academia, opportunities to publish have increased tremendously thanks to online publishing options, but the commensurate pressure to ‘publish or perish’ has also increased. In the biomedical sciences especially finding a way to increase the number of times one is cited can be very important for one’s career. It seems feasible then that academics keen to get attention for their research will try to think up a catchy title, involving words from well-known songs for instance, to make their publication stand out from the crowd. Although, there could be many other less serious reasons for using pop artists as a form of inspiration. For example, as part of a bet to win a free lunch, as five Swedish scientists admitted in 2014 that they had been doing for years (Michael, 2014; Gornitzki, Larsson & Fadeel, 2015).

As researchers interested in biomedical sciences and rhetoric, we wanted to investigate the extent to which songs written by Bob Dylan, the “cult guru of marginal voices” (Basu & Santiniketan, 2013) - and idol of one of this paper’s authors - has had an influence on biomedical literature. The artist, awarded the Nobel Prize in Literature in 2016 for what the Swedish academy’s permanent secretary, Sara Danius, described as “creat[ing] new poetic expressions within the great American song tradition” (Dwyer, 2016), has had an extraordinary influence on contemporary music and sold more than 100 million albums worldwide (Czechowski, Miranda & Sylvestre, 2016). We wondered how much of his work would be referred to in biomedical articles. In addition, we wanted to compare the occurrence of Dylan’s work with that of one of the other greatest contributors to popular music: The Beatles. As Schinder says, the influence of this supergroup “cannot be overstate[d] – not just on music, but upon virtually every aspect of popular culture” (2007, p.159). Our study, which certainly could be construed by some as trivial or humorous, does have two serious aims: firstly, we are genuinely interested in whether (biomedical) researchers think that borrowing words from popular titles will attract readers, and secondly, we wonder whether Dylan’s and the Beatles’ words may be having any kind of effect

on the traditionally ‘serious’ but mostly boring realm of academia. Furthermore, we used this project that employed specialist search engines with web-based tools for bibliometric analysis and result visualization, as well as “old-fashioned” email contact with the listed authors of the biomedical articles, as an opportunity to involve undergraduate students in a truly original, lighthearted real-life interdisciplinary research project.

## Methodology

As starting point for our study we took the song titles listed on the website of Bob Dylan ([www.bobdylan.com/us/songs](http://www.bobdylan.com/us/songs)), to retrieve all 639 songs recorded by Bob Dylan, and The Beatles Bible ([www.beatlesbible.com/songs](http://www.beatlesbible.com/songs)) which lists all 302 Beatles songs. We were only interested in songs written by Bob Dylan or The Beatles, and not in those where they had covered others’ work. For example, Beatles’ cover versions of rock and roll classics, such as *Roll over Beethoven* and *Memphis, Tennessee*, were excluded from further analysis. It should be noted, however, that none of the publications in the biomedical literature with *Memphis, Tennessee* in the title referred to the original Chuck Berry hit song but dealt with someone from or something which occurred in Memphis Tennessee. An example is *The yellow fever epidemic of 1878 in Memphis, Tennessee* from the Bulletin of the History of Medicine (Baker, 1968). Throughout his career, Bob Dylan also recorded a number of cover versions, especially on the *Self Portrait* album (*The Boxer*, by Simon and Garfunkel and *Take a Message to Mary* by the Everly Brothers). For our analysis we used all songs written and recorded by Bob Dylan or The Beatles, irrespective of whether these songs have also been recorded by others. Both the Beatles and Bob Dylan have been covered by a great many artists; Wikipedia lists 2058 covers of Beatles songs ([https://en.wikipedia.org/wiki/List\\_of\\_cover\\_versions\\_of\\_Beatles\\_songs](https://en.wikipedia.org/wiki/List_of_cover_versions_of_Beatles_songs)) and 1374 covers of Dylan songs ([https://en.wikipedia.org/wiki/List\\_of\\_artists\\_who\\_have\\_covered\\_Bob\\_Dylan\\_songs](https://en.wikipedia.org/wiki/List_of_artists_who_have_covered_Bob_Dylan_songs)). Joan Baez, The Band, and The Byrds in fact have built their careers on Bob Dylan songs. None of the covers, however, beats the original, except perhaps *All along the watchtower* by Jimi Hendrix (although one of us (GTR) certainly is biased here). We furthermore have excluded song titles consisting of a single word as it is difficult to unequivocally attribute such a title to a specific song. While the word *help* (24,677 hits in PubMed.gov, assessed on November 29, 2017), for example, could refer to the Beatles song, it is virtually impossible to establish a direct link, especially in the biomedical literature. It should be noted that 3 publications were found with *Help, I need somebody* in the title. While these being clear references to The Beatles song, it is a line of text rather than the title, and were therefore also excluded. For these reasons 30 songs of the Beatles and 36 Dylan songs were excluded from this study.

When using PubMed/Medline as search interface it has to be kept in mind that this search engine uses a stop-word list consisting of commonly found terms which are not included in a search. Several Dylan and Beatles song titles can be generated consisting solely of stop-words such as *Here, there and everywhere*. Next to the exact song title, we found numerous title variations and

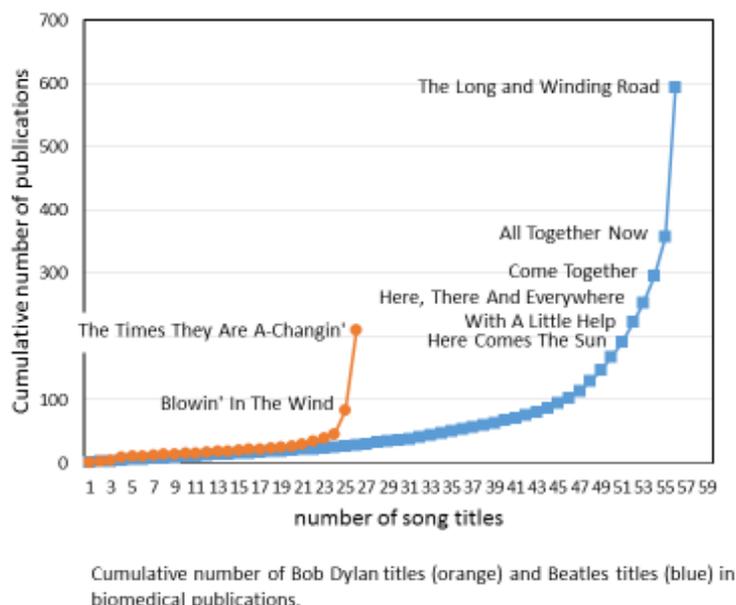
lyric quotes, such as *With a little help from my enteric microbial friends* (Berkhout, 2015) and *How will you need me, how will you read me, when I'm 64 (or more!)* (Chason et al., 2010). Because of the above limitations of the search interfaces it is virtually impossible to obtain a complete overview of all title variations. For that reason, we unfortunately also had to leave out the title variations in our analysis.

Song titles consisting of a general term such as *I feel fine*, *Getting better*, *Going going gone* and *Beyond the horizon* were checked manually for the context in which they were used. In most cases the publications were rejected (57 Beatles titles and 113 Dylan titles). Not surprisingly, the term *I feel fine* is used frequently in the biomedical literature but only a single paper actually intended to quote this famous Beatles song. Another paper actually referred to R.E.M.'s *It's the end of the world as we know it (and I feel fine)* (Smith & Evans, 2004).

## Results and Discussion

### The Top Hits

Ultimately our bibliometric analysis was based on  $302-87 = 215$  Beatles song titles and  $639-149 = 490$  Dylan song titles. We used Medline (Ovid) to search for these song titles in the titles of biomedical publications. There were 589 publications in the biomedical literature which contained a Beatles song in the title, and a total of 57 different songs were quoted. For Bob Dylan we found 201 publications that quoted 26 different songs. The catalogue of The Beatles therefore is quoted more often and more extensively than that of Bob Dylan ( $p < 0.001$ ; see Figure 1). The difference would be even greater if a correction for the catalogue size were to be made. Figure 1 shows that almost 80% of all Dylan quotes stem from 2 songs: *The times they are a-changing* and *Blowing in the wind*. The top song of The Beatles is *The long and winding road* (39% of all publications). Together with *All Together Now*, *Come Together*, *Here, There And Everywhere*, *With A Little Help From My Friends*, *Here Comes The Sun*, *Ticket To Ride*, *A Hard Day's Night* and *Let It Be* they contribute to 80% of The Beatles quotes.



**Figure 1. Titles of Beatles and Dylan songs used in biomedical publications**

Table 1 has a breakdown of the Beatles’ songs used in scientific academic as compared to professional academic publications. Overall, *The long and winding road* is the most quoted Beatles song in both types of publications, but is used significantly more often in scientific academic journals. Interestingly, it appears that song titles with work-related double meaning (*All together now*, *A hard day’s night*, *We can work it out*) are used significantly more often in professional academic publications (indicated in bold in Table 1).

**Table 1. Beatles songs in scientific and professional publications**

	All	Science		Professional		Significance
		Number	%	Number	%	
Total	589	479	81	110	19	
The Long And Winding Road	236	207	<b>43</b>	29	26	0.001144
All Together Now	63	40	8	23	<b>21</b>	0.000121
Come Together	42	30	6	12	11	0.08771
Here, There And Everywhere	31	29	6	2	2	0.072769
With A Little Help From My Friends	31	27	6	4	4	0.396829
Here Comes The Sun	24	22	5	2	2	0.184367
Ticket To Ride	21	16	3	5	5	0.538734
A Hard Day's Night	16	6	1	10	<b>9</b>	0.000005
Let It Be	16	14	3	2	2	0.520447
We Can Work It Out	11	6	1	5	<b>5</b>	0.02417
Other titles	98	82		16		

Chi-square statistical analysis was performed and expressed as p-values. The results are significant at  $p < 0.05$ . Significant different percentages are indicated in **bold**.

Our analysis is primarily confined to the use of Beatles and Dylan song titles in the biomedical literature. This encompasses the disciplines medicine, biochemistry genetics, and molecular biology, immunology and microbiology, neurosciences, nursing, and health professionals as defined by Web of Science (<https://webofknowledge.com>). We have compared the frequency of *The long and winding road* (Table 2) and *The times they are a-changing* (Table 3) for the other disciplines defined by Web of Sciences. The data in Table 3 show that *The long and winding road* is most often used in the field of Medicine, followed by the Social Sciences. However, relative to the total number of publications in this discipline (9.6 million), social science publications (at just over 1.5 million) score 2x higher than medical publications.

**Table 2. Publications per discipline for The long and winding road**

Discipline	# publ.	Discipline	# publ.	Discipline	# publ.
Medicine	217	Environmental	19	Mathematics	8
Social Science	82	Agri and Biol	17	Chem Engineering	7
Biochem, Gen, MolBiol	62	Neurosciences	17	Health Prof	6
Engineering	37	Chemistry	16	Energy	5
Buss, Man, Acc	27	Nursing	15	Dentistry	3
Arts and Hum	26	Econo Finance	13	Decision Sci	1
Computer Sci	23	Physics Astro	13	Veterinary	1
Immunol Microbiol	22	Materials Sci	10	Undefined	15
Psychology	22	Multidisc	9		
Pharma Toxicol	20	Earth Plan Sci	9		

Data assessed on November 28, 2017 at Web of Science

The same trend is visible for Bob Dylan's *The times they are a changing*: in absolute numbers Medicine is in top position with 36 publications, but relatively speaking, social science uses the song more. There are other differences when comparing the top scoring disciplines for *The long and winding road* with *The times they are a-changing*. Nursing and Chemical Engineering score significantly higher for Dylan than for The Beatles (Nursing at place 4 and 15, respectively for Dylan and The Beatles; Chemical Engineering at 6 and 22). In the Dylan rank order (Table 3), Biochemistry, Genetics and Molecular Biology drops from their 3<sup>rd</sup> rank (for The Beatles) to 16<sup>th</sup> place. Immunology and Microbiology, 8<sup>th</sup> for The Beatles, isn't even listed in the Dylan rankings.

**Table 3. Publications per discipline for The times they are a-changing**

Discipline	# publ.	Discipline	# publ.	Discipline	# publ.
Medicine	36	Environmental	1	Mathematics	0
Social Science	16	Agri and Biol	2	Chem Engineering	6
Biochem, Gen, MolBiol	2	Neurosciences	1	Health Prof	4
Engineering	8	Chemistry	1	Energy	5
Buss, Man, Acc	6	Nursing	7	Dentistry	0
Arts and Hum	3	Econo Finance	1	Decision Sci	0
Computer Sci	5	Physics Astro	0	Veterinary	1
Immunol Microbiol	0	Materials Sci	3	Undefined	2
Psychology	5	Multidisc	1		
Pharma Toxicol	3	Earth Plan Sci	9		

Data assessed on November 28, 2017 at Web of Science

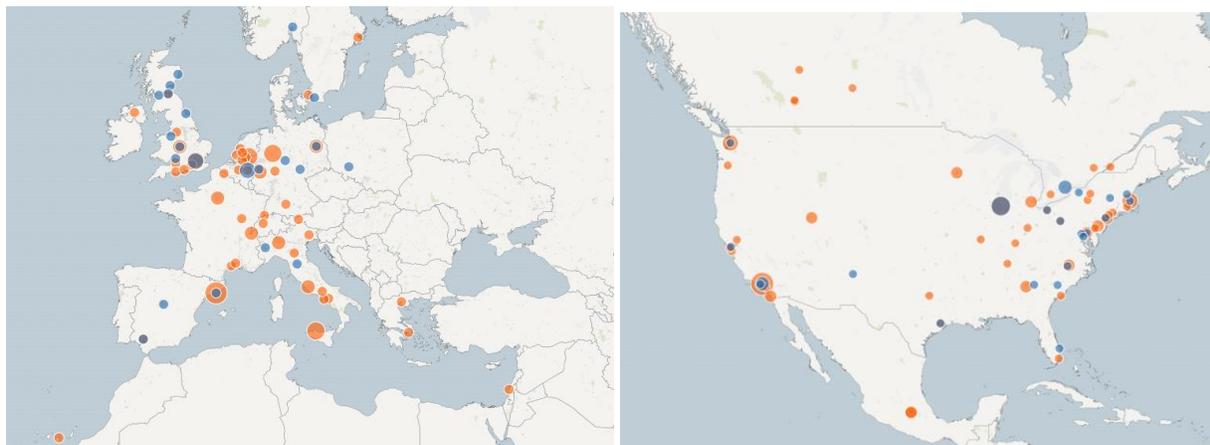
Using the Create Citation Report tool of Web of Science, we then went on to analyze the quality and the impact of the publications that used a Beatles or Dylan song in their titles. The publications with Beatles songs in the title were cited 3916 times, corresponding to an average of 11.6 citations per item and an H-index of 30 (i.e. the top 30 publications each have been cited at least 30 times in other publications). The highest cited publication is on “*Th17 cell differentiation: the long and winding road*”, published by Mandy McGeachy and Daniel Cua in *Immunity* 2008. As of November 2017, this paper had been cited 432 times. Articles with Dylan inspired titles did not perform as well for the authors as the band from Liverpool. Publications that use Dylan’s *The Times they are a-changing* (either spelled as *changing* or as *changin’*) are cited a total of 79 times, an average of 1.72 per item and giving an H-index of 5. Kemeny’s June 2013 article *Treatment of metastatic colon cancer: “The times they are a-changing”* in the *Journal of Clinical Oncology*, is the highest impact Dylan quoting publication, having been cited 21 times as of 29 November 2017.

### The top countries and cities

We compared the global impact of The Beatles and Dylan by analyzing the geographical distribution of author affiliations for *The long and winding road* and *The times they are a-changing*). Anonymous publications, such as editorials, were excluded in this analysis.

*The long and winding road* occurs in publications originating in all continents, while the *Times they are a-changing* reaches South America (and Tasmania), but not Africa and Asia. British scientists are particularly fond of the Beatles: 9.5% of all *Long and winding road* quoting publications in the last 25 years are from the UK, although the country’s scientists are responsible for just 6.5% of all science publications. It furthermore appears that US, Australian, Italian and Dutch scientists are also Beatles fans, but that *The Long and winding road* is

significantly underrepresented in Japan and China. For Dylan this analysis is more difficult to make because of the smaller numbers, but Britain, Italy and Australia clearly appreciate Dylan, but, perhaps somewhat surprisingly, apparently those from the US do not. The hotspot cities for *The Long and Winding Road* are in Europe: Barcelona, Palermo, Bielefeld, and Nijmegen. In Northern America the academic centers with the most quotes for this song are Los Angeles and Chicago. Top cities for Dylan are London, Chicago and Toronto (Figure 2).



**Figure 2. Geographical distribution of affiliations of the corresponding author of publications quoting either *The long and winding road* (orange) or *The times they are a-changing* (blue).**

We also analyzed the gender distribution of the biomedical authors either quoting Dylan or The Beatles. To that end, we determined the corresponding author’s gender by checking their full name, and double-checking by including it in our questionnaire. As table 4 shows, we were able to determine the gender of 472 Beatles quoting authors, and 162 Dylan quoting authors. Our data show that significantly more female scientists as corresponding author, use Beatles song titles.

**Table 4. Gender of corresponding author**

	Male	Female	Unknown	Total
Beatles	316	156	117	589
(percentage)		(33)*		
Dylan	128	34	41	203
(percentage)		(21)		

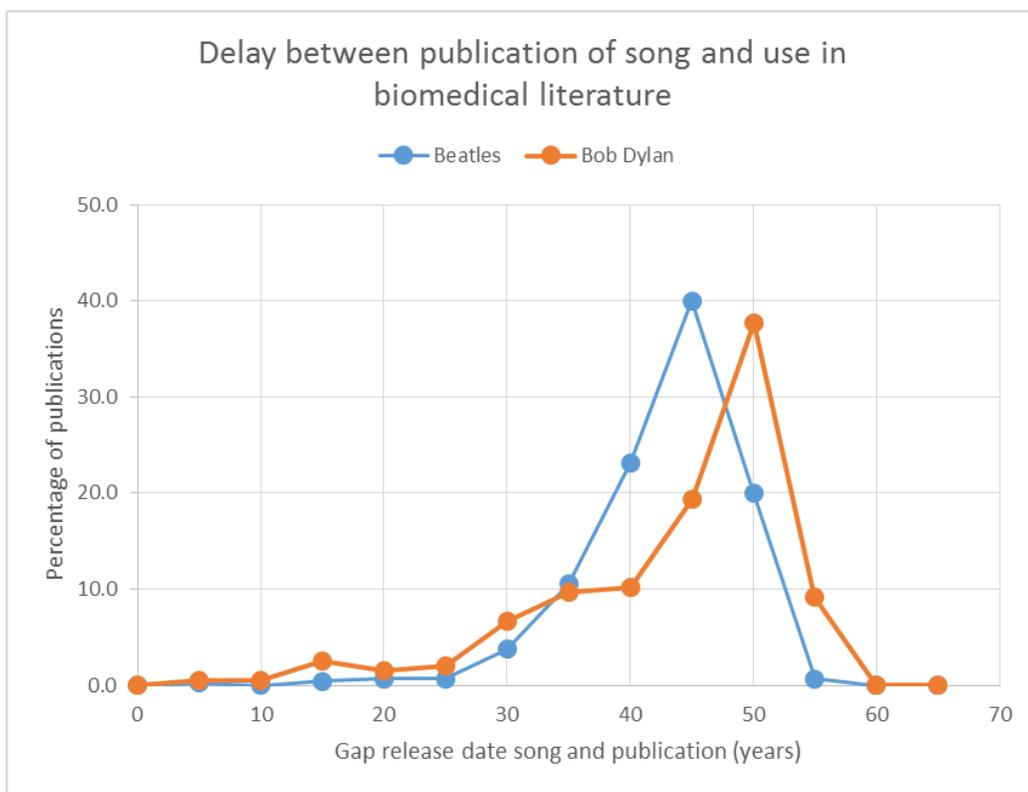
\*The difference between the percentage of female authors quoting a Beatles or a Dylan title is significant at  $p < 0.01$

### The top reasons

*The long and winding road* was released in 1970 on the *Let it be* album, *The times they are a-changing* already in 1964 on the album with the same name. Both songs became hits in their year of publication, yet it took many years before biomedical research writers used these song titles. Of all *Long and winding road* quoting papers, only 3% was published before 1990, of the *Times*

they are a-changing quoting papers, 4% is from before 1990. We surmised that the reason for this delay might be that future biomedical researchers were teenagers at the time of the Beatles and Dylan’s peak and adolescence is often associated with the first development of musical tastes (sometime referred to as ‘receptive years’). Secondly, it could be due to the growth in the annual volume of biomedical publications over the past decades. That, however, does not explain the rather sudden upward turn after 30 (Beatles) or 40 (Dylan) years of publications quoting those songs (see Figure 3).

Thirdly, perhaps it is because of an increased interaction between popular culture and the biomedical scientific community. To test these assumptions, we sent a questionnaire to all the authors (still alive) of Dylan and Beatles quoting papers, for whom we could retrieve their current email addresses, asking why they had done so (Full questions in Rijkers et al, 2017). For this analysis we have excluded the professional journals such as *Nursing Times* as usually the author is not responsible for such articles’ accompanying headlines. In total, 128 Beatles quoting authors and 58 Dylan quoting authors replied to our questions.



**Figure 3. Number of biomedical publications in period after song release**

When starting the survey, we had estimated that most authors who used Beatles and Dylan quotes would by now be close to retirement, as they might have been teenage fans when the Beatles and Dylan were scoring most of their hits. Bonneville-Roussy et al. (2013), explain how several studies into musical habits have tended to conclude that “musical preferences crystallize

in early adulthood”, however, they caution that such studies tended to have small samples and focus on popular music. While teenagers find discovering and listening to music extremely important, more so than older people do, more recent research in social psychology suggests that people’s musical appreciation goes through a number of developmental influences: the young preferring intense music, older people opting for something more sophisticated (Bonneville-Roussy et al., 2013). Only a minority, 20-25%, of respondents were in their teens when the song they quoted came out. Up to 10% of scientists quoting a Beatles or Dylan song were not even born the moment the songs they are referring to were released. Perhaps then, the Beatles and Dylan are a sophisticated type of music and as such get noticed by ‘sophisticated scientists’ when they are at an age ready to publish scientific articles?

The majority of respondents were happy to share why they had chosen the title of a Beatles or Dylan song in their own publication. Approximately 50% confirmed it was to make the article stand out. Others said it was because the song seemed such a good fit for the article’s content. Some admitted too that they were fans. Of the 128 Beatles quoting authors who answered our questionnaire, 82 (60%) mentioned that they really preferred Beatles music over that of Bob Dylan. 11 were neutral, but 30 (24%) were in fact more of a Dylan than Beatles fan. Of the 27 Dylan quoting authors, just eight indicated that they really preferred Dylan over the Beatles, six could not decide and 14 (52%) confirmed they in fact preferred The Beatles over Dylan. It thus can be concluded that catching the reader’s attention was an overriding argument for choosing a song title rather than music preference per se.

## Conclusion

Using bibliometric analysis and web-based tools to look at biomedical publications, we find that The Beatles outperform Bob Dylan as a source of inspiration for titles. In particular, *The long and winding road* and *The times they are a-changing* are firm favorites. The Beatles seem particularly popular with women scientists and scholars in Britain. Scientists say they used the songs to draw attention to their biomedical article or because the song title covered the article’s content extremely well. Additional research will be required to substantiate whether there is a growing awareness of an interaction with popular music, and popular culture in general, within the (biomedical) scientific community. As social scientists also seem very partial to using these giants of pop music, further research should try to ascertain their motives, as well those of researchers in the humanities. It remains to be seen whether Bob Dylan’s Nobel Prize for literature will encourage a whole new generation of music and culture lovers to take note of him. If so, he might knock the Beatles from their dominant position. His latest albums *Shadows in the Night*, and *Fallen Angels*, however, consists completely of covers - virtually all once recorded by Frank Sinatra-, so perhaps Sinatra or another more modern singer or band might be the next muse for science publication titles.

## Acknowledgements

The authors wish to thank all the scientists who responded to the questionnaire and in particular wish to thank UCR students Kaatje Bakker, Anouk Daams, Elizabeth Mcpherson, Joleyn Tange, Eva Versteeg for their help with data collection. We also wish to thank the Beatles and Bob Dylan for giving us the idea to write about this topic and for the inspiration to include the Beatles song *Tell me Why* in the title of this article.

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***Bibliographic information of this paper for citing:***

- Rijkers, Ger T., Luscombe, Anya, & Sloof, Carla (2017). "Tell Me Why Bob Dylan and the Beatles Song Titles Are Used in Biomedical Literature." *Webology*, 14(2), Article 159.  
Available at: <http://www.webology.org/2017/v14n2/a159.pdf>
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