

## Questioning Cyber-Utopia: Skepticism in Digital Social Networks

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### *Introduction*

Science Communication has had a boom due to the Internet's tools and platforms. Today, more content is being produced and distributed than ever. But, is it proportionally reaching more people than before? Is the Internet really a cyber-utopia as it was promised a few decades ago? To research these questions, the skeptical community's online communication was analyzed.

Scientific Skeptics, also known as Skeptics, are a community of science communicators with a very specific objective: criticize paranormal and pseudoscientific claims -such as alternative medicine, belief in psychic powers, Astrology, or climate change denial-, and to explicate the methods and results of science and critical thinking (Kurtz; 2009, Carroll; 2012). They communicate science in order to debunk pseudoscience: their aim is to change the audience's behavior -stop them from using, buying or believing in pseudoscientific products or claims-, and to influence public policy, in order to have a more educated and democratic society (Kurtz, 2010c).

Skeptics have migrated to the Internet as a way to consolidate and grow their community, but also in order to reach more people. Today, there's a plethora of skeptical projects around the world in all platforms, languages, styles and about different topics or specializations. Powered by utopian ideas such as that through digital social media billions of people can be reached, and that the Internet has facilitated the production and distribution of content, this migration keeps increasing each year. But are they really communicating to more people? And, if so, are they changing people's beliefs and behaviors?

If, as the Argentinian philosopher Mario Bunge has stated: "Pseudoscience is always dangerous, because it pollutes culture and, when it concerns health, the economy, or the polity, it puts life, liberty, or peace at risk" (2009: 248), then, Skeptic's goal creates a particular necessity: to reach people outside the community. It's not enough to "preach to the choir" or to wait for people to find their outlets. If they want to have a real impact on their society, then they must try to transcend the network.

For example, in 2010, local Australian Skeptics showed that Power Balance bracelets -silicone armbands with supposed magical powers- had no scientific basis. They unmasked trickery and illusions used to achieve the company's alleged results. In turn, the government stopped the sale of the product and forced the company to return to their clients the money they spent on the bracelets. This is a clear example of online science communication being able to change behavior. But is the norm or an exception?

### *Method*

Using Social Network Analysis, the Spanish speaking online skeptical community was studied in order to find out if communication outside the network of skeptics actually happens or, on the

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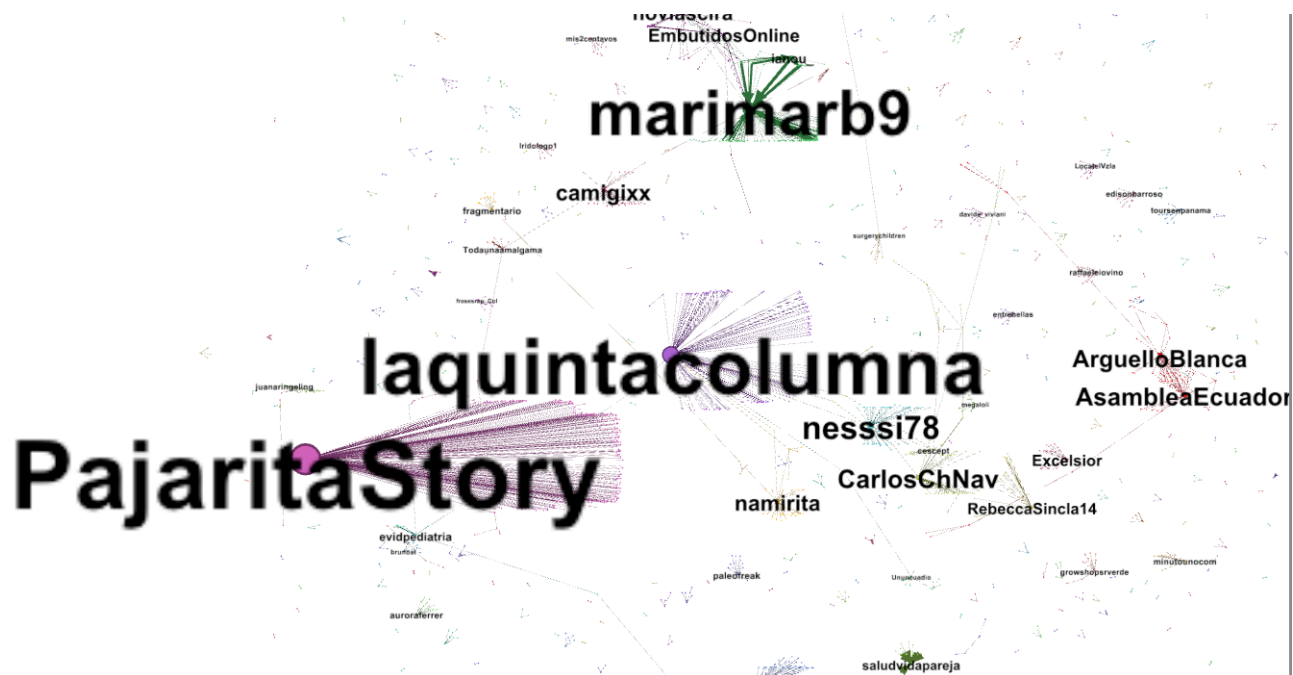
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contrary, most messages stay inside it.

A network is a set of nodes such as individuals, webpages, institutions or countries. The edges are the relationships between the nodes. Information can be transmitted through these networks, as well as diseases, languages or political views, among many other things (Jackson; 2008). Although Social Network Analysis has been productive since the first half of the 20<sup>th</sup> century, today, thanks to digital social media and the Internet, it's possible to study these networks more easily and in bigger numbers.

To analyze the flow of information in the skeptical community, the study was centered on Twitter due to the platform's popularity and their data recollection policy. From September 1<sup>st</sup> till October 15<sup>th</sup>, 2015, all the tweets containing the keywords "alternative medicine" in Spanish, and its different configurations, such as "altmed" or "#alternativetherapies" (all as one word) were collected. The alternative medicine concept was chosen because it encompasses many types of practices such as Homeopathy, Reiki or Faith Healing and it was observed that both Skeptics and believers of alternative medicine used the concept in similar manners, unlike words like pseudoscience: believers don't tend to call their beliefs pseudoscientific.

This produced a corpus of 7,971 tweets created by 2,163 users. Among them, they had 1,844 edges. Here are a couple of examples of the collected tweets. Some were clearly pro alternative medicine, others were clearly skeptical of them, and the rest were either neutral or they couldn't be clearly interpreted.



**Fig. 1:** Complete network of 7,971 tweets between 2,163 users.

## Results

Two different analyses were done to the tweets. First, a Conversation Network Analysis to study shared information between users by understanding their interactions: the more tweeting and retweeting is done between two nodes, the closer they are pulled together, thus creating communities of conversations.

This analysis showed the existence of no less than 434 groups of users interacting with themselves, as shown in figure 1. As it can be seen, there are a lot of groups or pairs of people,

but no defined communities, implying that people are talking about alternative medicines on Twitter, but to their own communities. There are users with plenty of retweets, such as «PajaritaStory», «Laquintacolumna» or «marimarb9», but it looks like the information is not reaching very far. Not even the number of followers seemed to influence the scope of their tweets. For example, the user «entrebellas» had more than 900,000 followers, but only 8 other users retransmitted the tweet (0.00088% of its followers), meanwhile, «PajaritaStory» had 2,683 followers but its message was retweeted by 293 of them (almost 11% of its followers).

Focusing only on the top 20 influence users, meaning that their message was received by others and retweeted, it was found that more than half (55%) of the messages were in favor of alternative medicines and only 35% were clearly skeptical.

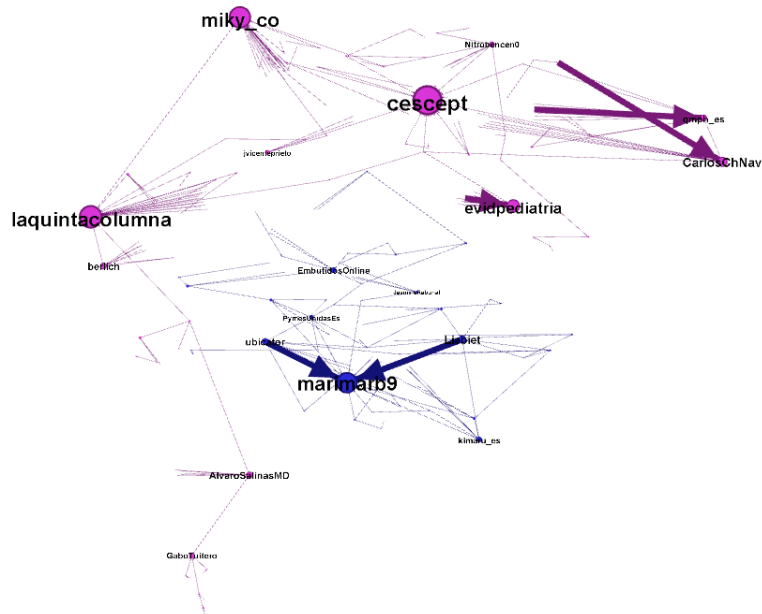
The second technique used was Dissemination Network Analysis. This time, instead of using all of the users, 200 tweets that were clearly either pro or against alternative medicines were selected. Four main clusters or communities were identified, representing almost a third of all the nodes in the network, the rest were too small to be considered a group. These networks are conformed as follows:

Cluster	% of nodes in cluster	Type of information shared
1) «laquintacolumna»	16.67%	Skeptic
2) «marimarb9»	7.39%	Believer
3) «gominolasdpetra»	4.21%	Skeptic
4) «asambleaecuador»	3.83%	Believer

**Tab. 1:** Main four communities using Dissemination Network Analysis.

As the percentages in table 1 show, there are big differences in the relative size of each community: the first is twice as big as the second one, and the same goes between the second and the third. This could suggest the network's internal cohesion: Sceptics could be better at creating group union.

Looking only at the two main clusters (fig. 2), it can be seen that, although they appear close to each other, they don't really have any nodes that are connected, making the two completely separate communities.



**Fig. 2:** Two main clusters, one in blue and one in pink. None of the nodes connect between communities.

## Discussion

This study is part of a bigger body of evidence pointing to the same conclusion: information flows easily inside specific networks, but it rarely transcends them. What happens when people only get information that agrees with their point of view? In politics, ideological sides have become more polarized and segregated due to their information bubbles (Fox News, for example) affecting voting and, in the end democracy (Pariser, 2012). In medicine, ideology and worldview shape people's belief in vaccines and continuously reaffirm their stance with the spread of misinformation (Lewandowsky, et al; 2012), even in the face of contradictory information (Nyhan, et al; 2014), creating a rise in anti-vaccine communities. In the workplace, groups lose creativity and innovation because no new information flows into them (Burt, 2004). Even conspiracy theories are immune to debunking because they tend to live inside closed groups (Zollo, et al; 2015).

This phenomenon has been identified as an Echo Chamber but also by many other names: Cyberbalkanization by Marshall Van Alstyne and Erik Brynjolfsson (1996), The Filter Bubble by Eli Pariser (2012), or Homophily by Miller McPherson, Lynn Smith-Lovin y James M. Cook (2001). They all share one simple concept: communities, groups and networks tend to be composed of ideologically similar people. Friends on Facebook, followers on Twitter and blog readers encourage our ideologies, leaving us with a very partial representation of the world.

In the past, this was attributed to geography -people living close to each other think alike- but the Internet shows that this variable is neither necessary nor sufficient. But then, why is the Internet not the promised cyber-utopia? Four possible types of biases can be conceptualize that could be the cause of such high levels of lack of communication between communities.

**Cognitive biases** – Such as Confirmation bias: searching and favoring information that confirms our personal ideas.

**Social biases** - Digital divide: having access to the internet conditions the ability to access information, for example, in Mexico, less than 50% of the population has access to an Internet

connection.

**Cultural biases** – Language: English is the most used language on the Internet. Not speaking it conditions the information one can or cannot get.

**Technological biases** – Algorithms: Google's PageRank or Facebook's EdgaRank learn the user's preferences and with time they only show "wanted" information on the Results Page or their Newsfeed.

These four biases can help people be in a network similar to them, but in turn promote only certain information to flow inside the network. These are double-edged swords, while they help communities come together, they keep people apart from others. As with most biases, these tend to act in the background, but disappear or their effect diminishes once they are brought evident; they might not determine us, but they do limit our information access.

In conclusion, this analysis shows that although information is flowing inside the networks, it's not reaching everybody, as it's been promised by utopian ideas of the Internet's scope -we are a long way from Nicholas Negroponte's enthusiastic views. What does this mean for the Skeptic community? It means that thanks to these biases the community has grown and it's closer than ever. At the same time, it means that most of their information tends to stay inside the network, in other words, they are preaching to the choir, and therefore not fulfilling one of their main goals: educating people about the dangers of pseudoscience and influencing public policy. The same conclusion applies to Science Communication in general because all social media has limitations when diffusing information to the general audience, especially to those not interested in science a priori. Communication success can be improved simply by being conscious of these biases.

## References

1. Bunge, M. *The Philosophy Behind Pseudoscience* In *Science Under Siege Defending Science, Exposing Pseudoscience* (pp. 235-251) EEUU: Prometheus Books.
2. Burt, R. S. (2004) Structural Holes and Good Ideas, *American Journal of Sociology*, 110, 2 pp. 349-399.
3. Carroll, T. (2012). *Skepticism*. November 15, 2012, in *The Skeptic's Dictionary*: <http://www.skepdic.com/skepticism.html>
4. Jackson, M. (2008): *Social and Economic Networks*. E.E.U.U: Princeton University Press
5. Kurtz, P. (2009) *Science and the Public Summing up Thirty Years of the Skeptical Inquirer*. In *Science Under Siege Defending Science, Exposing Pseudoscience* (19-33). EEUU: Prometheus Books.
6. Kurtz, P. (2010) *The New Skepticism: A Statement of Principles* en *Exuberant Skepticism* (225-228). EEUU: Prometheus Books
7. Lewandowsky, S., Ecker, U. K. H., Seifert, C. M., Schwarz, N. & Cook J. (2012). Misinformation and Its Correction: Continued Influence and Successful Debiasing. *Psychological Science*, 13 (3), 106–131.
8. McPherson, M., Smith-Lovin, L. & Cook, J., (2001): Birds of a Feather: Homophily in social Networks in *Annual Reviews Sociology*, 27, 415-444
9. Nyhan, B., Reifler, J., Richey, S. & Freed, G. L. (2014, April). Effective Messages in Vaccine Promotion: A Randomized Trial. *Pediatrics*, 133 (4), 1-8.
10. Pariser, E. (2012). *The Filter Bubble, How the New Personalized Web is Changing What We Read and How We Think*. E.E.U.U: Penguin.
11. Van Alstyne, M & Brynjolfsson, E. (1997): *Electronic communities: global village or cyberbalkans?* In [web.mit.edu/marshall/www/papers/CyberBalkans.pdf](http://web.mit.edu/marshall/www/papers/CyberBalkans.pdf), revised May 13th, 2014
12. Zollo, F., Bessi, A., Del Vicario, M., Scala, A., Calderelli, G., Shekhtman, L., Havlin, S. & Quattrocchi. (2015). *Debunking in a World of Tribes*. 2015, October 14, de arXiv: <http://arxiv.org/pdf/1510.04267v1.pdf>

## Acknowledgements

I want to thank Dr. Ernesto Piani for his comments and guidance and, of course Orly Cortés for all her absolute support.