

RETORICA E SCIENZA

*Kairós in science blogging:
immediacy, self-expression and audience engagement*

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ABSTRACT

Il presente contributo indaga il concetto retorico di «kairós» quale fattore decisivo del successo argomentativo della comunicazione scientifica online per evidenziarne la forma linguistica che assume nei blog di scienza, un genere di discorso sempre più usato da scienziati e gruppi di ricerca internazionali per coinvolgere il pubblico di esperti e non-esperti nell'impresa scientifica moderna. L'approccio è insieme retorico e linguistico, attingendo in particolare dagli studi di Carolyn Miller e colleghi sui generi della divulgazione scientifica e fondando l'analisi linguistica su osservazioni di frequenza in un corpus di blogs mantenuti da singoli scienziati di aree diverse.

The present paper explores the rhetorical concept of «kairós» as a decisive factor of the argumentative success of scientific communications to highlight the linguistic shape it takes in science blogs. Science blogs are a discourse genre increasingly used by scientists and international research groups to engage publics of experts and non-experts in the modern scientific enterprise. The approach is both rhetorical and linguistic. It draws from studies of popular science genres by Carolyn Miller and fellow rhetoricians and bases its linguistic analysis on frequency observations in a corpus of blogs maintained by scientists in different areas.

KEYWORDS

Kairós, Science blogs, Immediacy, Self-expression, Word frequency, N-grams



1. Introduction

In two influential papers published in 2004 and 2009 rhetoricians of science Carolyn Miller and Dan Shepherd examined the personal weblog from the perspective of genre studies, asking the question why have blogs become so popular a discourse genre? And what kind of social contingencies have made blogging take over as a preferred platform of opinion-making and information sharing when personal blogs became concerned with public affairs? From a rhetorical point of view, their question concerned the *kairós*,¹ i.e. the appropriate and timely context that originally made blogging an opportune and apt means of knowledge construction and dissemination. Based on extensive analysis of blogs, of their genesis in the 1990s and developments in the years 2000s, the scholars concluded that the success of blogs lies in their immediacy and apparent spontaneity, in the freedom of expression they allow for and the dialogic appeal of internet posting, which puts an individual in conversation with the potentially infinite audience of the web.

In this paper I build on Miller and Shepherd's 2004, 2009 analyses of the *kairós* of blogging to extend their original research questions to science blogs and find linguistic evidence of the rhetorical features of immediacy and spontaneity, the blurring of the boundaries between the private and public spheres and the dynamics of interaction and engagement which compel scientists to write online. I argue that by looking at frequently repeated phrases in a small corpus of science blogs maintained by individual scientists in different areas of science, one can retrieve linguistic traces of the rhetorical opportunity filled by blogs and understand more of the changing rhetoric of science of digital genres. This research endeavour is in line with the approach of the American New Rhetoric that owes to Perelman and Olbrechts-Tyteca's *Traité de l'argumentation*² in two respects: first, American rhetoricians highlight how discourse genres develop, stabilise and change and what shape they take when becoming diffuse;³ second, some, like Jeanne Fahnestock, have stressed that linguistic expression is the material correlate of argumentation and of the rhetorical construction of discourse aimed at persuasion.⁴ Because science discourse on the web is not exempt from persuasion,⁵ it is useful to analyse the style of blogs from a rhetorical perspective to unveil the ways in which the rhetor's communicative exigencies are realized linguistically, how discourse unfolds and interaction with the audience is shaped online. Section 2 reviews Miller and Shepherd's analysis of blogs and defines science blogs as a genre, while section 3 presents the results of the linguistic analysis of a small corpus of science blogs collected by the author as a part of a wider research project on knowledge dissemination.⁶ Sections 4 and 5 discuss the results considering the rhetorical concept of *kairós*, and finally, section 6 draws some conclusions.



2. The *kairós* of blogs: rhetorical approaches

Linguists and rhetoricians alike have tried to define blogs as a discourse genre. Blogs are webpages characterised by frequent posts displayed in reverse chronological order, with the most recent one on top, alternating multimedia contents such as videos, audios and text often linked to the main webpage through hypertextual links. The hypertext configuration of blogs is meant to prompt a selective rather than linear reading of their contents, while the regular updates are evidence of their timeliness and relevance to public discourses.

Miller and Shepherd have distinguished three phases in the development of blogs. The first phase coincides with the 1990s and a use of the internet limited to Information Technology experts, programmers who could code their own webpages and would post commentaries on websites of interests. The main function of blogging at the time was thus information sharing within a relatively niche community of interested users.⁷ The second phase of blogs goes in parallel with the technological developments of the web which allowed less web-savvy users to start their own weblog, personal recounting and self-expression being the main communicative purposes. According to the two scholars, this is a time of public disclosure and exhibitionism apparent in many other popular genres, such as reality television and personal memoirs by private people, which blur the boundaries between private and public sphere.⁸

The third phase in Miller and Shepherd's exploration corresponds to the popularity of social media, which allow potentially anybody to go online and express their viewpoint, make a personal narrative public, and create different kinds of user-generated contents. Public affairs blogs are motivated by a very similar *kairós*, namely the need for venting a political opinion, often out of dissatisfaction with mainstream journalism, and in order to establish a connection with potential readers and stimulate participation in public discourse.⁹

To sum up Miller and Shepherd's conclusions, the *kairós* of weblogs is to be found in the bloggers' freedom of choosing and presenting personalised contents, in the communicative opportunity for self-disclosure, self-clarification and self-validation. Bloggers can voice their own individual truth perceived by their readers as «real and un-mediated».¹⁰ They can do so in a spontaneous and direct way while maintaining an outward orientation and establishing proximity to the audience. With posts that are frequent and short, timely and relevant to the public, blogs contribute to community building. Since the scholars' analysis more than ten years ago, social media, including blogs, have grown in circulation and importance in an unprecedented way, showing that the same communicative needs are still very much at play today.

When considering science communications, two different kinds of blogs have been identified based on their communicative functions. One is the so-called «individual blog»,¹¹ a space for the blogger to express their ideas freely and interact with a wide public that can react to posts through comments, or by sharing posts, thus acting as multipliers. Access and participation are regulated by the bloggers themselves, who decide whether readers can



comment on the posts.¹² Interaction with their readership is considered one of the reasons why scientists decide to start a blog to disseminate their personal views and stimulate debate often in parallel with more traditional venues of knowledge dissemination. By blogging, scientists start a conversation with the unlimited audience of the web consisting of other scientists from the same or a neighbouring field, experts as well as amateurs, and the public at large. They expose themselves to public comment and foster discussion on current and controversial topics.¹³ There is therefore a very personal dimension to science blogging which brings this type of writing close to the personal diary, and a networking aspect that is more common in face-to-face discussions than traditional research genres.¹⁴ This has led Ashley Rose Mehlenbacher to define blogs as: «trans-scientific» types of discourse,¹⁵ while Marina Bondi called them «interwoven polylogues», stressing their dialogic nature.¹⁶ Another kind of blogs is that of popular science magazines like «Scientific American» and «Nature» or blogs networks such as «PLOS» that have moved online to publish daily on scientific topics. Similarly, «The New York Times» and other newspapers have transformed their science columns into a blog, where scientists can write their independent and unmediated opinion backed by the *ethos* of the publishing institution. In this kind of blogs, the individual endeavour has become institutionalized, as pointed out by Mehlenbacher.¹⁷ Either way, bloggers find a new rhetorical opportunity to appease old rhetorical exigencies.¹⁸

3. Linguistic analysis of science blogs

The linguistic analysis is conducted with the aid of text processing software that allows to generate frequency lists of words and phrases, compute n-grams, i.e., repeated sequences of a set number of words, and observe a word or phrase in its natural context of occurrence via concordances.¹⁹ The software is run on a small corpus made of four individual blogs on a range of topics in STEM disciplines (i.e., Science, Technology, Engineering and Mathematics), which are maintained by four researchers of different seniority and institutional affiliations, all based in the US. The corpus consists of approximately 400,000 words between blog posts and comment sections (each section related to one post might contain more than one comment) published between March 2019 and March 2014 (in the reverse chronological order typical of blog posting), thus covering a 5-year time span. The four blogs are «Genomics, Medicine and Pseudoscience»²⁰ maintained by Steven Salzberg, a professor at Johns Hopkins School of Medicine, «Mountain Beltway»²¹ written by geology scholar Callan Bentley, «Neurologica»²² by Steven Novella, a clinical neurologist at Yale University School of Medicine, and «Skulls in the Stars»²³ by Gregory J. Gbur, a professor of physics at UNC Charlotte. The blogs variously deal with topics in medicine and health, earth and environmental sciences, neurology and biology, physics and history of science. All four blogs are still active with an average two posts per month accompanied by comments. Their circulation and degree of interactivity are confirmed not just by the comment threads, but also through their being ranked among the top science blogs by



reviewing services of science websites. Figure 1 shows the homepage of each blog included in the corpus to give a flavour of how contents are displayed. As can be seen, they are all characterised by dated entries, in some instances time-stamped, organised in reverse chronological order, with a link for reader commentary, and information about the author:

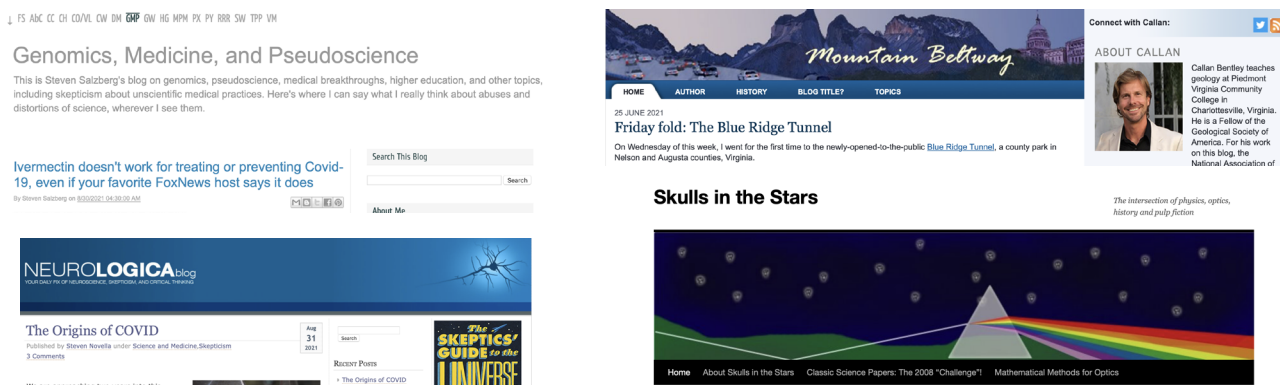


Figure 1. Homepages of the selected four science blogs.

The text searches for the frequency distributions are done in steps that follow one another in an iterative rather than linear fashion, one search leading on to the next iteratively. First, the top lemmas are considered to see if there are lexical traces of the rhetoric of *kairós* among the most frequent word types in the corpus overall. Then, the Posts and the Comments are analysed separately, and the lemma lists from each component compared to one another to identify words that are more typical of the Posts than the Comments and vice versa. A selection of significant lemmas is observed in context through their collocates, concordances and examples from the corpus with a tag identifying the source text file in parenthesis (notice that the Z- in front of the blog acronym and date stamp stands for Comment). Finally, 4-grams are computed to extend frequency to units larger than the individual word type or lemma. The choice of focusing on 4-grams, i.e., sequences of 4 words repeated many times across the Posts and Comments in the corpus, is in line with other comparable studies of register variability, which have been able to distinguish between written academic texts and spoken conversation based on frequent 4-grams.²⁴ Reusing the same methodological step is therefore expected to yield comparable results. The results of the analysis are presented and discussed in the next two sections.

4. Self-expression, subjectivity, and identity

We start by considering the most frequent lemmas in the overall corpus, keeping the Posts together with the Comments, and notice that the personal pronouns *I* and *you*, including all inflectional variants, appear among the top 20 lemmas (*I* being the thirteenth most frequent lemma and *you* the twentieth). This observation helps place blogs closer to the frequency distributions typical of spoken genres, personal deixis being a prominent

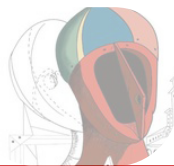


feature of speech, than of written genres, where personal pronouns do not appear among the most frequent words / lemmas. For example, if we take a larger corpus of written English, such as the Brown Corpus of written American English, we see that *I* is only the twentieth most frequent lemma and *you* the thirtieth. If, instead, we consider the whole of the British National Corpus,²⁵ a large representative corpus comprised of both written and spoken genres such as spontaneous conversation, the deictics *I* and *you* have a more similar distribution to the one observed in the science blogs corpus (*I* and *you* respectively being the thirteenth and sixteenth most frequent lemmas).

When looking at separate lemma lists for Posts and Comments, then the personal pronoun *I* is ranking higher in the Comments than in the Posts. This observation prompts two further searches, one to compare the word frequency distributions from Posts and Comments, the other to check if there is any statistically significant difference in the use of personal pronouns between posts and comments.

The first search has yielded two different pictures of the language of Posts and Comments. Scientific terms (nouns such as *heat*, *plane*, *motion*) having to do with the topics discussed and references to the bloggers' context at the time of posting (e.g., *US*, *Trump*) are typical of Posts, while Comments are characterised by deictic pronouns *I*, *you*, interactional formulas (*thanks*), and negative verbal operators (*can't*, *don't*), the latter co-occurring with first person pronouns (as, for example, in *I can't fully agree*). The negative operator *don't* similarly belongs in fronted negative imperatives with interactive function, for example, *don't ignore or deny them*, *don't get me wrong*, *don't even think about it*. The different distributions reflect the two distinctive functions of posts and comments. While posts inform about and prompt discussion on science-related topics, comments function as responding utterance in the adjacency pair comprised of post and comment and function argumentatively to express agreement / disagreement with a claim put forward by the blogger or by another commenter.

The second search has confirmed that there is a statistically significant difference between how frequently the forms of the pronouns *I* and *you* are used in the Comments and in the Posts with Comments being where pronouns are really typical. Because the frequency of first-person pronouns and possessives is a measure of «explicit author presence in the text», or «self-mention»²⁶, it is useful to look at the collocates of the subject pronouns in both Posts and Comments to see if there is any regular pattern of verb choice that might be revealing of respectively the bloggers' and commenters' subjectivity and point of view, what Ken Hyland termed «authorial identity» in relation to more traditional genres of scientific writing.²⁷ Similarly, second-person pronouns are an indication of direct audience involvement and therefore also worth analysing in context to see if any specific meaning is construed by means of the co-occurring verbs. Patterns of *you* are discussed in Section 5. The collocates of *I*, i.e., repeated co-occurrences computed within a span of 4 words to each side the pronoun, are different in the Posts and the Comments. If we take only the top 10 collocates, the verbs associated with the pronoun *I* in blog posts include: verbs



of mental processes,²⁸ particularly the cognitive *doubt*, *guess* (exemplified in 1 and in figure 2), *appreciate*, and the affective/emotive *regret* (example 2), expressing the blogger's viewpoint and attitude, then, verbs of the material process type such as *finish*, *blogged*, which lexicalise the blogger's actions, and, when moving down the list of collocates, more verbs of affection like *welcome*, *delight (in)*, and the desiderative *wish*, also corresponding to the more attitudinal side of the spectrum of mental processes. Interestingly, the most frequent collocate is *tired*, as in *I was so tired*, *But I was tired*, also revealing something of the emotional state of the writer, i.e., dissatisfaction.²⁹

(1)

I doubt that "Lyme literate" doctors will accept the latest results and stop prescribing long-term antibiotic use; their websites indicate that they already know that they are right. I hope, though, that patients will start to question doctors who put them on long-term, possibly harmful antibiotic regimens that don't provide any benefit. (GEN_2016-04-04.txt)

(2)

This year, *I regret* to report that my numbers have fallen off this increasing trend of the first four years, with only 59 total species observed. (MB_2016-12-31.txt)

The concordances of *I guess* in figure 2 show that this verb choice is found in three of the four blogs, not in «Skulls in the Stars», as a way to introduce an opinion:

Hit	KWIC	File	
1	"sleigh" shape (with a curled-over "nose"):	I guess Alan and I missed these due	MB_2014-04-
2	capabilities of our computers right now, and	I guess also the things our computers cannot	MB_2017-10-
3	material body work together. (OK, problem solved,	I guess.) Conclusion Egnor is playing word and	NEU_2014-12
4	that exhibits politics he disagrees with – which	I guess could include any research in biology	MB_2016-11-
5	etaphysics," or what scientists call, "science."	I guess I shouldn't be surprised that	NEU_2014-12
6	work, but it is his last – so	I guess it deserves to be read on	MB_2015-03-
7	DSM should have contained this passage. But	I guess it didn't fit Hari's	NEU_2018-01
8	, according to Clarey, but does the red.	I guess it follows that any sandstone you'	MB_2014-03-
9	editors let them get away with this.	I guess JAMA's editors like headlines, perhaps	GEN_2015-12
10	at the next election. Simple enough equation,	I guess, sad as it is to behold. "	MB_2017-01-
11	(less void space) rather than decrease it.	I guess something else must be going on.	MB_2014-10-
12	the likes of Hull her ilk, but	I guess that can get stale after a	NEU_2016-11
13	hard to imagine such a thing – but	I guess that's where books like Rosin'	MB_2014-03-
14	the fact that this is the Dolomites,	I guess the chances are good that they	MB_2018-08-
15	that made Barrat's book so powerful.	I guess the one thing I'd say	MB_2018-01-
16	not the case for these "folded oldies."	I guess we can console ourselves that they	MB_2018-09-
17	field trip to a place like this.	I guess with this set of photos and 3	MB_2018-01-

Figure 2. Concordances of *I guess* in Posts.

Negative finite operators *haven't*, *hadn't*, *wasn't*, *couldn't* are also quite common among the collocates of *I* in the Posts. Their rhetorical function seems to be narrative because of the past tense used when the blogger tells a story or reports something personal that happened to him, as can be seen in examples (3) and (4):



(3)

I gave two talks at NPU during my stay; the first one was broadly advertised, and *I couldn't help take* a photo of the poster. (SKU_2015-06-15.txt)

(4)

So I was surprised to stumble upon an article titled “Johns Hopkins Scientist Reveals Shocking Report on Flu Vaccines,” which popped up on an anti-vaccine website two weeks ago. Johns Hopkins University is my own institution, and *I hadn't heard* any shocking new findings. I soon discovered that this article contained only a tiny seed of truth, surrounded by a mountain of anti-vaccine misinformation. (GEN_2014-11-03.txt)

However, it is in the Comments where self-mention is more clearly associated with an expression of attitude in that the verbs collocating with the subject pronoun *I* overlap as a category, but the lexicalisations differ, and a much wider range of verbs is used by commenters to voice their viewpoints, covering the whole gamut of mental processes from perceptive to cognitive through desiderative and affective-emotive. In fact, the verbs are *notice, wish, suspect, guess, recall, feel, wonder, and love* (if considering the top 15 collocates), which express the commenter's opinion or attitude. Moreover, the adverb *personally* appears as significant collocate, reinforcing subjectivity and stance (see example 5 from a comment to «Neurologica»).

(5)

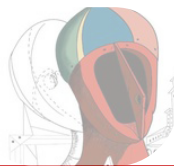
I personally think that the problem with people's diets is not too much carbohydrate, but too much simple sugars, which causes wild swings in insulin levels as blood glucose levels suddenly increase and then precipitously fall, causing feelings of hunger. (Z-NEU_2018-01-16.txt)

Finally, the desiderative verb *agree* appears among the collocates of *I* in the Comments and not in the Posts, revealing the rebuttal-to-a-claim function of the commentaries (see example 6). Also, according to Hyland, *agree* has a more attitudinal than epistemic function.³⁰

(6)

Right, but my point was that I think that this conversation misses a lot when we talked about AI or robots “replacing” people. *I agree that* for more jobs, and certainly most high end professional jobs, AI/robots aren't going to fully replace a human worker, but they could take over tasks that previously occupied a significant portion of that worker's time, (Z-NEU_2019-03-12.txt)

In Hyland's words, commenting on instances of *I know, I am sure that, I believe strongly*, in another genre, namely CEO's letters, «self-mention with epistemic verbs of judgement underlie an overt acceptance of personal responsibility, and an explicit attempt to build a personal ethos of competence and authority»³¹ whereas, when combining with verbs of affection, *I* is working to establish a relationship with the reader. This point is clarified



further by Hyland who considers «attitude markers» co-occurring with self-mention as playing an affective role by emphasising the subjective standpoint and by contributing to the enactment of a relationship with the reader.³² Examples from our data illustrate that same point:

(7)

The epidemiology isn't published yet, but *I very strongly suspect that* the zinka virus is only teratogenic during pregnancy. Many viruses are. (Z-NEU_2016-01-26.txt)

(8)

I am not fully satisfied with the label “disorder”. (And this is not because of the stigma, but because *I actually feel that* I would not trade my ADHD+stimulants against being ADHD-free). *I wonder what you* think of the concept of neurodiversity. (Z-NEU_2015-02-23.txt)

Based on the most frequent collocates of first-person pronouns and the choice of verbs, we can therefore conclude that the personal and attitudinal dimension of discourse is pervasive in both Posts and Comments. However, the writer's attitude becomes more explicit in the Comments where the conversational function is that of commenting on a post.

5. Immediacy, audience engagement and community building

Besides self-expression and subjectivity, the other aspect of blog writing that appeals to bloggers is the networking function that is enabled through the post-comment dynamics. To quote from Miller and Shepherd, «[m]any bloggers see blogging as a way of developing relationships, via linking back, with an online community».³³ This is also what gives blogs a sense of immediacy and spontaneity more typical of the spoken medium than written genres. In the already cited work on self-mention, and in another study of audience engagement in popular and professional science,³⁴ Ken Hyland also looks at reader engagement and states that «[r]eader pronouns are the most explicit way that readers are brought into a discourse».³⁵ These include second-person pronouns and the inclusive use of *we*, meaning *you* and *I*, but also personal asides, i.e. parenthetical writer's comments on something that has been said, questions and directives, i.e. mostly imperatives and deontic modals. As mentioned in Section 4, subject pronouns are a prominent feature of science blogs, ranking among the top lemmas in both Posts and Comments, and especially so in the Comments. To look for linguistic traces of immediacy and audience engagement, therefore, it is useful to analyse in more detail the use of *you* and the verbs it usually occurs with.

Like with the pronoun *I*, also the collocates of *you* are different in Posts and in Comments.³⁶ In the Posts, among the top 10 collocates of *you* are verbs of mental processes *recall*, *notice* with *you* as grammatical Subject directly addressing the reader, as can be seen in the examples (9) and (10) from «Skulls in the Stars» and «Neurologica»:



(9)

The Platonics, *if you recall*, were symmetric in faces, edges, and vertices: that is, every face, edge and vertex was equivalent to every other one. (SKU_2017-03-09.txt)

(10)

You will notice that Egnor does not define “engram,” even though it seems to be the linchpin of his current argument. Perhaps that’s because it really adds nothing to the issue. An engram is an outdated term for the physical substance of a memory in the brain. (NEU_2014-12-16.txt)

A few negative operators also rank among the top collocates of *you*, namely *haven’t*, *can’t* and *won’t*. These are often combined with a generic use of the second-person pronoun, as in examples 11 and 12, both from Steven Salzberg’s blog, the second in an aside:

(11)

If you sequence the genome, *you won’t find* any mutations that indicate that the fetus has an extra chromosome copy. (GEN_2014-03-09.txt)

(12)

(Actually, their work showed that the virus could be transmitted between ferrets, not humans, for the obvious reason that *you can’t ethically test* this on humans.) (GEN_2019-03-04.txt)

The negative operator *haven’t* occurs in the sequence *if you haven’t*, introducing a suggestion for the reader (13, 14 both from «Mountain Beltway»):

(13)

So *if you haven’t given any thought to* AI, I strongly encourage you to do so. (MB_2017-03-06.txt)

(14)

(*if you haven’t read* his piece in the Atlantic that was released today, “How to Build an Autocracy,” I recommend it) (MB_2017-01-30.txt)

Finally, *you* in the Posts is followed by verbs of the material process type such as *order*, *fly*, *buy*, *eat* appearing when the blogger is pointing to a generic situation the reader might easily relate to for the sake of explanation, as in example (15):

(15)

if you order larger sizes, or one of the saltier choices (though you may not be able to tell what those are), or more than one side dish, you can easily exceed 100% of your recommended salt intake for the day (GEN_2019-03-03.txt)

A different picture emerges from the Comments, where the top collocates of *you* include *thank* as in the pragmatic formula *thank you*, the verbs *realize* and *expect* of the mental process type, and the two verbs of saying *comment* and *ask*, referring to the blogger or



other commenters and showing the «initiative and reactive function» of blog posts and comments as identified in Bondi's study of economics blogs.³⁷ The other two frequent collocates that point to the interpersonal dynamics of comments in relation to posts are *yourself* and the vocative *Steven*. The latter use is ascribable to the explicit mention of the blogger in the comment, as in the example from a commentary to Steven Novella's blog. Keeping in mind that *Steven* is the first name of two scientist-bloggers, the data show that commenters frequently address the blogger by first name. Examples (16), (17), (18) illustrate all these uses:

(16)

As I high school science teacher, I am very grateful for such an excellent example of science in action. I will remember this post and reference it when I teach Earth Science again. Your post is a perfect example of the claim-evidence-reasoning scheme that is central to the Next Generation Science Standards. *Thank you* for sharing your sleuthing! (Z-MB_2017-12-30.txt)

(17)

Steven, could you comment on this article which was on the front page of a major newspaper in NZ this morning? (Z-NEU_2018-02-26.txt)

(18)

Perhaps you have 2 standards *Steven*. One for "orthodox medicine" and one for what you consider "alternative" medicine. *Let me ask you this*: in your life, have you ever mentioned the danger of hospital caused infections or ever criticized the medical industry for such infections. (Z-GEN_2017-09-18.txt)

Yourself reinforces the dyadic orientation of comments, as can be seen in the rather aggressive comment to Steven Salzberg's blog in (19):

(19)

Please educate yourself before writing an educational public article that is saturated with inaccurate information. There are numerous scientifically based articles, you can find them on PubMed, that provide and describe the neurological and physiological benefits of a chiropractic adjustment. Again, *please educate yourself* before providing false information to the public based on your opinion. (Z-GEN_2014-04-20.txt)

To sum up, it is in the Comments that one sees the language of immediacy typical of dialogic interaction, which can be said to be another feature of the *kairós* of blogs. As a final step in this analysis to provide further evidence for the perceived immediacy of blogs, the corpus is searched for 4-grams, i.e. repeated sequences of 4 words across the Posts and Comments. This search has shown how the most frequent 4-grams, that is with the most spread distribution across bloggers, contain phrases typical of spoken interaction, the most recurrent one in the Posts being *it turns out that*, a phrase typical of colloquial



conversation. This phrasing is used by all bloggers, example (20) from «Genomics, Medicine and Pseudoscience» shows its use in context:

(20)

This sounds reassuring, unless you read the study. *It turns out that* the risk of stroke was 10% higher in patients who saw a chiropractor compared to those who saw a regular doctor. Yet NIH wants us to believe that the study found no serious risk. (GEN_2015-03-02.txt)

Another frequent 4-gram in the Posts, *if you want to*, used by all four bloggers, contains the second-person deictic pronoun. This is used by the blogger as generic reference, as in (21) from Novella's blog, or when addressing the readership directly, as in the two examples respectively from Salzberg's and Bentley's blogs (22, 23). This finding compares to Biber et al.'s that 4-grams with *you* as subject pronoun occur in conversation with the main verb *want* and are mostly part of interrogative or conditional clauses.³⁸

(21)

If you want to change your weight, you have to change your daily habits, your lifestyle. "Going on a diet" is a famously unsuccessful strategy, no matter what the diet is. (NEU_2019-02-26.txt)

(22)

For example, one question shown here filled half a page: just reading it would take some students longer than they can afford for this speed-obsessed test. (*If you want to* see a full-sized image, get the tests here). (GEN_2016-06-05.txt)

(23)

So it's also fun to read *if you want to* see wisps of those epic, durable characters forming in O'Brian's imagination before Master and Commander was ever written. (MB_2017-12-04.txt)

Of all four bloggers considered, Steven Salzberg is the one whose discourse bears the most evidence of this conversational style, often making asides containing direct addresses to the reader with suggestions in the form of directives.

In the Comments, while the 4-gram *I don't know if* reflects the conversational style of science blogs, it also provides corroborating evidence of self-expression and subjectivity as a frequently observed feature of the comments.³⁹ In example (24) from a comment to Novella's «Neurologica», the phrase is followed by a pronominal chain with the subject pronoun *I*, where the commenter keeps referring to their feelings and nutritional regime.

(24)

I don't know if we need to avoid fat though, and maybe it depends on which kind. As for protein, *I just go by how I feel. If I don't have* enough protein for several days, eventually *I feel like I need it.* (Z-NEU_2018-01-16.txt)



This «conversational style»⁴⁰ can be considered the linguistic correlate of the *kairós* of blogs, the immediacy and spontaneity accompanying the act of posting, and the interactivity of the post-comment threads that allow for audience engagement and community building. To fully interpret the linguistic evidence presented in this section, we can refer once more to Hyland, when he observes that self-mention and engagement markers, including the reader pronoun *you*, the use of direct address and directives, «all suggest the personal, direct and involved communication of face-to-face conversation».⁴¹ Clearly, this applies to science blogs as well.

6. Conclusions: *kairós* in science blogging

In this paper I have tried to give linguistic substance to the rhetorical concept of *kairós* when applied to science communications online, taking science blogs as a case in point. The rhetorical appeal of blogs has been said to lie in the double opportunity for self-expression and community building, as well as in the immediacy and spontaneity usually associated with the spoken mode more than with traditional written genres, where careful planning is the norm, as argued by Miller and Shepherd and Luzón.⁴² The linguistic analysis of the phraseology of blogs, as represented by a small sample of posts and comments on science matters, has revealed the personal focus of science blogging, where self-mentions through the personal pronoun *I* are an important aspect of the dissemination of knowledge and the construction of the blogger's identity. Together with first person deictic references, the high incidence of verbs of cognition and affection (e.g. *think, know, guess, doubt, agree*), expressing the writer's opinion and attitude, shows that self-expression, attitudinal stance, and self-disclosure are a driving communicative factor of posting on the internet by scientists and an equally attractive drive for commenters who join in the online conversation. This free expression of one's perspective is also visible in the many traces of the conversational style of blogs, or the tendency to write as if speaking. Markers of spontaneous spoken interaction as in casual conversation, such as questions, second person pronoun references *you, yours*, and directives, the latter pointing to the advising function of posts, are a signal of interactivity and engagement with the web audiences that «allow bloggers to cultivate the self in a public way»,⁴³ thus responding to the other communicative exigency of knowledge sharing and community building. By prompting discussion on a scientific topic of their interest and by engaging in a conversation with a variety of publics, bloggers appease their need for debating openly and in an unmediated way.

Looking back to the theme of this special issue of DNA, revolving around the keywords *regia* and *attesa* (see the issue title «La regia dell'attesa»), in other words, «direction», as both ideation and execution, and «waiting», or «time one awaits», suggesting the idea of rhetorical situations and the control orators exert over discourse, we can conclude with Miller and Shepherd that blogs are the genre of immediacy and proximity with the



audience, the place where the blogger directs written communications as if interacting live with their readership, with no need for waiting. A rhetorical situation that breaks time-space constraints and creates a discourse that is unconstrained, immediate and yet real, a language that reaches out to a web wide audience is the *kairós* that keeps scientists engaged with science communications online. It will be interesting to follow how all this evolves as a result of the recent changes in communications brought about by the still perduring pandemic.

NOTES

1 For a very recent discussion of *kairós* in the rhetoric of science, see both Leah Ceccarelli's 2019 overview of the concepts that rhetoricians turn to when conducting research on science communications, and Katherine Rowan and Andrew Pyle's 2019 analysis of *kairós* in risk communication.

2 Perelman, Olbrechts-Tyteca 1958.

3 Miller 1984; Berkenkotter, Huckin 1995; Askehave, Nielsen 2005; Miller, Shepherd 2004, 2009; Mehlenbacher 2019.

4 See Jeanne Fahnestock in *Rhetorical Figures in Science* (1999) and *Rhetorical Style: The Uses of Language in Persuasion* (2011).

5 E.g., Mehlenbacher 2019.

6 The research herein presented has been supported by PRIN 2015TJ8ZAS, a national research project on "Knowledge Dissemination across media in English: continuity and change in discourse strategies, ideologies, and epistemologies".

7 Miller, Shepherd 2004: 12; Miller, Shepherd 2009: 266-267.

8 Miller, Shepherd 2004: 5, 11; Miller, Shepherd 2009: 271.

9 Miller, Shepherd 2009: 275-276.

10 Miller, Shepherd 2004.

11 It is Trench 2008: 190-ff. that makes the distinction between individual blogs and blogs maintained by research institutions.

12 Hoffmann 2012: 18-19.

13 Mauranen 2013; and see Einsiedel 2014 on public engagement with science.

14 The networking function of science blogs has been shown through quantitative linguistic analysis by Luzón 2012, 2013.

15 Mehlenbacher 2019: 108.

16 Bondi 2018.

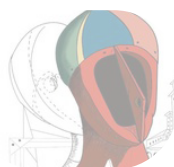
17 Mehlenbacher 2019: 137; and see also Greco, Pitrelli 2009: 194-203 on the role of science blogs in the changing rhetoric of science communications.

18 Miller, Shepherd 2004.

19 The software has been developed by Brezina et al. 2020.

20 Available at <http://genome.fieldofscience.com>

21 Available at <https://blogs.agu.org/mountainbeltway/>



- 22 Available at <https://theness.com/neurologicablog/>
- 23 Available at <https://skullsinthestars.com/>
- 24 Notably Biber et al. 1999: 1001-1003, ivi: 1014-1015.
- 25 Frequency data for the BNC is available at <http://www.natcorp.ox.ac.uk>
- 26 Hyland 2005: 53.
- 27 Ivi: 148.
- 28 The semantic classification of verbs into process types is taken from Halliday, Matthiessen 2014. Particularly, examples of mental processes are listed in Table 5-10 (2014: 256-257) and material process types in Table 5-5 (ivi: 234-235).
- 29 The italics in the examples has been added to highlight the various forms discussed.
- 30 Hyland 2005: 149.
- 31 Ivi: 79.
- 32 Ivi: 83 and see also 164-165 for self-mention and attitude markers.
- 33 Miller and Shepherd 2004: 10.
- 34 Hyland 2010: 125 ff.
- 35 Hyland 2005: 151.
- 36 Collocates are calculated on a span of 4 to the Right and 4 to the Left of the search word, using a statistical measure of significance commonly used for collocation, i.e. Mutual Information (see Brezina et al. 2020).
- 37 Bondi 2018.
- 38 Biber et al. 1999: 1004.
- 39 See Biber et al. 1999: 1003 on sequences such as this marking personal stance, by reporting personal feelings, thoughts, or desires.
- 40 Myers 2010: 84-ff.
- 41 Hyland 2005: 177.
- 42 Miller, Shepherd 2004, 2009; Luzón 2012, 2013.
- 43 Miller, Shepherd 2004: 15.

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