COVID-19 through the Prism of Rhetorical and Discourse Research

Deadly Rhetoric Gone Viral: Genomic Language and COVID-19

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Abstract: Currently the entire world is being gravely affected by the deadly coronavirus (SARS-CoV-2). As rhetoric cannot be detached from material and discursive circumstances, and considering the present kairos of the COVID-19 pandemic, in this article we discuss COVID-19 as a deadly genomic rhetoric gone viral, a hostile material argument. In our study we use biosemiotician Kalevi Kull's (2009) epistemic, that organisms can be studied rhetorically, since life processes of organisms do not only exchange messages but consist of and create knowledge. Throughout the article we take a transhuman interdisciplinary stance as rhetoricians with one foot in our disciplinary scholarship and the other in the territory of the marginalized parallel discipline of biosemiotics. From this point of analysis, we reexamine the character of genomic language as the unique, biome-wide acheiropoetic written language that is the ultimate common mother-language of every living organism on earth, the language in which viruses like SARS-CoV-2 act as material texts. In the final part of the article we discuss the virus as power.

Keywords: COVID-19, genomic rhetoric, acheiropoietic, material rhetoric.

Introduction

As of this writing, the worldwide death toll from the COVID-19 pandemic is nearing 800,000, while worldwide case numbers are estimated to exceed 25 million. Figures such as these foreground the urgent exigence for scholars to address the genuinely novel rhetorical issues posed by a deadly pandemic that, beyond a worldwide medical emergency, constitutes a crisis of understanding as well. The purpose of this transhuman, transdisciplinary study is to begin to address that exigence by demystifying the genomic language in which the SARS-CoV-2 virus exists as a text.

In the 1990's, both George Kennedy and Celeste Condit separately predicted in general terms the profoundly rhetorical character of the genome ("genomic language"), and thus, albeit indirectly, that of the current pandemic. In the following decade, writing shortly after the completion of the Human Genome Project, David B. Searls (2001) [1] argues in his article, "Reading the Book of Life," that in the twenty-first century the genomically-literate scholar must necessarily become "less like an archaeologist, discovering and poring over shards of evidence to piece together rudimentary translations, and more like a literary critic, attuned to theme and variation, elucidating ever more subtle nuances of meaning and relationship in a well-worn *textus receptus*" [2]

Amid the urgent kairos of COVID-19 we here attempt to pick up and extend Kennedy, Condit and Searles' interdisciplinary conversation by taking upon ourselves precisely the mantle Searls describes, that of critics taking an interdisciplinary stance as rhetoricians with one foot in our own disciplinary scholarship and the other in the territory of the often-marginalized parallel discipline of biosemiotics. Throughout this study we consistently use biosemiotician Kalevi Kull's (2009) epistemic that "organisms can be studied from the point of view of a theory of knowing … because semiosis—that is life process—does not only transfer messages, it also produces messages, that is, a knowledge." [3] Writing in mid-pandemic, we in no way presume to review or sum up the extraordinarily vast and daily growing medical, scientific and scholarly literature *about* COVID, but rather seek to briefly examine the rhetorical nature of this novel and disastrous human contagion *as organisms may see it*. To this end, adopting a deeply transhuman (but not posthuman) stance, we first reexamine the genomic language within which viruses like COVID act as a material text, the unique, biome-wide acheiropoetic (not written by human hands) written language that is the ultimate common mother-language of every living organism on earth.

In this study, in order to better understand the rhetorical nature of COVID, we offer a few tentative steps toward crafting a comparative genomic rhetoric, organized in broad categories analogous to those already familiar to rhetorical scholars: Logos, pathos, ethos, argumentation, delivery, epistemology, memory, authorship, power, and the social (here, ecosocial) construction of genomic text.

Throughout this study, rather than amateurishly attempting to appropriate, reduce, paraphrase, or figuratively scribble glosses on the margins of legitimate medical experts' and scientists' published reports, we opt as informed non-scientist, non-physician scholars to preserve the integrity of our sources' work and our own by emulating eminent rhetorical scholar Paul Kei Matsuda's (2003) [4] practice of foregrounding and making critical use of direct quotes. We consciously

choose this approach in order, in his words, to "reduce the risk of appropriation by reproducing, as much as possible, the exact wording of the works I consider. Unconventional though it may be to quote from sources so extensively, it is important for the purpose of this article." [5] We follow this practice to avoid, to the extent possible, what linguist Paul Harris (1995) condemns as "disciplinary blinkers" that "obscure the boundary between facts and definitions altogether" [6] and in the worst of cases, result in materially falsifying others' work. Absent any existing body of current rhetorical scholarship directly addressing this truly novel worldwide emergency, there appears to be no other viable approach that would allow an honest approach to the preliminary exploration of a truly cogent and coherent rhetoric of genomic language, and thus of COVID-19, both seen in their own terms, that is, as genomic text and language.

COVID-19 is a hostile text, and genomics is the language in which it is written

Remarkably, even at the beginning of the third decade of the twenty-first century the idea that DNA, RNA and associated epigenetic information can be treated as true text or language, as the "Book of Life" (Searls, 2001; Markoš, 2010), or even as a body of literature (Searls, 2001) with its own poetics (Weber, 2011) is still far from uncontested in mainline rhetorical scholarship. [7]

Indeed, reductionist (in the scientific sense of attempting to explain phenomena by reducing them down to the simplest level or particle) methods would hardly lead one to conclude that genomics is a language at all. In a statement reminiscent of Kenneth Burke's (1966) dialectical opposition of "composition" to "division" [8], biosemiotician Howard Pattee (2009) acknowledges that "Even in the most detailed physical description of matter there is no hint of any function or meaning." [9] However, Pattee himself underlines (2009) to the contrary that:

> Genetic language conforms to most … conditions for a human language. That includes discrete, one-dimensional sequences, small alphabet, syntax (not all sequences meaningful), functional units (sentences), and most important, rewriting (recursion) and self-reference (metalanguage and semiotic closure). [10]

Yet paradoxically, while mainline rhetorical scholarship largely continues to resist or ignore the idea that genomic information is language, the genome-language metaphor that has long since become "more than a metaphor." [11] and has "lost its metaphorical character" [12] has now penetrated both interdisciplinary scholarship and popular culture to such a degree that Oregon State University Genetics Instructor Tara Rodden Robinson (2010) writes:

> Imagine owning a library of 22,000 books. … [T]his collection contains unimaginable knowledge such as … basic building instructions for every creature on earth, and even the explanation of how thoughts are formed inside your brain. … This fabulous library has only one problem—it's written in a mysterious language, a code made up of only four letters that are repeated in arcane patterns. The very secrets of life on earth have been contained within this library since the dawn of time, but no one could read the books – until now. [13]

In a similar vein but at a more scholarly level, Favareau (2009) writes, "Of the innumerable examples of pattern recognition, recording, signaling, and communication throughout all levels of living organizations only two clear examples of open-ended, creative language systems exist, the genetic language and natural languages." [14]

Linguists Marc D. Hauser, Noam Chomsky and W. Tecumseh Fitch (2002) together carry the metaphor further, pointing out that "the human faculty for language appears to be organized like the genetic code: Hierarchical, generative, recursive, and virtually limitless with respect to its scope of expression." [15]

Others (Abel and Trevors, 2006 [16]; Katz, 2008 [17]; Pattee, 2009) [18] go as far as to contend, based on evident similarity and the principle of parsimony, that genomic language is in fact the direct linear prototype of all human spoken and written languages. Abel and Trevors (2006) refute charges of undue anthropomorphism in such an ambitious claim by suggesting that:

> [H]uman observers may not be projecting linguistic frameworks onto genomic structures; rather, it could be their linguistic faculties that reflect the grammatical structure of genetic code. This universal genetic grammar would clarify why the evolutionary mechanisms specific to languages and to species are similar. It would also help to explain their polymorphisms and the physiological basis of natural languages. [19]

Pattee (2009) concurs, arguing that "Genetic language is the primal general-purpose language from which all other symbol systems and human language evolved." [20] While this extraordinary claim lacks extraordinary proof, it is sufficient for our present purposes to recognize the character of genomic language as meaningful and rhetorical text, at least analogous to human languages.

COVID-19 is rhetorical

Even while consciously avoiding undue anthropomorphism, a necessary implication one can draw from the linguistic nature of genomics is that the operations of the genome (and thus, necessarily, of the SARS-CoV-2 virus) are rhetori-

cal. In fact, George Kennedy (1992) [21] argued early on for the rhetorical nature of genetics in general, evidently unaware as he wrote that a quite similar idea had been proposed in different terms almost two decades earlier by linguist Roman Osipovich Jakobson (Hoffmeyer, 2008, p. 361). At the time Kennedy wrote, biologist M. I. Sereno (1991) [22] was describing "analogies between biological and cultural/linguistic evolution," and biosemioticians Claus Emmeche and Jesper Hoffmeyer (1991) [23] were already using the distinctive triadic rhetorical schema of American philosopher Charles S. Peirce [24] to explore the rhetorical implications of genomic language.

Of course, attempting to shoehorn a newly discovered language and a body of text not written by human hands into existing Western rhetorical categories, whether classical, Peircian, modern or postmodern, is an enterprise open to serious question. As Tonnessen (2015) writes, quoting Markoš, "We move … into an unknown language with unknown grammar and try, with a dictionary in our hands, to compose grammatically correct sentences." [25] Nonetheless, as discussed above, the remarkable degree of similarity between genomic language and human-created text does legitimately allow us the luxury to experiment with familiar discursive rhetorical categories before daring to suggest a completely new native rhetoric of genomics and thus of the Coronavirus. However, in an era when scholars (e.g., Mufwene 2008) [26] are already using the analogy of a virus to describe the phenomenon of human verbal language itself, it is hardly transgressive for rhetoricians to reverse the analogy and describe a virus as material language. Indeed, in a recent practical application of such a material rhetoric, Asgari (2019) reports using artificial intelligence for "Life language processing," something which he describes as the "Deep learning-based language-agnostic processing of proteomics, genomics/metagenomics, and human languages." [27]

Objections

For nonscientists perhaps the most common initial objection to the concept of genomic text as language has long been the persistent twentieth-century conceit of "the genetic code" being nothing more than a simple, mechanical and inartistic instruction-set, devoid of serious rhetorical interest. Writing to the contrary even before the current era of genomic literacy, Condit (1999) correctly forecasts what has become today's scientific consensus (e.g., Wiley, 2011) [28], that genomic language and communication are much less the operation of a DNA/RNA "genetic code" as mechanical "blueprint" than "the full organism… as it functions with and within its environment." [29] Discussing the contingent, rhetorical nature of genomic language, biosemiotician Miguel García-Sancho (2006)

describes DNA as “a unit in permanent contact with external environmental and other biological molecules in the process of gene expression. This makes it necessary to take into account all the components in the system and to define their interactions, in order to find emergent properties not deducible from the isolated elements.” [30] He argues that it is thus “incorrect to consider DNA a text-like ‘blueprint which regulates its own execution’ or functioning.” [31]

As Condit had surmised thirteen years earlier, molecular biologists Adrian L. Slusarczyk and Ron Weiss (2012) report that “the dynamics [that generate pattern and structure in higher organisms] take place within complex, interconnected networks, making it hard to tease apart the essential mechanisms responsible for morphogenic features from those that perform fine-tuning or distantly related functions.” [32] Niño El-Hani, Queiroz and Emmeche (2009) explain that rather than a single cellular DNA “blueprint” there exists “an expanding zoo of heterodox genetic entities” in the cell or extracellular spaces (i.e., the epigenome, in current terminology). [33] Thus, “The expression of gene products always involves indetermination, since it is affected by several environmental factors, both internal and external to the cell.” [34]

Thus, genomic text (and by extension, the SARS-CoV-2 virus) does not and cannot function at the cellular level as a simple controlling “codescript” [35], computer program, or mechanical “master narrative.” To the contrary, as Niño El-Hani, Queiroz and Emmeche (2009) explain, “DNA molecules are governed by the cell, rather than command the cell in a dictatorial way, as the metaphors of genetic ‘programs’ and ‘controllers’ suggest. Biological systems function by means of a ‘democratic’ rather than a ‘dictatorial’ control structure.” [36] According to Wagner (2014) [37], genomic signals typically “…are not instructive (i.e., do not contain information about the final product), but are only permissive (i.e., they trigger a process intrinsic to the cells themselves). The signal does not contain the blueprint of the character…; rather it is simply a limited, replaceable signal for a choice between a small number of alternatives.” [38] Interestingly, these later findings directly refute Condit’s (1999) earlier pre-genomic era summary dismissal, when she writes that “the communicative interactions of DNA within an organism …do not distribute power. These are not, therefore, rhetorical actions.” [39]

Even though the scientific and informed scholarly consensus on the nature of genetics, genomics, epigenomics and virology is now qualitatively different from that prevalent even at the turn of the twenty-first century, Weiss (2011) laments that “popular culture and society continue to cling to genetic determinism and have barely taken notice of the ongoing epigenetic shift in genetics.” [40] In

fact, very much contrary to popular mythology, it is now well known that "Genes are neither discrete…nor continuous…they do not necessarily have a constant location… and they are neither units of function...nor units of structure." [41] The discovery of the complex, networked and highly contingent character of the genome and of viruses has thus cut the theoretical foundation out from under the twentieth century behaviorist assumption that cells, plants, animals, and even humans are no more than instinctually-programmed "cellular automatons" deterministically following tropisms and drives in a lifelong cycle of stimulus and response, reward and punishment, in what is ultimately nothing more than a single-minded struggle to survive and reproduce.

What is COVID?

As is now well known, COVID-19 is caused by a physical Coronavirus, a member of the family of viruses that is also responsible for the common cold. A virus, according to Merriam Webster's online dictionary, is "any of a large group of submicroscopic infectious agents that are usually regarded as nonliving extremely complex molecules, that typically contain a protein coat surrounding an RNA or DNA core of genetic material but no semipermeable membrane, that are capable of growth and multiplication only in living cells, and that cause various important diseases in humans, animals, and plants." [42] If RNA/DNA (and thus, viruses) can be rhetorically viewed as true language, a virus such as SARS-CoV-2 must necessarily be understood as a material statement in that language, in this case a highly antagonistic statement.

Logos

As in the case of any other general-purpose language, genomic language allows for argumentation, and the primary form of genomic argumentation is by logos. Writing in the discipline of biosemiotics, Gunther Witzany (2010) [43] describes genomics as "the logos of the bios" suggesting the practical, prescriptive character of most genomic text, including viruses. Pattee (2009) [44] notes that genomic text is far more direct and declarative than spoken language: "Genetic language has nothing like the complex grammar of human language, no tenses, no propositions, no figures of speech, and no displacement." [45] Yet, as Pattee points out, this deceptively simple, declarative text language allows for the practical and virtually instantaneous solution of problems intractable to present-day science, such as that of protein-folding. Unfortunately, in the case of the current pandemic the "simple, declarative text" of the SARS-CoV-2 virus has also

proven itself capable of posing existential problems for the human race that still lie largely beyond the reach of contemporary medicine.

Ethos

Biosemiotician T. Von Uexküll (2010) [46] ventures into the rhetorical realm of ethos when he differentiates genomic “self and non-self.” Oncologists Ryan and Bernstein (2012) [47] explain how genomic identity (ethos) is materially instantiated at the cellular level in the phenomenon of histocompatibility (immune system self-recognition). They further write “Histones and associated chromatin proteins control the accessibility of genomic elements and thereby influence their targeting by protein machinery. Regulatory elements in the genome are exposed when chromatin is in a permissive configuration…Chromatin also affects global genome architecture in a dynamic fashion.” [48] Thus, human blood types are material arguments from ethos, as are our individual immune systems, where SARS-CoV-2 is, absent prior infection or vaccination, not immediately recognizable as “non-self.” Possibilities for an effective and safe vaccine require priming the human immune system to recognize, attack and eliminate (i.e., refute) the virus as “other.”

Pathos

Biosemiotician Søren Brier (2010) notes that “emotions [i.e., pathos] [must] be connected to the performances of instinctual movements to create the motivational urge of appetitive behavior” and that “emotional experiences are connected to the perception and behaviors with an instinctive basis.” [49] This statement may appear highly problematic if one still maintains the now-antiquated premise that life below the human level is purely instinctual or “nothing but interacting molecules.” [50] However, if one grants the premise that living organisms, even microscopic, have some degree of freedom (e.g., if a prokaryote flagellate is in some way at liberty to determine which way to swim and is not simply a cellular automaton mechanically responding to tropisms of light, gravity, pressure, temperature or chemical gradients), the idea of motivation and thus of emotion, much more in the strict classic sense of drive, from Lat. *e-movere*, to move or motivate, rather than in the contemporary romantic sense of “feeling,” becomes appropriate, at least in a broadly metaphorical sense.

It must be mentioned at this point as a word of caution that once one dares to finally jettison the Enlightenment conceit that only fully-functioning, rational, “civilized” adult humans can truly “feel” (i.e., are capable of pathos) the space of inquiry opened up is an ideological minefield. Barely two centuries ago it was

generally agreed that "non-rational" beings (a category then and variously construed to include "wild" animals, horses, dogs and cattle, children, the mentally and emotionally challenged, "savages," enslaved, colonized and nonwhite people in general, convicts, and even industrial workers and deep-sea sailors) lack the capacity for true feelings as such, and thus may be whipped, branded and tortured at will (Of course, the objects of this treatment might have had a quite different opinion, but no right to speak).

Genomic text: Social construction on a biospheric scale

Human genomic text is materially, socially and ecologically constructed, both agonistically and antagonistically, not only by the collectivity of all our human and pre-human ancestors and their choices and actions but by other living species as well, non-ancestral life-forms with whom we come in contact in our shared planetary biosphere. This can sometimes involve predation, parasitism and endemic diseases that select for those who are most resistant while inadvertently selecting for negative phenotypes as well (e.g, the well-known case of malaria and sickle-cell anemia). In the specific case of COVID-19, the relatively high mortality rate being inflicted by the disease is antagonistically rewriting the shared human genome by "burning through" part of the living human population, disabling or eliminating from the gene pool a statistically significant portion of those of reproductive age or younger who are or were particularly vulnerable to the contagion.

The social construction of genomic text is constant and biome-wide. The contention that COVID-19 originated as a zoonotic infection in bats or other mammals [51] is a latter-day materialization of feminist scholar Danna Hardaway's contention in her, "Cyborg Manifesto" (1991), that "…the boundary between human and animal is transgressed [and] bestiality has a new status." [52] Nor is this type of "horizontal transfer" (i.e., interspecies rhetoric at the genomic level) unusual. As an example, Kosaka and Ochihya (2012) [53] report that mouse RNA can transfer to human cells, and "after the transfer of mouse exosomal [extracellular] RNA to human mast cells, new mouse protein was found in the recipient human cells, indicating that transferred exosomal mRNA [messenger RNA] can be translated [i.e., read by the human cell to produce protein] after entering another cell." [54] The researchers note without comment that any possible effects these exogenous genomic materials might have on human embryogenesis and organ formation are unknown. [55] This latter example shines an entirely new light on the late 1980's and early 1990's academic polemic surrounding behaviorist Robert Zellner's "rodential model for composition." [56]

On the same line but perhaps even more remarkably, molecular biologist Lin Zhang et al., (2011) report that “exogenous plant miRNAs [stable microRNAs] in food can regulate the expression of target genes in mammals,” including humans. These researchers note that “the intake of certain plant miRNAs generation after generation through a particular food source may leave an imprint on the genetic map of the human race.” [57] This unexpected plant/human rhetoric is of no small import, particularly considering Trewavas’ (2005) [58] and Mancuso et al.’s (2018) [59] separate but concurring arguments that green plants are in fact intelligent organisms. [60]

Going a step beyond even interspecific ecosocial construction of genetic text, in an analysis reminiscent of the once-popular “Gaia” theory, now referred to as the “Holobiont” theory by Saltmarsh (2018) [61], environmental scientists Shahid Naeem, J. Emmet Duffy and Erika Zavaleta (2012) [62] propose that it is the “cumulative mass” of all earth’s biodiverse organisms that provides us with “genetic resources, cultural values and many other benefits.” [63] The authors report that the task of understanding this “staggering diversity of organisms” as one single irreducible ecosystem [i.e. one single grand genomic text within which all communication is endogenous] “poses a fundamental challenge of modern science.” [64] Dobrin (2011) suggests that within the ecosystem “the conscious mind [is] a small subsystem running its program of self-construction and self-assurance while remaining ignorant of the actual dynamics of complex systems.” [65] He suggests that at a deeper level even this degree of individuality may be illusory, since “the system cannot be convincingly divided into subsystems in ways that reveal any ruptures in the system itself.” [66] At this truly Olympian level, COVID-19 can best be seen as a momentary fluctuation or imbalance in the ineffably complex system of terrestrial life, a stray material argument “going viral” amidst the grand, dynamic discourse that is Gaia.

Possible schemata for a comparative genomic rhetoric

Writing in the discipline of biosemiotics, D’Onofrio, Abel, and Johnson (2012) [67] propose a novel reductive rhetorical schema within which natural genomic argument can be understood to consist primarily of “data + control” [68] in the form of “prescriptive information” that is “undetermined by cause-and-effect necessity” but is “specific and intentional.” [69] They describe what is recognizable as argumentation (a word they never use themselves) in the genomic realm as “choice-contingent causation and control,” a curiously military-sounding rhetoric they describe as algorithmic but “not physicodynamically determined” or “‘necessary’ in the sense of physical law.” [70] Non-determinism (i.e., freedom)

here means that "Life chooses to obey the rules in order to survive. No physical law forces life to be alive." [71] The authors point out that in the case of living organisms, "Rules can be easily broken, and govern choice contingent behavior," arising "out of uncoerced choices in the pursuit of function and utility." [72] They propose that what could be identified as the two components of genomic argument are "prescriptive data" and "prescribed (executing) algorithm," a control or instantiation function. [73] The first category can be understood analogically as argument, the second as materially instantiated audience response.

This latter closely resembles Barbieri's (2009) contention that there is a type of biosemiosis "whose function is not to interpret the world of life, but to create it." [74] His observation, closely echoing a similar, familiar statement made by Karl Marx, has the potential to be highly instructive in terms of rhetorical composition theory, where either overly expressive self-referentiality or overly mechanical views of "process" can obscure the ultimate function of human composition, which perhaps should arguably be "not to interpret the world of life, but to create it, to bring its objects into existence and to organize them into functioning wholes" (Barbieri, 2009). [75] Writing eleven years later, geneticist Anthony Jose (as described by University of Maryland, 2020) [76] effectively concurs with Barbieri's conjecture, describing a genomic rhetoric in which "DNA may not be life's instruction book -- just a jumbled list of ingredients" and where other "inheritable information is stored outside the genome," i.e., as epigenetic information.

Endogenous vs. exogenous (e.g., viral) argument

Absent from D'Onofrio, Abel and Johnson's schema described above is any clear differentiation between exogenous material argument (coming from the outside), and endogenous argument (originating within the cell or organism itself), something biosemioticians Thure von Uexküll, Werner Geigges, and Jörg Herrmann (2010) [77] call "endosemiosis." Supporting the notion of what could be identified as an endogenous genomic rhetoric, Markoš (2010, p. 691) [78] writes that "Proteins—'words' uttered in the [genomic] language—enter into complicated syntactic and semantic relations, which constitute the cellular *parole*. The cell is thus a materialized *parole*." [79] Trewavas (2005) reports that:

> [C]ell proteins construct a cellular network composed of a power law distribution of hubs and connectors... Both metabolic and signaling networks are constructed from modules with recognizable recurring circuit elements or network motifs that: (i) filter out spurious input fluctuation; (ii) generate temporal patterns of expression; (iii) accelerate throughput; (iv) exhibit highly

optimized tolerance of variations in individual protein constituents. [80]

As Pattee (2009) admits in an evident nod to conservative scholars, “Applying concepts like choice and purpose to cells, even as a metaphor causes most people more exasperation than enlightenment.” [81] However, according to Trewavas (2005), even prokaryotes (one-celled organisms) function as what are in effect free agents, rhetors making, being convinced by or rejecting arguments. He writes that “In bacteria, the network of two-component kinases and phosphatases has been termed a phospho-neural network that enables single bacterial cells to construct associative responses (i.e. cross-talk), learn, remember, make informed decisions, perform linguistic communication and exhibit social intelligence” [82] , this directly opposing Condit’s (1999) earlier contention that “in the communication of DNA and the cell, the cell is invariant in the way it interprets the code of DNA.” [83] In 2007, Shapiro titles an article, “Bacteria are Small but not Stupid: Cognition, Natural Genetic Engineering, and Socio-bacteriology.” By 2011, Görlich, et al. go as far as to explicitly describe a process of explicit “bacterial decision-making” [84], a rhetorical space in the most classic sense.

Oncologist Giorgio Prodi (2010) proposes that “the immune system performs an ‘interpretation’ of the material objects it can explore,” while antigens (foreign proteins or infectious agents) are “’information-bearing objects’… for an immune system.” [85] Viruses such as SARS-CoV-2 can thus be correctly understood as a class of free-floating exogenous arguments that “superimpose a complex viral molecular genetic identity onto their host” (Villarreal, 2004). [86] In this instance Derrida’s well-known pre-genomic era axiom that “Language is set adrift, untethered from the speaking subject” is here materialized and actuated. [87]

Jagger, et al. (2012) [88] report that a pathogenic virus (in their example, Influenza A, but applicable by extension to SARS-CoV-2 as well) not only infects a host, but also directly “modulates the host response” at the genomic level, “to decrease pathogenicity,” to limit inflammation and apoptosis (endogenous genomic death-rhetoric, discussed below), and to reduce T-cell activity. This “modulation” can be understood in rhetorical terms as a material refutation of the cell’s endogenous antithesis/resistance to the antagonistic viral argument.

A useful analogy to the somewhat novel concept of genomic viral argument is how, as is well known in the realm of discursive rhetoric, providing an advance refutation of actual or potential objections to a hostile thesis is occasionally referred to in contemporary terms as “vaccinating” an audience. However, as Lee, et al. (2012) [89] report, even vaccines meant to ward off disease can provoke deadly reactions and form lethal recombination, another situation not unknown metaphorically to discursive rhetoricians.

Viral activity (genomic argument) can also reduce an organism's resistance to a separate, unconnected opportunistic genomic argument (infection) (e.g., Foley, 2012) [90], and hostile viruses and microorganisms can even "hijack" existing endogenous genomic conversation to their own benefit and the host organism's detriment (Wang, et al., 2010). [91] Similar or closely metaphorical phenomena (a precursor argument reducing resistance to another argument to follow, or an antagonistic third-party rhetor "hijacking" conversation among individuals, discourse communities or even among nations) are familiar at the discursive level but remain as yet undertheorized in the field of rhetorical studies.

Genomic arguments can also be non-pathogenic exogenous genetic material (as noted above) that has the potential to interact with, change (i.e. persuade), or even permanently integrate with another organism's genomic text or identity (Margulis, 2009). [92] If one uses the idea of genomic argument, all these processes are easily identified in rhetorical terms as materially-instantiated persuasion, a type of genomic rhetoric that, incidentally, is also employed antagonistically by cancer cells to subvert other living cells (e.g., Kosaka and Ochiya, 2012). [93]

As mentioned earlier, it should be noted that exogenous viral argumentation (i.e., viral contagion) is not always antagonistic (pathological). Thus Villarreal (2004) presents evidence supporting what he calls "highly counterintuitive thesis" that exogenous viruses now integrated into the human genome "endowed the host with major creative acquisitions in the evolution of life…such as associative (social-based) learning and the acquisition of the cognitive capacity for human language" [94], a powerful material rhetoric indeed. Genetically modified viruses (including HIV) have been used for some time by geneticists as vectors to deliver therapeutic genetic material (i.e., agonistic material arguments) into the genomes of living cells. [95]

At this point it is relevant to return to the familiar discursive rhetorical category of "ethos" as a useful tool for understanding: It is common knowledge that not all potentially-vulnerable human patients exposed to SARS-CoV-2, or even HIV or the common cold, become infected, that oak trees cannot catch the "flu," and that tobacco mosaic virus cannot infect either humans or oaks. An organism is at liberty to choose to be "convinced" by or to reject "prescriptive data" (argument) both for reasons of "logos" (whether the material argument presented is "logically valid," i.e., correctly prescriptive) and of "ethos" (whether the nature of the material argument, valid or invalid, sufficiently corresponds to the identity and character of the audience genome being addressed).

Agnonistic and antagonistic argument

Genomic argument is rarely either/or, black or white, yes or no, but much more often simply “agonistic” (enabling), or “antagonistic,” a useful binary imported by Darsie Bowden from biochemistry into rhetoric and composition studies. [96] A cell or an organism that is infected/persuaded by the exogenous antagonistic argument of the SARS-CoV-2 virus (or by HIV or any other pathogenic virus) may not necessarily die sooner than its analogous cells or other individuals of its species, but may simply become less fit (less able to compete for limited resources and carry on life tasks, including reproduction), just as does an organism that becomes gradually more resistant or insensitive to the endogenous, agonistic chemical rhetoric of insulin (i.e., insulin-resistant diabetes). The organism (or person) may or may not die prematurely, but it gradually loses strength and reproductive functionality. In this context, Markoš (2010, p. 210) [97] points out in a discussion evocative of the discursive rhetorical category of “invention,” that,

> Living beings need not sit back and wait for an adaptational change delivered by a mutation. A good example of this was recently found in yeast. The yeast cell harbors two types of glucose transporter in its membrane. Changing the ratio of the proteins can optimize the glucose intake in standard environments. In the case of special needs, however, the cell can produce multiple copies of both genes and perform recombination. (pp. 690-691) [98]

COVID-19 as death rhetoric

One of the more curious aspects of genomic argumentation in general, and COVID-19 specifically, is that it includes a powerful rhetoric of death, something neatly elided in most classical and contemporary discursive rhetorical theory. “Apoptosis,” or “programmed death,” can be an endogenous material rhetoric within the cell’s own existing genomics, or it can be extrinsic, signaled to the cell (or to the entire eukaryotic organism in the case of aging, grave injury or illness) either by components of the organism’s larger genome, or by exogenous infection such as COVID. As cited by Gough (2010), S. Yuan et al. report (2010) [99] the existence of genomic “death domains and death receptors,” and date the origin of extrinsic apoptosis to millions of years before the evolution of vertebrates. In “genomic time” individual cells or organisms are expendable, and only genus- or species-level extinction is true death. At the cellular level, death is not necessarily tragic: To the contrary, certain types of genomic signaling “may have anti-oncogenic [anti-cancer] functions by promoting cell death.” [100]

Among familiar contemporary rhetorical categories, the idea of “Thanatos,” or the “death wish” is a well-known but little-examined rhetorical trope in

Freudian discourse. The phenomena of anorexia nervosa, human warfare, plus the contemporary phenomena of suicide-bombers, discursively-provoked mass cult suicides, and the surprising discovery (Teicher, Glod and Cale, 1993) that "de novo suicidal ideation" [101] can be evoked pharmacologically by selective serotonin re-uptake inhibitors (SSRI's) in previously non-suicidal individuals all raise a deeply disturbing question for rhetorical scholars: Whether "apoptosis" (related to the Greek word for "afternoon" or "sunset") might have a naturally-occurring organism-level discursive rhetorical analog to the similar genomic-level phenomenon, perhaps operating as some form of human emergency-"self-destruct mechanism" that can be triggered discursively as well as genomically or pharmacologically.

Delivery: The argument blocked

In discursive argumentation it is axiomatic that an argument undelivered, one that is not successfully conveyed to, noted by, understood by, or acted on by its intended audience, is an argument that fails. While the ancient rhetorical canon of delivery is relatively undertheorized in the contemporary rhetoric of written text, perhaps because "censorship" of most sorts is considered "inartistic," in the existential struggle against COVID's death-argument, "reasoned" confrontation and refutation (i.e., an effective vaccine) may be "too little, too late" for thousands or even millions of victims. Thus, relatively inartistic physical methods of physical censorship (masks, social distancing, hand-washing, etc.) are deemed necessary to limit or prevent exposure to the hostile argument.

Interestingly, genomic rhetoric evidently offers additional possible methods for impeding the delivery of the deadly genomic argument of COVID. Goethe University Frankfort (2020) reports that "Blocking cellular communication stops SARS-CoV-2," [102] a thoroughly rhetorical approach to this very material crisis. Researcher Christian Münch et al. (2020) [103] report that using existing substances aimed at "blocking translation" of the COVID virus (in genomic rhetoric, "translation" means the reading of a genetic text and material production of a given protein following the "instructions" in the text) can "prevent SARS-CoV–2 replication," thus suggesting another possible way to address the current crisis.

COVID-19 and genomic epistemology: The high cost of learning

Although in eukaryotes the individual organism's immune system learns at the genetic level, this type of learning is generally thought not to be passed genetically to following generations, at least after the lactation period in mammals. The multigenerational species-level genome (not the individual cell or organism)

“learns” immunity in genomic time not necessarily because the genomically unfit always die prematurely (“survival of the fittest”), but because the less fit, regardless of lifespan, may be less likely to successfully reproduce and flourish, and are thus likely to make a smaller contribution to following generations’ species-wide genome. Genomic epistemology (“evolution”) is as slow or fast as a given species’ generations. Thus Pattee (1995) notes that “Life is constructed, but only by trial and error, or mutation and selection, not by theory and design. Genetic information is therefore very expensive in terms of the many deaths and extinctions necessary to find new, more successful descriptions.” [104] He underlines that “Genes take generations to acquire new information that is expressed over the lifetime of the organism.” [105] The concept of “herd immunity,” much heard in the polemic public and political discussion surrounding COVID-19, directly favors just such a concept of genomic epistemology, even though at a staggering cost in lives.

However, contrary to D’Onofrio, Abel and Johnson (2012) [106], epistemology in genomic language must not be understood as a simple mortal binary with one degree of freedom: life or death. Instead, Noor and Milo (2012) [107] correctly describe evolution as a “multi-objective problem,” and Shoval, et. al (2012) [108] elegantly describe how evolution and thus genomic epistemology functions as a slow and exceedingly complex, long-term multi-dimensional Pareto optimization of multiple life-tasks. Barring the special, but in no way assured case of development of a fully effective COVID vaccine like that for smallpox or poliomyelitis, one might venture to consider COVID’s future long-term social and economic effects on humanity in just such terms.

However, it is worth noting (but seldom discussed) that genomic epistemology can, in this case, be a two-edged sword: A hastily- concocted, partially-effective COVID vaccine (a situation addressed by Bartsch, 2020) [109] may well end up selecting (“teaching”) the most resistant and pathogenic variants of SARS-CoV-2 how to better spread a projected second or subsequent “wave” of pandemic. In fact, alarming reports such as that by Rafiul et al. (2020) [110] suggest that this “learning” process is already underway as we write.

Genomic memory: Costly, but it lasts “forever”

At its best, genomic language functions as the rhetoric of memory *par excellence*. Individual memory is ephemeral, human written memory goes back barely 4000 years at best, and our graphic memory (cave art) roughly ten times that long (Hellstrom, 2012, p. 1388) [111], but the “biochemical complexity of extant organisms is the outcome of process of biological evolution that started perhaps

4×10^9 years ago" (Islas, Becerra, et al. 2004, p. 250). [112] As Shcherbakov (2011) reminds us, "Each individual entity is relatively short-lived, but species and lineages are potentially immortal, and some of them remain unchanged for hundreds of millions of years; pre-Cambrian organisms of three billion years ago probably did not differ significantly from modern bacteria" (p. 10). [113]

Thus, our species and, necessarily, each one of us has a genomic memory that goes back several billion years. Sluzarczyk and Weiss (2012) note that "The dynamic processes of animal [including human] morphogenesis are based on a 'metazoan toolkit,'" (p. pe16) [114] parts of which Suga et al. (2012) date all the way back to the time of "the evolution of multicellular metazoans from a unicellular ancestor" (p. 1). [115]

Even though the time-scale of genomic memory exceeds the duration of individual and collective human memory by multiple orders of magnitude, and although Clayton's concept (as cited by Turner, 2007, p. 55) [116] of deep "genome time" is useful as a phrase, his identification of the latter with an imaginary "perpetual present" is highly problematic. Such a concept imposes a counterfactual frozen stasis on what is in fact a highly dynamic system that, even excluding mutation, is constantly being recalled and re-instantiated with each reproduction or recombination, each pandemic or major variation in the physical and ecosocial environment, or even with simple mutation and ageing over the passage of years. Ryan and Bernstein (2012) [117] report that a living organism's DNA, even that part "sequestered" within the cellular nucleus "can be … modulated by cellular events, such as epithelial-mesenchymal transition, metabolic changes, and aging" (p. 1513). [118] Thus, the twentieth century's hegemonic doctrine that "the DNA and the cell are locked into a relatively static relationship with a relatively fixed code (in a given generation)" (Condit, 1999, p. 345) [119] is no longer tenable.

According to Shcherbakov (2011), "Stasis is an inevitable consequence of every successful evolution." (p. 1). [120] This is not to suggest Clayton's "eternal present," but rather that hard-won genomic knowledge usually dies only with genus or species-level extinction and sometimes not even then, e.g., hens evidently retain the genetic memory of how to grow teeth, though not the practical ability to materially instantiate that knowledge without human help (Kollar and Fisher, 1982). [121] Barring the possibility of human extinction, stasis (herd immunity) of some sort will eventually be the outcome of the COVID-19 pandemic, but neither doctors, scientists nor rhetoricians can securely predict what it will look like either in the short or the longer term.

Genomic authorship

Not all discursive rhetorical theory can be effortlessly ported over from human glottal speech and text to the non-glottal, semasiographic (Boone, 2004, p. 314) [122] language of genomics. As Foster (2007) astutely observes, questions of “authoring, addressivity/answerability, purpose, exigence, agency … are so tightly imbrigated as to be almost impossible to discuss discretely” (p. 164). [123] Here she identifies the suite of rhetorical categories that is most problematic in terms of COVID-19 specifically, and genomic language in general, the most polemic category among these being authorship.

At the deepest theoretical level, the issue of authorship, and thus necessarily, exigence, purpose and agency of naturally arising genetic text remains a discussion without resolution, at least outside the realm of religious faith. Adopting Humberto Maturana’s 1972 neologism (Maturana, 1980, p. vi) [124], Dobrin (2011) and some biosemioticians (e.g. Pattee, 2008) [125], prefer to describe the authorship of natural genomic text as “autopoeitic,” i.e., “self-creating.” Self-creation, as opposed to self-assembly and self-organization, a well-known reality in crystal physics and molecular biology, is a claim of impeccable Aristotelian pedigree (Aristotle believed that maggots were spontaneously generated on rotting meat) However, it is a claim which poses a severe ontogenetic challenge to contemporary thinkers. Although Hoffmeyer (2008) accepts the concept of self-organization in principle (pp. 177-182) [126], he contends that “neither genes nor individuals” have authorship of natural genomic text, only the “life cycle” (pp. 107-109) [127] within a deeply networked environment reminiscent of Foster’s (2007) “networked process” of human composition. [128]

Parenthetically, as an alternative to the term “autopoeitic,” “a word without a history” (Maturana, 1980, p. xvii) [129] and one that implicitly poses an extraordinary claim without proffering extraordinary proof, the existing term “acheiropoeitic,” a word used in both Greek and English to refer to an icon reputedly “not written by human hands,” is a less openly ideological, more generally acceptable descriptive term for discussion of the origin of natural genomic text, a term not so tightly bound to the Peircian strong-anthropic “cosmogonic philosophy” (Hoffmeyer, 2008, p. 39-42). [130]

In the specific case of COVID-19, the question of authorship is, if possible, even more polemic than in the general case of genomic text, with issues of American and international politics here stirred into the mix. Occasional polemic references to the contagion as the “Chinese” or “Wuhan” virus (e.g., Zietlow & Derickson, 2020) [131] in the 2020 U.S. election campaign have strongly politicized the entire question of authorship and potential culpability for the cur-

rent pandemic. This yet unresolved controversy is potentially as rich for future rhetorical study as it is to ongoing scientific and political research.

Genomic rhetoric and rhetoricians

For scholars in the humanities, the entire field of genetics and genomics has long been marked "off limits" by a forbidding, hegemonic rhetoric of inaccessibility. E.g., rhetoricians Zoltan P. Majdik and Carrie Ann Platt (2012) [132] use the words "complexity," "complex" and "complicated" no less than thirty times in their twenty-three-page journal article on the rhetoric of direct-to-consumer genetic testing. Even as eminent a transdisciplinary scholar as Condit (1999) complains that the professional discourse of and about genetics usually takes place "in a language unintelligible to those not trained in the sciences" (p. 326). [133]

Nonetheless, functional genomic literacy is considerably less complex to achieve in principle and in practice than mastering the intractable heights of higher mathematics, the still-unplumbed depths of a putative universal human grammar, or even the everyday challenge of gaining adult native-level fluency in a new spoken language. However, genomic language is in no way "other" to us—genomic text resides within every life-form on earth, making genomic language more native to us than our mother-tongues and as universal as life itself. Genomic literacy is a literacy of our own bodies, and is necessarily as complex as we are, as the planetary biosphere is.

COVID 19 and power

Famously, 20th-century French postmodern philosopher, historian, and literacy theorist Michel Foucault once declared that "Power is everywhere; not because it embraces everything, but because it comes from everywhere" (Philip, 1983, p. 30) [134]. This omnipresence of power has been never so clearly exemplified as by the current pandemic. In recent months the Coronavirus has been exhibiting its naked power to the world. No matter how much we have progressed in science and technology, this virus has progressively increased and challenged human existence (Paudel, 2020). [135] Allegedly originating in Wuhan, China (Zietlow & Derekson, 2020) [136], it has quickly spread to every corner of the world. Regardless of caste, color, gender, class, and geography, it has been able to spread and write its name in history, taking hundreds of thousands of lives including doctors, nurses, and government ministers, while sickening millions of ordinary people. Occupying a central place in discourse in houses, streets, parliaments, and congresses of every country, it has greatly impacted every sector and

terrified everyone, from the most powerful rulers to beggars on the street corner (Paudel, 2020). [137]

In terms of public rhetoric, virtually overnight the Coronavirus pandemic has created or resurrected and universalized some previously unfamiliar English words and phrases, including Social Distancing, Isolation, Quarantine, Lockdown, PPE (Personal Protection Equipment), Sanitizers, Rapid Testing, Self-quarantine, Self-isolation, and others. Knowing or not knowing the meaning of the words, people are using them. Had there not been a Coronavirus it is likely that some people would not use or even hear or read these words throughout their lives (Paudel, 2020). [138]

Similarly, the Coronavirus has shown its material power by plunging the world into an economic crisis. Countless companies are on the verge of collapse or already in bankruptcy, leaving vast numbers of employees without work or earnings. Restaurants, cafés, hotels, industries, public transportation, schools and universities have all been greatly affected. The virus has challenged scientists to develop countermeasures to it. Teachers have had to learn overnight how to teach without a classroom, economists explore how to recover from financial losses, government bodies struggle to understand how best to cope with “unprecedented” times, sociologists, and anthropologists hasten to study its effects on human society, psychologists strive to explore its psychological and mental effects, media people fight to update the news. The power of the invisible Coronavirus shakes the world (Paudel, 2020). [139]

The virus has also demonstrated its discursive power by causing the creation and spread of rumors across the globe. In a short period it has given birth to countless viral rumors such as the false allegation that 5G mobile networks spread COVID-19, that exposure to the sun or temperatures higher than 25C protects people from it, that drinking alcohol is protective, that taking hot drinks or a hot bath can prevent it (World Health Organization 2020) [140], that turmeric powder wards off infection, and a vast number of other myths, quack remedies, conspiracy theories and folktales. The Coronavirus has also given fodder to people across the political spectrum who are grumbling to or about their governments, their political parties, political leaders or government officials. People are cursing their governments for not being able to manage their coronavirus-related problems and for failure to address those problems in a timely manner (Paudel, 2020). [141] The power of COVID-19 has become evident for all to see.

It has also influenced educational sectors, shifting many educational institutions to virtual modes. Students and teachers who have access to the Internet and computers are experiencing a new mode of education as they use different apps,

including Zoom and Skype for their classes. Meanwhile many poor and rural students, particularly in the Third World who do not have solid access to technology have been altogether deprived of education for the duration of the crisis (Paudel, 2020). [142]

At the same time, the emergency created by the virus has provided an unprecedented amount of free time to voracious readers and writers. It has opened a great number of potential areas of research for scholars to write articles, do assignments, and write dissertations. It has created content for academics, artists, painters, graffitists, music composers, singers, and comedians to use to compose their creative works. Similarly, for social media lovers it has given abundant time to indulge and "socialize" on social media. People suddenly have free time for posting, sharing their daily activities, meals, pets and past photos on social media (Paudel, 2020). [143] Unfortunately, social media have also allowed rumors, fake news and fraudulent information and "cures" to proliferate (University of California, 2020). [144]

However, at the same time this pandemic has sadly prevented some people from marrying or dating with partners and lovers, has halted most normal in-person social and cultural activities, and has canceled gatherings of all sorts (Paudel, 2020). Travelers and international students have been confined to home or unexpectedly stranded overseas or along their way (Jie, 2020). [145]

All this has profoundly changed people's daily life activities overnight. As going outside is dangerous, people are exercising and entertaining by practicing yoga, dancing, singing, playing musical instruments on their verandah and around their immediate surroundings. It has allowed people to learn cooking, as well as to have different varieties of foods, with households sitting down together (Paudel, 2020). [146]

Sadly, it has also posed extreme problems for people who live by their daily wages."[T]he pandemic could have a catastrophic effect on food security and consequently on nutrition worldwide" (Walter and Eliza Hall Institute, 2020). [147] A scarcity of some foods and consumer goods has prevailed in markets even in the United States. In many cases the price of goods has been hiked, while on financial markets the price of gold and precious metals, the traditional "refuge in a storm," has soared. Around the world the pandemic has spread fear, disruption, and pain to older people, to the sick, beggars, and street vendors, as well as to people who are trapped indoors with abusive or mentally unstable partners or housemates (Gosangi et al., 2020). [148]

Yet in a certain sense, the virus has favored nature, since at this time nature has had a brief chance to rest. There are fewer vehicles on the streets, there are

fewer planes in the sky, there are fewer ships on the sea, there is less oil drilling, there is less mining work in the mines, and there is less farming work in the fields. Had it not been for the coronavirus people would have continued disturbing, demolishing, destroying and exploiting nature. Air, water, and noise pollution have all decreased (Paudel, 2020). [149]

If COVID-19 were not so contagious and if governments had not strived to keep people inside their homes, perhaps they would have already come into the streets to protest, and cities would have already been on fire, even more so than during recent waves of protest. But now in the face of the virus, all people, countries, and government bodies on Earth have become powerless before the overriding power of genomic rhetoric, the power of the invisible Coronavirus. (Paudel, 2020) [150]

Conclusion

In this article, by employing a transhuman interdisciplinary stance, writing as rhetoricians with one foot in our disciplinary scholarship and the other in the territory of the marginalized parallel discipline of biosemiotics, we discuss genomic language relating to the current COIVD-19. Our discussion suggests that genomic language is a direct and natural language. Its rhetoric is in fact more democratic and natural than the rhetoric we human beings have created. The discussion corroborates the character of genomic language as the unique, biome-wide acheiropoetic written language that is the ultimate common mother-language of every living organism on earth, the language in which viruses like SARS-CoV-2 act as material texts.

As there is as yet a dearth of research studies on the rhetoric of genomic language in general, and COVID as argument in particular, such study should be expanded. We believe our work is a stepping-stone, providing some ideas, to work on this area and to be explored in depth by future scholars. This study will be significant to researchers who aspire to work on genomic language, its characteristics, and its inherent rhetoricity. Genomic language is only now, almost two decades after the completion of the Human Genome Project, becoming truly readable as a body of text, yet the lack of rhetoricians and RWS scholars who are truly literate in genomics is still near-total. A great rhetoric scholar such as George Kennedy is gone, and Celeste Condit (who published some works on this question) is no longer publishing on this subject, just when it is needed the most. Yet there is a dire need to execute both theoretical and empirical research in this area. We believe that this work can help a bit build a more solid rhetorical theory of genomic language and carry out empirical study on it.

As this work is for purely rhetorical purposes, it will not obviously contribute anything to developing a material vaccine, therapy or cure for COVID-19. However, our work and further scholarship in this area can potentially contribute to understanding among non-scientist scholars seeking to comprehend genomic language, particularly after the outbreak of COVID-19. Since discourse about COVID-19 is currently so polemic and so politically-loaded, this work provides a different and less polemic look at the subject, something potentially accessible to non-scientist scholars as well as to rhetorically-literate physicians and scientists.

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