



Review Article

Disrupt Medicine

Mihai Nadin*

Institute for the Study of Anticipatory Systems, The University of Texas at Dallas, 800 W. Campbell Road, Richardson, Texas, 75080, USA

Received: 29 July, 2021
Accepted: 10 August, 2021
Published: 11 August, 2021

*Corresponding authors: Mihai Nadin, Institute for the Study of Anticipatory Systems, The University of Texas at Dallas, 800 W. Campbell Road, Richardson, Texas, 75080, USA, Tel: 972.883.2832; E-mail: nadin@utdallas.edu

ORCID: <https://orcid.org/0000-0001-9712-8921>

Keywords: Anticipatory; Reactive; Sustainable; Data; Meaning; Non-deterministic

<https://www.peertechz.com>



Abstract

Current medicine is anchored in reactive practice. Modern medicine became an extension of the physics and chemistry based on the Cartesian reductionist-deterministic view of the world. However, reaction is more expensive, by many orders of magnitude, than anticipatory actions; and in the long run, it is unsustainable. If physicians do not want to be replaced by machines—neither by 2035 (as medical experts already predicted) nor ever—they should stop treating human beings as machines. Only anticipation-grounded medicine can save medicine from itself.

Introduction

From humourism to germs, from exorcism to trephination, from herbs and unguents, and from all that past where medicine was at the borderline between magic and science to our days, the distance is enormous. The history of how disease was identified in various cultures and treated over millennia is probably the most faithful testimony to a progressively better understanding of the human being. Medicine is the most complete—and contradictory—treatise on what life is and what defines an individual [1].

Under circumstances brought about by extreme situations, such as the pandemic that has shaken the world since December 2019, the body of knowledge and experience (in diagnosis and treatment) has gained new significance. Are we still so much at the beginning of understanding life (and what can affect it) that one virus (from the millions and probably billions of them) proves all accumulated knowledge to be useless, or at best marginally consequential?

The broader image of the state of the art of biology and medical science obviously deserves closer analysis. Practitioners of medicine—a variety that now extends to molecular biologists, experts in genetics, Big Data processing, machine learning, etc.—have been subjected to a real-life experiment in which their own lives are at risk. Notwithstanding spectacular

accomplishments—which merit a larger space than a short article about the state of medicine in our time—within Covid-19 medical praxis has failed spectacularly. Of course, this judgment invites a more elaborate analysis, which transcends the intentions of this communication.

The subject at hand is the new condition of medicine against the backdrop of the new condition of science. Medicine undermined itself by becoming applied physics and chemistry, instead of participating in the development of a biological view of the living matter.

Reactive vs. Anticipation-informed medicine

Current medicine is anchored in a reactive practice. For all practical purposes, it became an extension of physics and chemistry, operating within the perspective of reductionist-determinism not of biology, i.e., the science of the living. If physicians do not want to be replaced by machines, they should stop treating human beings as machines. Medical practice grounded in anticipation, which is guided not by reaction, but by possible future outcomes, can save medicine from itself. Reaction, by its nature, is amoral, void of ethic. Anticipation informed medicine does not eliminate reactive medicine (essential in helping those affected in accidents, for example). It brings with it the expectation of a holistic view of health and healing. As a result, anticipation informed medicine recovers

the ethical dimension of health care which in the age of the machine reductionism was lost.

The underlying science

Science anchored in reductionist determinism is giving up understanding reality in favor of measuring it. The measured reality becomes numbers. As processed data, they facilitate inferences from the past—causes represented by numbers—to the present—effects, as yet other numbers. Data are raw material for predictions void of understanding. This path is legitimate where the subject of change has no active role in making choices. Stones erode into sand; water evaporates, ice melts—all without any trace of intentionality. But that is not the case with the path from the stem cell to a new organism, to aging, to eventual death. The patient plays an important role in healing.

Understanding is a long-term endeavor, with many pitfalls. Suffice it to recall that pandemic outbursts were once associated with sin and godly revenge. The meaning of otherwise unexplainable death was hijacked into the irrational. It derives from misconstrued intentionality attributed to constructs (deities, gods and goddesses) meant to explain what seemed unexplainable. Data processed without any understanding of what they stand for is of the same nature. Ascertainments about the future in disregard of meaning are agnostic of intentionality.

The broader crisis of vision, CoVID (VID from the Latin *vedere*, to see), within which Covid-19 takes place, is the result of giving up knowledge in favor of the more expedient data, in particular automated processing of data. This choice: data over knowledge, i.e. the abandoning of understanding, is the expression of living on borrowed time. Indeed, what is at stake is sustainability Figure 1.

Turning a deeply rooted crisis—the pandemic that affected the entire world—into an opportunity became the justification for the effort to understand the obsession with numbers in disregard of meaning. Huge amounts of money were spent to react to Covid-19 without even understanding what it is. The alternative would have been the meaningful mapping of human interactions represented as significant information. This is also the unavoidable path towards effective prevention. Expensive—and only partially adequate—reactions to breakdowns based on data-driven predictions, but not on knowledge, are not sustainable. Integrating reaction and anticipation, science can be at the same time effective and meaningful.

If someone were to take the mathematics used in the representation of physical phenomena as a model for describing the organism, the number of variable necessary would exceed the number of entities that make up the universe [2]. This illustrates why the predictive power of physics, describing the non-living universe, is insufficient should someone attempt to describe change in the living based on it. The virus-organism interaction that eventually led to the pandemics is an example. It constitutes a reality for which not yet enough knowledge has been available in order to understand it to the extent to which something can be done about it, not only describe it. There are a

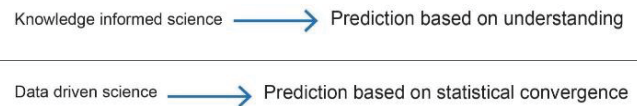


Figure 1: From Knowledge informed science to Data driven science—abandoning meaning in favor of the expediency of automated data processing agnostic of understanding.

lot of data—no doubt about this—there is little (if any) effective science. That genetics, for example, provides descriptions (in the form of sequencing data) of the make-up of the virus is admirable—but not consequential for treating the sick. With the pandemic, humankind realized that the exploration of the universe (rockets, satellites, measurement technology, etc.) is trivial compared to the new biological entity labelled Covid-19.

The rocket made it to Mars and will generate data about its changes. In the same time interval, people died because current reactive science could not save them. It probably never crossed the minds of those who put their blind trust in the science capable of landing Perseverance on Mars that this same science might, in some ways, be the cause of their SARS-CoV-2 induced anguish. This is a spectrum condition of the human body resulting from its accidental interaction with a virus that existed for millions of years in the ecosphere. It is important to take note of the fact that the corona virus was studied since the SARS (acute respiratory syndrome) epidemic (ca. 2003), but actually known since 1965. However, Dr. Jeffrey Kahn, of the University of Texas Medical Center, stated, “I didn’t believe there was a big effort to make vaccines against these because here were thought to be more of a nuisance than anything else” [3]. Infectivity, extremely high, goes to the credit (if the expression can be used in the context of a life-threatening condition) of the human being—sick or only carrying the virus—not to that of the agency-free virus. What also escaped the attention of those desperately seeking to help the victims was the paradoxical fact that the new possibilities opened by science and technology proved to be, at the same time, sources of new risks. In other words, vulnerability is actually self-inflicted. At this point, a bit of history could be useful in explaining the focus on the WHY? question of the pandemic, a bit of history could be useful.

Understanding the Why?

John Snow, celebrated as the founder of epidemiology, traced the source of the cholera epidemic (London 1852-1860) not to miasma (“bad air”), but to contaminated well water, and published *On the Mode of Communication of Cholera* (1855)—which the medical establishment rejected out of hand.

Cholera in England—first cases in 1831. John Snow was at that time still a student of medicine. It is not clear what triggered the outbreak at that time. But there is a long history of plagues of all kinds that Snow was aware of. They go back to the Plague of Athens and the belief that the gods abandoned the Athenians (who in turn faced the curse through extreme indulgence). The plagues extended to the Antonine: almost one-third of the population of the vast Roman Empire perished. Apollo, the “avatar of evil” was of no help. Neither



was Christianity. The Plague of Cyprian was named after a bishop, not so much for his healing abilities as for preparing the victims for life after death.

To reference each and every disaster within different cultures and different religions is to accumulate answers to the WHY? question that everyone considered. The answers deliver an epistemological portrait of humankind in its evolution over time. Indeed, it is about what the people in Athens knew, what the Romans started to discover, what the Moslems or the worshippers of Buddha practiced. The Jews, given to handwashing and bathing (based on Biblical injunctions turned into rules defining a way of living), were many times spared lethal diseases, only to be accused of having provoked them. The irrationality of the argument did not make it disappear. In our days of epidemiological research well beyond what John Snow accomplished there are, “The Chinese did it,” “Americans spread the virus,” and, again, the “Jews (this time Israel) caused it”—answers to the WHY? question impossible to ignore. They echo assertions that testify to a primitive mentality: find guilt in the darkest assignment of it to those one hates or despises.

But back to England, 23 years later: 1854, SoHo, a suburb of London, and a terrible situation: people were dying of cholera. The Bishop’s pronouncements, along the line of the centuries-old answer that God punishes sinners, called for acts of redemption. Dr. John Snow found out that “within 250 yards of the spot where Cambridge Street joins Broad Street there were upwards of 500 fatal attacks of cholera in 10 days.” This is data: numbers that describe a situation.

There was a hypothesis—the virus was waterborne—and there was anecdotal evidence: the coffee shop served glasses of water from the Broad Street pump along with meals. Nine of the customers got cholera. A woman who no longer lived close to the pump liked the taste of its water so much that she had some delivered to her new address. She died the next day. However, in the neighborhood, the prison, with 535 inmates, had no cholera. It had its own water source. And finally, there was the grid, on which data were referenced to particular persons. This made the meaning of data evident: there was a contaminated source of cholera infections. Meaning always informs action:

I had an interview with the Board of Guardians of St. James’s parish, on the evening of Thursday, 7th September, and represented the above circumstance to them. In consequence of what I said, the handle of the pump was removed on the following day.

From data to meaning

Data, no matter how “Big,” do not answer the WHY? question. They must be referenced to what lies behind them, to the processes from which they are extracted. Practitioners of medicine might not even be aware that one of their precursors, Ignaz Semmelweiss, pleaded (1847) for hygiene—handwashing between patient visits—only to be mocked by his colleagues. Doctors were not willing to accept that they themselves contributed to the spreading of disease by rejecting handwashing before treating patients. But surprisingly, in the

context of Covid-19, “Wash your hands!” sounded like a new commandment for those not yet really convinced to do it as a matter of routine. It was repeated as though no one has learned anything from the lessons of past pandemics, or even yearly bouts of contagious illnesses. Handwashing (part of hygiene), social distancing, mask wearing, diet, and physical activity—anticipatory actions—are elements of behavior [4].

The WHY? question is a composite: Why me? Why not my neighbor? Why us? Why do some die and others do not? And many more. Religious, political, economic, social, cultural takes result in a variety of answers. For instance, those given by the Church, by the Board of Guardians, by merchants in the area.

Separating lepers from their community goes back to Biblical times, and probably earlier. This was, of course in the first place a reaction. Lepers were shunned as outcasts in order to prevent contamination of the population. For all practical purposes, separation is a primitive anticipatory action., and therefore the affected community tried to prevent contact between the sick and the healthy. In our time, China practices the same. Other times, other types of experts, and a variety of contagious diseases that lie in the past. Most important is that there was no political correctness to demonize the act of isolation as discrimination.

Facing a similar crisis (that caused the death of millions of people), humankind discovered what today is called “quarantine,” which stands for *quarante giorni*—a limited isolation period way less drastic than the death sentence of being forced to live among fellow lepers (as was done in Hawaii, beginning 1865, on the island of Kalaupapa). The 40-day isolation of the ill was chosen because it took so many days to be rid of the pestilential smells of bodies and rotting goods. Or because of some religion-based reason: the 40 days and nights of Noah’s flood, the 40 years that the Hebrews wandered in the desert; according to the New Testament, Jesus spent 40 days in the wilderness; and then there are the 40 days of Lent. Regardless: the pro-active measure was obviously one of containment. No one even knew how to properly formulate the Why? question of the disease, not to say how to answer it.

During the lockdowns tried at the climax of Covid-19, and 600 years after quarantine has been tried, people asked if society will relax after 40 days, or however long lockdowns and social distancing will be in effect? Or will everyone turn into a mask-wearing member of the herd—despite the warning that masks (including the N95) are only partially effective? Will life return to normal? “Sorry, but grandma’s die and babies are born. So goes the cycle of life” was repeated again and again in various chats. The descriptive “We don’t need to slow the spread. We need to have health organizations throw spaghetti noodles at the wall for a cure and treatment until one sticks” [5] made the headlines. “Don’t tell me what to do” encapsulates the misunderstanding of freedom claimed by those who are less free than anyone else. (The phraseology quoted comes from someone in the county in North Dakota hardest hit by Covid-19). The “WHY? should the pandemic affect my freedom?” has been echoed in the anti-vaccine



posture of people questioning science: “You brought the damn thing on us, so why should we trust you?”

Einstein advised: *Stay away from negative people; they have a problem (or more) for every solution.* For example: social distancing and lockdowns will result in a higher rate of births, divorces, alcoholism, weight gain, mental health problems, and social disunity. Well, yes and no. Hundreds of years ago, Newton, caught in a lockdown, came up with his theory of action–reaction (Newton’s third law: For every action, there is an equal and opposite reaction), which changed the world, as he enjoyed the unintended benefit of social distancing. Trinity College (Cambridge) sent students home during the Great Plague of London (1655). The focus on how matter (atoms and molecules, cells and genes) changes originates in Descartes’ *Method*, and in Newton’s physics, which added legitimacy to determinism. Indeed, the machinery of the universe, with its precise clock, does not conjure behavior (or free choice), but rather the explanation of its functioning according to forces described in what are called the laws of physics. Within this context, scientific prediction is a matter of knowing the law and applying it. The data from measurements confirm the knowledge or generate new questions. The Why? of physics is quite different from the WHY? of the living.

Problem solution

The anticipatory perspective as complementary to deterministic medicine is the alternative—a new Cartesian revolution [6]. But it is not as comfortable as the beaten path of physics and its promise for technology. It took over 200 years (more precisely, since Newton, Descartes, and Laplace) for scientists and scholars to realize that the beaten path at best offers partial answers (often wrong) to the question of what change means in the living, in particular to the condition qualified as disease or illness. One cannot expect abrupt abandonment of the huge investment (time, energy, money, human lives, and the lives of animals used in experiments) in following a path that was proven again and again as not satisfactory. Against the background of scientific advancement, we can hope for a shorter time for ascertaining a complementary view, and to start applying it to situations for which physics–based medicine is not adequate. Implants are extreme solutions; genetic processes of healing should become the focus. Reacting blindly to the pandemic proved to be costly and ineffective. The pandemic could have been prevented, or at least the vaccination path prepared before the world crisis started. After all the corona virus was known for at least 60 years. The aging of the world population—the elderly suffered the most— is only one aspect; the degeneration of the species—expressed in, among other ways, systemic disorders

and debilitating spectrum conditions—is probably an even more critical problem. Disrupting medicine means getting rid of the mechanical view of life in favor of acknowledging its complex nature. Life is non–deterministic; medicine should be grounded on this understanding.

Conclusion

Medicine has to align itself with the anticipatory condition of life. In practice this can prompt the most significant revolution in our time. Medical practitioners (physicians, medical care providers, those involved in rehabilitation medicine, etc.), patients, scientists, and technology developers—ought to engage in the conversation. Covid–19 and the larger CoVID–of inadequate medical care— make the case for the transition from expensive, and only marginally effective, reactive treatment through “spare parts” (joint replacements, organ transplants) and reliance on pharmaceuticals (antibiotics, opiates) to anticipation–informed healthcare. Vaccination is only a part of this alternative view.

The current premise of treating various behavioral conditions (attention deficit disorder, hyperactivity, schizophrenia) through drugs has to be re–evaluated from the perspective of anticipation [7]. In the manner practiced today, medicine continuously generates dependence and long–lasting damage to those it is paid to help. The so–called “long–Covid” is an example. As we better understand the nature of the living, the proactive view of healthcare, within which the science and art of healing fuse, becomes a social and political mandate. The future of human kind depends on it.

References

1. Mihai N (2018) Redefining medicine from an anticipatory perspective, *Progress in Biophysics and Molecular Biology*. Amsterdam: Elsevier. [Link: https://bit.ly/37tNulF](https://bit.ly/37tNulF)
2. Kauffman S (2019) *A World Beyond Physics: The Emergence and Evolution of Life*. New York: Oxford University Press 168. [Link: https://bit.ly/3AvX04i](https://bit.ly/3AvX04i)
3. Williams S (2021) *A Brief History of Human Coronaviruses*. Scientist. [Link: https://bit.ly/2VyBAVI](https://bit.ly/2VyBAVI)
4. Marlene Z, Spencer HG (2020) Killing the Behavioral Zombie: Genes, Evolution, and Why Behavior Isn’t Special. *BioScience* 70: 515–520. [Link: https://bit.ly/2XdesvY](https://bit.ly/2XdesvY)
5. Atul G (2021) Don’t Tell Me What to Do. *The New Yorker* 36–47.
6. Mihai N (2003) *Anticipation–The End Is Where We Start From*, Baden (Switzerland): Lars Mueller Publishers 150.
7. Mihai N (2017) (Ed): *Anticipation and Medicine*, Springer International Publishing 363. [Link: https://bit.ly/2VJ6r16](https://bit.ly/2VJ6r16)