Cognitive Elements of Communication III

The Billboard paragraph:

Influencing your readers' emotions

Write About Science WAS

Introduction

In a scientific paper, the introduction should do several things:

1. Describe the background or problem in more detail than the abstract; introduce!

2. Describe briefly what the authors have done that is new, preparing the reader to move to the methods...

3. Tease the reader, promise a later pay-off with a taste of the results to come.

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Introduction

This section should do several things:

1. Describe the background or problem in more detail than the abstract; introduce!

2. Describe briefly what you've done that is new, how you've attacked the problem, preparing the reader to move to the methods

3. Tease the reader, promise a later pay-off with a taste of the results to come.

This section should introduce the *WHOLE PAPER* and promise the reader a pay-off if they keep reading.

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A good introduction...

Magnetic alignment in grazing and resting cattle and deer

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PNAS, 9 September 2008

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Background, of course...

Farmers and attentive nature and countryside observers know that most cattle and sheep, when grazing, face the same way. Many of them ask for the reason and which factors determine the direction in which they align. The farmers' wisdom and experience indicate that cattle face into the wind, whereas sheep face away from the wind; the animals expose the maximum body surface area to the sun when sun basking in cold but sunny times of the day. Several scientific studies also addressed alignment of grazing cattle and sheep from the point of behavioral thermoregulation, i.e., they focused on alignment under suboptimal weather conditions. Thus it was confirmed that cattle stand perpendicular to the sun on cold, sunny days, especially in the

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Brief detail on methods, of course...

In this study, we address these questions by combining several methodical approaches. First, we recorded body alignment of cattle in satellite images provided by Google Earth. In this manner we received scan-sampling data on alignment of animals in diverse localities across the globe and in diverse times, making it unlikely that effective direction of each of the factors (wind, sun, and temperature) was a common key factor of the alignment in all places and times. Second, we observed alignment in grazing

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AND some results/conclusions...

animals) of red deer and roe deer. We demonstrate that in all cases the animals tend to show a roughly north–south (N-S) body alignment, and we argue that a further extrinsic cue, the magnetic field of the Earth, has to be considered as a factor affecting spatial orientation in cattle and deer.

Magnetoreception is a widespread, although enigmatic, sensory ability. Behavioral experiments have demonstrated that diverse animals, including representatives of six vertebrate classes, can use the magnetic field of the Earth as a cue for spatial orientation (2). Among mammals, robust evidence for magnetic compass orientation has been obtained only recently for, thus far, just a few rodent species (3–7) and one bat species (8).

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Comparably, not so good...

REVIEWS

Early-warning signals for critical transitions

Marten Scheffer[1], Jordi Bascompte[2], William A. Brock[3], Victor Brovkin[5], Stephen R. Carpenter[4], Vasilis Dakos[1], Hermann Held[6], Egbert H. van Nes[1], Max Rietkerk[7] & George Sugihara[8]

Complex dynamical systems, ranging from ecosystems to financial markets and the climate, can have tipping points at which a sudden shift to a contrasting dynamical regime may occur. Although predicting such critical points before they are reached is extremely difficult, work in different scientific fields is now suggesting the existence of generic early-warning signals that may indicate for a wide class of systems if a critical threshold is approaching.

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Background, yes...

But not even a hint about results/conclusions...

> We will first highlight the theoretical background of leading indicators that may occur in non-equilibrium dynamics before critical transitions, and illustrate how such indicators can perform in model generated time-series. Subsequently, we will review emerging empirical work on different systems and discuss prospects and challenges.

This is a missed opportunity

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The “billboard” or “nut graf”

A key paragraph in an essay or feature length article that aims to convince readers, in a few sentences, that really interesting material is coming later – so they should feel good about continuing with the article.

1. It's a glimpse of the pay-off to come

2. A tool to change the reader's emotions, with a promise that reading onward will be worth it.

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The New York Times

In Good Health?
Thank Your 100 Trillion Bacteria

By GINA KOLATA (13 June, 2012)

For years, bacteria have had a bad name. They are the cause of infections, of diseases. They are something to be scrubbed away, things to be avoided. … No one really knew much about them. … what do they look like in healthy people, and how much do they vary from person to person?

The New York Times

… the Human Microbiome Project… sequenced the genetic material of bacteria taken from nearly 250 healthy people.... They discovered more strains than they had ever imagined — as many as a thousand strains on each person. And each person's collection of microbes, the microbiome, was different from the next person's. To the scientists' surprise, they also found genetic signatures of disease-causing bacteria lurking in everyone's microbiome. But instead of making people ill, or even infectious, these disease-causing microbes simply live peacefully among their neighbors.

The "teaser" paragraph

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Exercise

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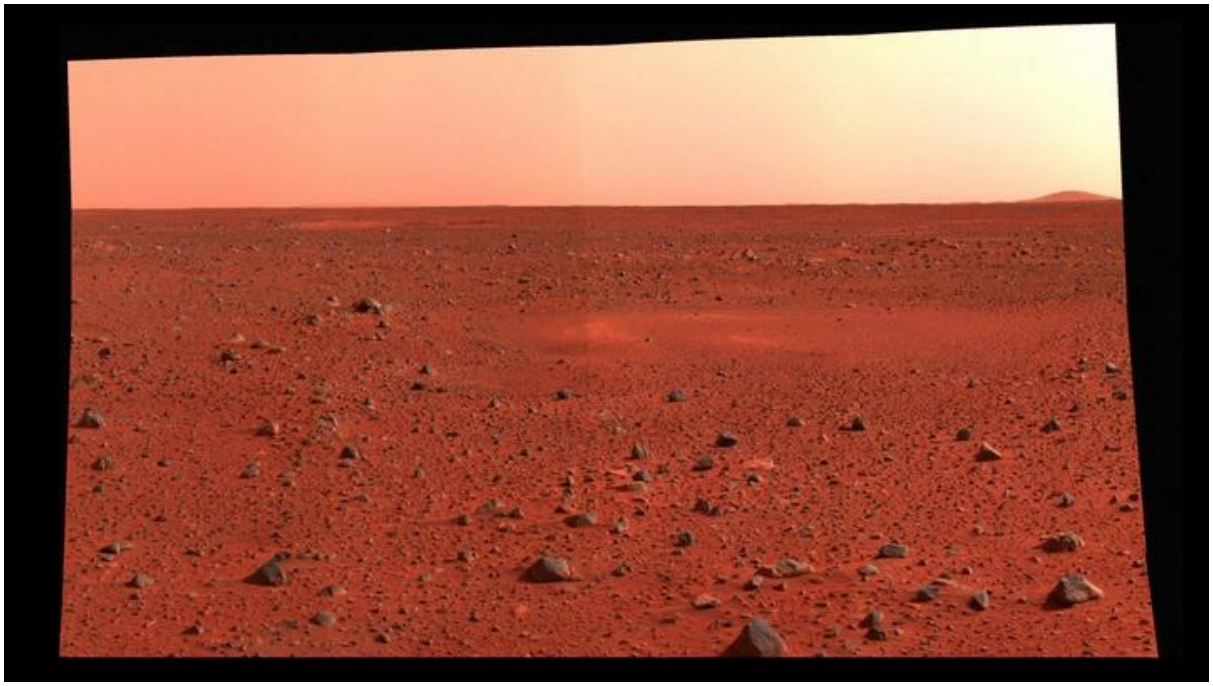

There's no place like home—unless you're Elon Musk. A prototype of SpaceX's Starship, which may someday send humans to Mars, is, according to Musk, likely to launch soon, possibly within the coming days. But what motivates Musk? Why bother with Mars? A video clip from an interview Musk gave in 2019 seems to sum up Musk's vision—and everything that's wrong with it.

In the video, Musk is seen reading a passage from Carl Sagan's book *Pale Blue Dot*. The book, published in 1994, was Sagan's response to the famous image of Earth as a tiny speck of light floating in a sunbeam—a shot he'd begged NASA to have the Voyager 1 spacecraft take in 1990 as it sailed into space, 3.7 billion miles from Earth. Sagan believed that if we had a photo of ourselves from this distance, it would forever alter our perspective of our place in the cosmos.

Musk reads from Sagan's book: "Our planet is a lonely speck in the great enveloping cosmic dark. In our obscurity, in all this vastness, there is no hint that help will come from elsewhere to save us from ourselves. The Earth is the only world known so far to harbor life. There is nowhere else, at least in the near future, to which our species could migrate."

But there Musk cuts himself off and begins to laugh. He says with incredulity, "This is not true. This is false—Mars."

He couldn't be more wrong. Mars? Mars is a hellhole. The central thing about Mars is that it is not Earth, not even close. In fact, the only things our planet and Mars really have in common is that both are rocky planets with some water ice and both have robots (and Mars doesn't even have that many).

Mars has a very thin atmosphere; it has no magnetic field to help protect its surface from radiation from the sun or galactic cosmic rays; it has no breathable air and the average surface temperature is a deadly 80 degrees below zero. Musk thinks that Mars is like Earth? For

humans to live there in any capacity they would need to build tunnels and live underground, and what is not enticing about living in a tunnel lined with SAD lamps and trying to grow lettuce with UV lights? So long to deep breaths outside and walks without the security of a bulky spacesuit, knowing that if you're out on an extravehicular activity and something happens, you've got an excruciatingly painful 60-second death waiting for you. Granted, walking around on Mars would be a life-changing, amazing, profound experience. But visiting as a proof of technology or to expand the frontier of human possibility is very different from living there. It is not in the realm of hospitable to humans. Mars will kill you.

Musk is not from Mars, but he and Sagan do seem to come from different worlds. Like Sagan, Musk exhibits a religious-like devotion to space, a fervent desire to go there, but their purposes are entirely divergent. Sagan inspired generations of writers, scientists, and engineers who felt compelled to chase the awe that he dug up from the depths of their heart. Everyone who references Sagan as a reason they are in their field connects to the wonder of being human, and marvels at the luck of having grown up and evolved on such a beautiful, rare planet.

The influence Musk is having on a generation of people could not be more different. Musk has used the medium of dreaming and exploration to wrap up a package of entitlement, greed, and ego. He has no longing for scientific discovery, no desire to understand what makes Earth so different from Mars, how we all fit together and relate. Musk is no explorer; he is a flag planter. He seems to have missed one of the other lines from *Pale Blue Dot*: "There is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world."

Sagan did believe in sending humans to Mars to first explore and eventually live there, to ensure humanity's very long-term survival, but he also said this: "What shall we do with Mars? There are so many examples of human misuse of the Earth that even phrasing the question chills me. If there is life on Mars, I believe we should do nothing with Mars. Mars then belongs to the Martians, even if [they] are only microbes."

Musk, by contrast, is encouraging a feeling of entitlement to the cosmos—that we can and must colonize space, regardless of who or what might be there, all for a long-shot chance at security.

Legitimate reasons exist to feel concerned for long-term human survival, and, yes, having the ability to travel more efficiently throughout the solar system would be good. But I question anyone among the richest people in the world who sells a story of caring so much for human survival that he must send rockets into space. Someone in his position could do so many things on our little blue dot itself to help those in need.

To laugh at Sagan's words is to miss the point entirely: There really is only one true home for us—and we're already here.

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Article available at https://www.theatlantic.com/ideas/archive/2021/02/mars-is-no-earth/618133/

Research Statement

The Development of Synthetic Organic/Organometallic Methods and Future Interests

Recently, a synthetic organic renaissance has changed the way we plan synthetic strategy. Governmental regulations demand cost minimization and reduction of hazardous waste streams. The use of enantiomerically pure drugs in chemotherapy is necessary not only to realize enhanced specificity, but also to avoid possible side-effects cause by the other enantiomer. Furthermore, the elucidation of biological processes through structure activity relationship (SAR) studies depends heavily on organic synthesis to identify clinical compounds and improve pharmacological profiles.

The development of synthetic methods that meet the regulatory and commercial needs of the chemical industry, especially pharmaceutical interests, requires the training of students in organic synthesis. In light of these requirements, my research program concentrates on transition metals as a means of achieving efficient and cost-effective organic synthesis.

The use of transition metals to effect a desired transformation has several advantages over classical organic methods. First of all, metals can effect reactions catalytically ultimately leading to reduced waste and more cost - effective syntheses. Second, enantioselective processes occurring on a metal center containing chiral ligands will afford enantiopure compounds. Finally, the mild and chemoselective reactivity of transition metals allows a more convergent approach to complex organic molecules without the need for cumbersome protection/ deprotection strategies. My current projects, and those I envision, develop novel synthetic methodologies using transition metals and examine their scope and limitations, the ultimate goal being the efficient and economical asymmetric synthesis of clinically interesting compounds.

Using the methodological studies described below as a foundation, I envision my program expanding into bioorganometallic chemistry as a method of achieving selective chemical transformations. For example, transition metal-catalyzed processes using ligands capable of molecular recognition should be useful as models for naturally occurring metalloenzymes. The design of peptide and carbohydrate based ligands that will impart selectivity as a result of distinctive molecular associations is an area with enormous potential and I present some of my initial interests toward this end in the last proposal of this section. This represents long - term research interests that will allow my group to use its knowledge of organic and organometallic synthesis to make valuable contributions to the field of bioorganometallic chemistry.