Considering Leadership Anew

Considering Leadership Anew:

A Handbook on Alternative Leadership Theory

Edited by

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Here's to the ones who see leadership differently! Go on, critical dreamers: "Not yet, not yet the time to fold your wings"[1].

[1] From Rabindranath Tagore's *Hard Times* poem.

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INTRODUCTION

LEADERSHIP AND CONSIDERING LEADERSHIP ANEW

BY GERARDO ABREU PEDERZINI
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Think about a leader. Just for a second try to picture in your mind the ideal leader. What does s/he look like? Chances are that you thought about a woman or man who is confident, articulate, and strong. Chances are that you thought about a person who is in control, who knows what s/he is doing, and in whom you can confide in case you get into any trouble. This experiment has actually been done endless times. Academics have asked, for instance, executives or students to draw their ideal leaders, and they usually look like the leader I just described (see, for instance, Murphy [2018]). It is not a surprise that we actually think of leaders in this way. At the end of the day, historically and even evolutionarily, the role of leaders has been precisely to represent some mystical figure that by being conceived (Abreu Pederzini 2016) by followers as larger than life (Abreu Pederzini 2018), manages to impose order on society (Abreu Pederzini 2018b), inspire people to do their best, and make us all feel like we are protected.

The famous studies on the romance of leadership by Meindl and his colleagues, back in the 1980s (Meindl, Ehrlich, and Dukerich 1985; Bligh and Schyns 2007), showed us that followers fantasize about their leaders (Gabriel 1997), usually portraying them with capacities that leaders, sadly, do not actually have (Bligh, Kohles, and Pillai 2011). Because when thinking about leadership one needs to remember that leaders are simply human beings. There is nothing actually magical about them. And, hence, there is no reason for us to expect them to do magic (Abreu Pederzini 2017). Yet, the biggest challenge regarding this is that all of our fantasies of leaders have, for various reasons, been turned into academic theory that we teach and that we use to educate future leaders (Collinson and Tourish 2015). Within such romances, we can include how "followers might

fantasize their leaders as a path to an idealized nonsubjugated existence, or the object to blame for the failure of such realization" (Abreu Pederzini 2018, 328). Like this, mainstream leadership theory inculcates in future leaders and followers, false expectations and unattainable identities (Abreu Pederzini and Suarez Barraza 2019), which will only bring, eventually, frustration, conflict and disappointment. But, how exactly?

The ways in which academic theory has become permeated by these unrealistic leadership ideals, which sometimes we teach as if they were true, is complicated. Yet, in terms of academic leadership theory, we could say that this has been for long massively influenced by functionalist, modernist and positivist approaches (Marion and Uhl-Bien 2001; Heifetz 1994; Grint 2000; Mabey 2013), which although not necessarily wrong, their sometimes exaggerated implications are the root of many issues in ***mainstream leadership theory*** nowadays (i.e. the one that is usually taught in most business and social sciences schools). Let me explain each of these three terms (i.e. positivism, modernism, and functionalism), so that we know what we are talking about.

Positivism is about developing social theory following tenets from the natural sciences (Gephart 2004). Thus, it emphasizes the importance of expressing phenomena in a quantitative way (Ladyman 2002). There is nothing terrible about the latter, except for the fact that it usually prioritizes quantitative and numerical theories consistent with science, but not with modern science, but with the science of 300 years ago (for further discussion see, Abreu Pederzini 2016). This was the science where the world was aimed to be reduced–i.e. simplified–so that we could supposedly understand any type of phenomena by looking at the relationship between a couple of variables. When trying to explain, like Galileo did, how an object falls due to the force of gravity in a vacuum, whatever shortcomings of the positivist approach are not that dangerous (see, Kauffman 2008), as the phenomenon itself is quite simple, and any simplification might not jeopardize its explanation. But, when we need to explain leadership, a phenomenon where endless variables come into play, then, all of the sudden our obsession with simplifying the world results in at best insufficiently rigorous theories. For better or worse, this is, however, how most leadership theory has evolved. For instance, most mainstream leadership theory comes from social-psychology, where people argue things such as, for example, that certain traits (e.g. eloquence or confidence) are necessarily related to someone being capable to lead. Is it really that simple? If it were, then, for instance, the famous story of King George VI leading Great Britain, back in the times of World War II, despite his stammer, would have never happened, right? Yet, it did. So,

why are we so pervasively obsessed with looking for simplistic supposedly universal relationships between two variables (e.g. eloquence and effective leadership)? Why are we so obsessed with looking for universal laws that can provide us with magnificent formulas to lead? Why are we so desperate to get recipes for leadership?

Then, we have the modernist ethos. If you want to understand what modernism means, I would advise you to remember just one word: progress (Stewart-Williams 2010). Modernism is about the western ethos that loomed after the scientific and posterior industrial revolutions, and it is about thinking that we can be masters of the universe, and that there is nothing that we could not understand through reason. Therefore, this dream and delusion of modernism emerged from people thinking that every step into the future, as we have kept developing more technology and more ways to master nature, is a step into a better future, a step into progress (Paz 1989). In short, as Stewart-Williams argues, progress is about how as we have complexified our tools to master nature, we have come to dominate nature. Yet, in modernism this dominance is given a "positive valuation" "that is often difficult to justify" (Stewart-Williams 2010, 171).

Key within modernism is the idea that we cannot know and master the world unless we can predict it. Thus, an assumption behind the progressive ethos is that somehow our science and technology make us partly masters of nature because of how we can predict the future. Yet, this assumption needs to face, from time to time, realities that defy it. Because our dream of predicting everything sometimes is challenged by the non-linearity, complexity and chaotic essence of many events we face (Mlodinow 2008). Just think about the internet. For years, during the 20th century, science-fiction writers kept making wild predictions about crazy technologies we would have in the future. However, no one really predicted the internet. They predicted flying cars and teleportation, which have not happened, but no one thought about the World Wide Web. And, the reason is quite simple, the internet emerged partly accidentally through some minor experiments that eventually opened unimagined doors. Sadly, our desperation to predict the world is not capable of dealing with tiny things that have disproportionate consequences (Smith 2007).

Finally, we have functionalism (Burrell and Morgan 2005). Functionalism assumes that human beings in social contexts survive and play a role in those contexts, as long as that role is executing a function, which is fundamental to the sustainability and survival of the social group. This way of thinking comes from Darwinism, assuming always that there are ultimate causes (i.e., "whys" (Scott-Phillips, Dickins, and West 2011))

for things that exist in nature. There is absolutely nothing wrong with Darwinism, as far as I know. If anything, it is one of the most successful scientific theories in history. Yet, its applications into the social sciences through functionalism (Mabey 2013), cause concern, because of how simplistic sometimes they are. For instance, let us try to put together positivism and modernism with functionalism, to clarify the issues that arise here. If for modernism the ultimate end is to master the world, predict it, and control it, then certainly this quickly turns into a desired characteristic of leaders. In short, leaders should be able to be masters of the universe that are in control of things and defend their followers from all threats. Now, let us assume that positivism finds out that leaders with strong planning skills are the ones that are usually correlated to a capacity to master, predict and control the world. Then, a function emerges, which is for good planners to fulfil the necessary role of the one that can predict and control the world. In a word, a stereotype of leadership looms. And, while there is nothing absolutely wrong with this stereotype, there is however, something relatively wrong with it. What if, for instance, in the case of an emergency during, let us say an earthquake, we do not need a planner to save us, but someone flexible and adaptable, who through impromptu measures manages to at least move us, so that the tragedy does not destroy us? Or, what if, my family and I, do not want someone who controls the world, but a leader who simply loves us?

The problem with stereotypes is that they chain us to a way of thinking, generally by making arbitrary value judgements. Regrettably, the profound marriage between modernism, positivism and functionalism does precisely that. Now, what I have mentioned in here in terms of leadership stereotypes is just the tip of the iceberg. So many stereotypes about leadership have emerged, that it would take a whole book in itself to describe them. Furthermore, the problem is that these stereotypes have been turned into theories, and those theories have been turned into the main elements of the educational experience of future leaders. We teach leaders at university that they need, for example, to be powerful, and that therefore, when facing any form of resistance, they need to control it and suppress it (Collinson 2012, 2017). In short, we teach them some correlations, such as good leaders are powerful, and then we expect them to use them as universal recipes, so that they can fulfil the modernist function of mastering the world. But, then, what happens? What happens when they face turmoil in their companies that they cannot control and the more they try to suppress it the more the turmoil exacerbates? Or, what happens when they were supposed to have predicted, for example, the 2008/09 global meltdown and they could not? Simply put, leaders then

fall, and most importantly, they become complicit of all of this. Because, usually when a leader, wrongly prewired to control and master the world, faces a world that does not fit those expectations, s/he rarely would be open to change his/her beliefs about leadership. By contrast, leaders insist on their beliefs, and they, then, deliberately do anything they can to protect the positivistic modernist and functionalist ideal of the leader. Even if to protect that they need to break the law or behave in the most unethical ways, they will do it. We certainly saw them doing this back in the 2008/09 financial debacle.

In the end, what leaders face is a hurricane that they themselves helped generate. Sometimes because of this hurricane, some leaders will fall in dramatic ways (Mlodinow 2008), others will struggle to survive becoming conflicted with the fact that they actually do not know what to do, and others will just keep pushing and pushing for their beliefs to be held true, even if that means crossing some lines. So, to change this, what do we need? The answer is actually quite simple: we need different ways of conceiving, perceiving and thinking about leadership. We need different leadership theory. We need theory that could give leaders flexibility, theory that does not predispose them to a world that will not materialize, that it does not set them on a journey towards impossible aims, and that it does not foster in them terrible values. Most importantly, we need leaders that are not simply willing to comply with dominant academic rhetoric, but who are willing to think for themselves, challenge the status quo, and consider new ways of approaching their leadership. We need, additionally, academics who are willing to challenge the positivist, modernist, and functionalist reduction of leadership, take what is best from this approach, but look for answers to unanswered questions in other theories, in other ways of looking at the world. Key within this process would be to understand that leadership is not like gravity. That it would be quite surprising, thus, to find universal laws of leadership, and that, by contrast, we need to acknowledge how contextual factors play a key role to give leadership its own touch depending on the situation. We need to wake up and realize that language constitutes different realities in different places, that people develop different assumptions and varying cultural dispositions in different contexts, and that therefore, there is an element of leading that cannot be explained with generalisations, but needs, actually, in-depth understanding of individualities. Of course, the problem, the real problem is that positivism, modernism and functionalism permeate our society, especially western societies. They are part of who we are and how we think, and hence, they have embedded in us values, which are difficult to let go. The main values from positivism, modernism and functionalism,

are universal knowledge, simplicity, tangibility, dominance, immediate explanations for immediate results, effectiveness and probably efficiency. We live in a world that appreciates the latter, and thus, this is why we force our leadership theories to promote leaders that would comply with such values. Yet, our natures, our worlds, our inescapable times and the intricacies around them, show us time and again that things are different, that we need to find other ways to think, and that in the case of leadership theory, we need to get over mainstream theory and search for novel ways of understanding leaders.

In this collection, we are lucky to have ten different chapters, advocating for various approaches to leadership, and suggesting different arguments regarding how we might be able to think leadership anew. The collection represents a very diverse group of authors from many different countries and institutions, who have worked hard to rethink or sometimes *unthink* leadership. In **Chapter One**, Ahlness and Abdulmuminov take us through the magical world of neurobiological development, to create a radically different understanding of leadership, in light of evolution and climate change, setting like this the scene for an ambitious collection. Then, in **Chapter Two**, Field now uses technology instead of science to frame the possible ways through which the evolution of leadership is connected to the evolution of technology. The interconnection between leadership and technology certainly leads us to consider whether leadership is a profession, something that Miles, Corner and Schatten delve into in **Chapter Three**. Here, they provocatively suggest that perhaps there are issues of leadership that we will never grasp, that leaders themselves will never truly understand, or even if understanding will never be able to articulate and rationalize. Thus, they suggest the lens of a profession to re-think leadership. If leadership could be a profession, then, there are many things we need to consider about it, including of course the importance of gender issues within it. This is what Delaney and Stewart do in **Chapter Four**, which focusing on higher education and women's leadership in it, invites us to think about ways to break moulds in terms of gender and leadership through action learning. In **Chapter Five**, Tomkins ignites a new and powerful provocation by basically arguing–although in other words–that if leadership is a profession, then, we need first to re-acknowledge leaders and that leaders exist. Tomkins, using hermeneutics, invites to think about what supposedly critical leadership movements have accomplished, by denying the role of leaders in favour of systemic approaches. As valuable as those approaches might be, we cannot forget that leadership entails somehow leaders. Hence, in **Chapter Six**, de Marchis Pareschi wonders about what makes "good" leaders, taking us

back to the enchanting world of Greek philosophy and the powerful, yet sadly lost, concept of virtues. In **Chapter Seven**, Souza defends systemic approaches, and actually using some of the findings from his own research, he suggests a framework to make systemic approaches more friendly, robust, and integral. Despite all of the previous discussion on leaders and leadership, one thing by this point won't be clear yet: is leadership a good or a terrible thing? This is why in **Chapter Eight**, Niesche, going back to educational settings, recasts leadership as *pharmakon*. Suggesting, like this, that leadership is both a cure and a poison in many ways and that this ambivalence is what possibly makes so difficult to grasp leadership fully. Thus, in **Chapter Nine**, Abreu Pederzini aims to grasp leadership in a radically different way that acknowledges its many faces, contradictions, levels, dimensions, times, and ambiguities. This, he tries to accomplish by suggesting an irreverent big history approach to leadership. Finally, all these efforts take us to **Chapter Ten**, where Mohammed powerfully concludes this collection and its aims of thinking leadership anew, by lamenting that perhaps we cannot think leadership anew. Arguing that perhaps everything has been said about leadership, he invites us to instead rethink our desire in terms of leadership.

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List of Abbreviations

PTSD: Post-traumatic Stress Disorder.
CE: Common Era.
BCE: Before Common Era.
CLT: Complexity Leadership Theory.
HE: Higher Education.
AL: Action Learning.
PDSA: Plan-do-study-act.

CHAPTER ONE

LEADERSHIP AND NEUROBIOLOGICAL DEVELOPMENT

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Introduction

It is a tale as old as time: periods of crisis call for leadership. During national and social disasters, mainstream social-psychology approaches focus on personal characteristics and social arrangements in leadership. These approaches, however, fail to explain leader-follower behavior during times of severe environmental shocks and global shifts. These shifts are cataclysmic changes, and humans are hardwired to fear and resist threats to our survival. Many social theories of leadership suggest people desire decisive and power-consolidating leadership during crises and are likely to support more authoritative leader-follower dynamics.[1]

This assumption is the basis of Plato's Captain's Parable. In this parable, the state is a ship whose captain is a skilled navigator. The citizens are capable sailors who are not qualified to pilot the ship. When a threat to the state emerges–a storm arises–the sailors need the captain to take firm control of the ship (Barker 2009). This trend is illustrated through the emergency response and power consolidation efforts following an earthquake in Wenchuan, Sichuan Province, China on May 12, 2008, during the Great East Japan earthquake on March 11, 2011, and the 2017 drought in Northeastern Brazil (Hörhager 2015; Saito and

[1] This leader/follower dynamic forms the basis for the political science "doves and hawks" leadership phenomena. Doves are leaders who promote domestic growth and peace-pursuant policies. Hawks are aggressive and considered more effective during crises (Kelly 2014).

Kunimitsu 2011; Sena et al. 2018). Each case illustrates how natural disasters have a consensus-producing effect: individuals rise up to lead during uncertainty and danger. These figures consolidate power and decision-making processes, prompting followership through charismatic leadership and decisive decision-making on behalf of a community (Fritz 1961; Hanslik 2018). These leadership trends are well-documented in the recent history of natural and social disaster responses.

A theme that is common to these types of crises is temporary shock to the status quo. After natural disaster or other temporary shocks, power consolidation appears but it is not an enduring trend. Rather, pre-crisis figures regain control and decision-making structures revert back to pre-crisis modes. The social-psychological approaches that describe these behaviors fail to explain long-term stressors. During prolonged global-level shifts and repeated shocks to the environment, people strongly favor communicative and network-capable leaders, supporting learning and information-seeking behaviors in ways that cannot be explained through social-psychological approaches alone (Boin et al. 2005).

The prime example of a stressor that repeatedly shocks and pressures humanity is our planet's climate. These shocks and pressures not only present social challenges for humanity (climate refugees, abrupt weather patterns, droughts, etc.), they change the very neurobiological structure of our brains. This is the process we focus on as we address leadership: the impact of climate-induced brain development on leadership.

Roadmap

Evolving knowledge regarding brain structures, historical cases, and climate change and connected current discoveries in neurobiological science present a comprehensive picture of what neurobiological developments mean for leadership theory. Just as humans experienced unique neurobiological developments, current exogenous shocks and pressures may prompt changes in ways we cannot foresee.

It is important to look at neurobiological brain development to advance leadership theory development. The way our brains are wired dictates our receptiveness to social structures, response to disasters, and leadership characteristics. In the face of crises, we need to look to the past to see how our brains–and our leadership structures–have developed in response. Specifically, we must recognize past and contemporary challenges to our neurobiological state to understand why we respond to leadership the way we do–like taking a cognitive behavioral therapy approach to looking at our hard-wired inclinations and their impact. This is far from the

suggested analysis, strategies and social organization explanations, advanced by mainstream social-psychology approaches.

Mainstream approaches make assumptions about human nature that are not necessarily rooted in neurobiology or brain development. Classical realism, a Political Science theory that believes leaders consolidate power in dominating leadership strategies, is based on fundamental assumptions that humans are inherently flawed and self-interested, emerging from political and religious dialogues. While social-psychological leadership theories often make assertions about human nature, a gap remains between these theories and brain development studies. The assertions are rooted in contemporary behaviors rather than along their evolutionary basis. Some branches of leadership theory, particularly management research, are delving into neurobiological implications for organizations and management structures. The demand for novel approaches to management theory may translate well into broader leadership theory, as it recognizes a new approach to human inclinations (Lindebaum 2016).

Out with the old: Climate change and the cortex

Major brain development in humans occurred not only through our ancestors' interactions with other proto-sapiens, but also from climate changes and environmental shocks (Calvin 2002). The Ice Age (2.5 Million BCE) was a cataclysmic period that rapidly imposed shocks to early hominids due to abrupt climate changes every few thousand years. William Calvin, a renowned American theoretical neurophysiologist, describes these changes as "so large and quick that a single generation gets caught, forced to innovate behaviorally on the spot" (Calvin 2002, 28). In these situations, a species' ability to develop and adapt to a particular environment is no longer applicable; they must then survive and reproduce during a chaotic climate transition, where a new "behavioral regime" has not yet been established. These are the periods where species–and their brains–are tested.

The speed at which climate shifts occurred during the Ice Age is significant. In less than a century, rainfall drastically decreased, forests dried up and burned, and animal populations declined, resulting in less water, shelter, and food (Schmittner and Galbraith 2008). When global heating or cooling takes place over the course of centuries or millennia, change can take place over many generations. Hominids could repeat the livelihoods modelled by their parents while simultaneously adapting to gradually changing environments. Yet when the environment shifts within

the period of a single generation, an incredible demand is placed on the living generation to improvise and adapt.

In addition to changes during the Ice Age is the development of larger brains in the *Homo* family. Their brains had cortical folds in different places. Cortical folds are the "peaks and troughs" in the brain's surface that allow for a larger brain surface area within a smaller skull, enabling greater cognitive functionality. Early *Homo erectus* had a brain 80 percent larger than its predecessors (Watts et al. 2018). This growth occurred in tandem with greater hormone secretions and the development of regions within the brain, such as the hippocampus, which controls memory and learning. This wealth of neurobiological changes is identified with behavioral changes and expanded thinking capabilities, including:

- *Altruism*: Generosity beyond basic reciprocal sharing (sharing with others during their hard times knowing they may share with you during yours);
- *Planning for uncertain futures*: Knowing the future brings change beyond the cyclical changes of the seasons. These uncertain futures require individual and group-level planning;
- *Logical trains of inference*: The ability to link past events to present effects;
- *Ethics*: The ability to evaluate an action and its consequences from your and others' positions;
- *Games*: Engaging in play that has constructed rules (rather than "romping"); and
- *Creativity*: The ability to speculate futures without acting in the real world.[2]

Common features link these developments: foremost is engaging in abstract thinking and its manifestation through more complex forms of interpersonal interaction. Many concrete behaviors emerged from these capabilities. During a time of food scarcity, hominids became able to assess creative thinking skills to plan for future meals (Watts et al. 2018), fire was introduced through the increase in social and intellectual capabilities (Gowlett 2006), and it became more common for hominids to hunt large grazing animals (moreover, because a single animal would provide too much for one person to eat, hunters would give away the meat–even to those that did not participate in the hunt–and counted on

[2] These capabilities are widely recognized as emerging features from this period of brain enlargement. While developments in physical capabilities also occurred (e.g. accurate throwing), we focus on changes associated with thinking processes. This list has been adapted from Calvin (2002, 31).

reciprocity during future hunts) (Kurland and Beckerman 1985). Having a larger brain helped human ancestors develop cooperative complex social groups (Ash and Gallup 2007).

With the emergence of cooperation comes a shift in desired traits of leaders. Cooperation and leadership were not just about size and strength, but about abstract and creative thought. In other words, this period exaggerated the importance of abstract thinking traits, like cooperation, innovation, and planning. Leadership structures centered on these abstract traits began to emerge around 2.5 - 2 Million BCE. This process followed the restructuring and growth of the human brain (Boyd and Richerson 2009). We can see how these abstract thinking skills translated well to effective and desired leadership. Cognition, a greater ability to think and innovate, would lead to more successful hunts and the ability to travel between important resource locations. Cooperation required the ability to influence others' behavior to achieve shared goals. Attaining these goals led to higher survival rates, reproduction rates, and ability to geographically spread (Gowlett 2006). Finally, planning could direct food sharing, leading to a greater ability to meet growing energy requirements (a necessity to fuel enlarged brains). Ultimately, these neurobiological developments demonstrate a shift in desired leadership traits. A leader no longer had to be the strongest, fastest, or most aggressive. Someone with abstract and long-term thinking capabilities would enhance the group's prospects for survival, which was the most desired–and basic–outcome for followers.

While cooperation and leadership structures continued to evolve over time, with archeological evidence supporting spikes in cooperative developments around 700,000 and 50,000 BCE (Boyd and Richerson 2009), we leap forward to a more recent period in human history to look at the effects of another period of rapid and damaging climate change: the Little Ice Age.

In with the new: Brain development in the Common Era

For hundreds of thousands of years, early humans continued to evolve and spread. Brains developed and cultures progressed. *Homo sapiens* began to record their events. Feudal societies developed, and kingdoms, predecessors to current nation-state forms of organization, were established. The Little Ice Age, occurring between 1300 to 1600 CE[3],

[3] The exact years of the Little Ice Age remain open for discussion, with some labels ranging from 1300 CE to around 1850 CE. Despite this variation, many

represents a period of environmental events that are strikingly like the Ice Age. Rather than studying skulls, changes can be identified from social behaviors, trends, and medical records.

There are compelling reasons for neurobiological brain developments to occur over a few short generations during this period, similar to the era of development several million years prior. The Little Ice Age is well documented and linked to many political upheavals and plague pandemics in Europe. Winters were bitterly cold, and summers were frequently cool and rainy, leading to widespread crop failure, famine, and population declines (Pfister and Brázdil 2006). While the effects of this cooling were felt around the globe, we focus on a subset of European nations to provide illustrations of leader-follower dynamics and behaviors.

In Europe, neurobiological developments happened in tandem with political-cultural events. New political elites emerged–nobles and aristocrats. People transformed their environments, expanding agriculture to make up for poor yields due to climate changes. Societies that could diversify agriculture and strengthen their trade networks were more resilient to the adverse changes. Yet it was not always a matter of geographical location that dictated whether people were resilient. The Netherlands would have been expected to suffer alongside nations like Scotland, Ireland, or Switzerland given its climatic zone; however, records show that the people of the Netherlands fared well despite their particularly vulnerable location. This region provides examples of behaviors resulting from ongoing brain development that advanced desirable forms of leadership. This raises the question of whether human brains could have undergone neurobiological changes over the course of several generations less than a millennium ago. The answer: absolutely.

Studies show the human brain has continued to develop structurally and neurologically over the past several thousand years. In particular, developments in cerebral rhythm (a neural oscillation) that occurred two to three thousand years ago are believed to be tied to attention, learning ability, and working memory–all abstract skills that are necessary for long-term planning (Parameshwaran and Thiagarajan 2017). Neural oscillations (more commonly known as “brainwaves”) are respective patterns of neural activity in the brain and central nervous system. Cerebral rhythms in the parietal lobe (used in planning) would have been critical for survival and planning during famines and hardships of the Little Ice Age.

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scholars agree the harshest period in this Age fell around 1600 CE (Pfister and Brázdil 2006; Degroot 2018).

Adverse environmental conditions further favored a particular kind of neurobiological phenomena: the ability to develop expertise (Skoyles 1999). Those that developed expertise in specific areas fared better during the hardships of the Little Ice Age. As humans engage in expertise, our brains "wire more specialized circuitry" to solve repeated problems with less effort, becoming more efficient and using less energy (Vila Pouca et al. 2018). People who could develop expertise used energy efficiently, and were thus better suited to survive a period of scarce resources. Additionally, developing expertise requires the ability to sustain activity in the frontal and parietal cortices (believed to direct attention and planning), indicating growth in these regions (Hill and Schneider 2006). The Dutch responded to climate change by adapting and developing new technologies. Political leaders set up food sharing systems to avoid malnourishment. Communities became resilient through cooperation and abstract thinking. Constructing dikes and dams planned for uncertain futures and mitigated flooding. Additionally, transportation networks connected even smaller population centers (Degroot 2018). The ability to form expertise and engage in long-term planning benefitted leaders. The Netherlands experience some of the most stable political periods among European nations during the coldest point of the Little Ice Age (the 1500s), and also experienced some of the most comprehensive support for forward-planning kings by aristocrats and nobles (who were otherwise seen as threats to ruling families throughout Europe, Rowen 1988).

The Netherlands was not the only country to demonstrate resilience to environmental shocks enabled by a capacity for abstract thinking (Mandia 2000), but the wealth of data and records on this republic provides real examples of cognitive brain development during this time. The Little Ice Age contributed to new leadership models defined by an ability to use creative thinking and long-term planning to overcome challenges. People followed these leaders because of their increased capability to ensure the survival of the group. Once again, these dispositions emerged from the environmental shocks of climate change.

Filling in the gaps of traditional theory

Ultimately, neurobiological brain development associated with drastic climate shifts enhance skills associated with creativity, planning for uncertainty, long-term thinking, cooperation, and altruism. Individuals who exhibit those traits are more likely to gain followers due to how these skills lend themselves to a greater chance of group survival. Under this leader-follower dynamic, it is not so much charisma or articulation that

gains a followership, but the ability to conceive threats to survival and act to mitigate them. As we move from *Homo erectus* to *Homo sapiens,* the threats to survival become more multifaceted while group formation becomes more complex. This is where connections develop between neurobiological science and traditional social-psychology studies. The literature of the latter provides expansive theories on how groups form, and along which lines they form (whether it be ethnic, racial, national, cultural, or otherwise) (Anderson 1983; Wenger 1998; Castells 2010). Neurobiology literature speaks more to how groups act to preserve their community, lending critical insights to traditional approaches of leadership.

The origins of social leadership theory are more oriented along the lines of linear problem solving. As the field advanced (and human technological capabilities grew), it became more concerned with solving complex group problems. Leadership theory began to focus more on achieving complex well-being goals, and less on attaining the basic, fundamental goal of survival. Today, we live in a world that is once again experiencing drastic climate changes–heating–within a few generations that will affect all forms of life.

Critical considerations: Changes in the midst of modernity

While the Ice Age and Little Ice Age were natural earth cycles, our current environment is experiencing heating and extreme weather cycles, magnified by human activity. Regardless of what one may believe about the role of human activity in climate change, the undebatable reality is that changes *are* happening, and these changes *are* known to result in physical neurobiological changes, as past periods of climate change demonstrate. We do not have all the answers for this new reality, but the implications must be considered: our climate affects the leadership we desire in this era.

Current climate changes are associated with a variety of physical and mental conditions, such as PTSD, worsening asthma and allergies, sickness from pollution, and infections (Padhy et al. 2015; Carpenter 2016). While a growing body of research documents the physical impacts of climate change, less has been done on its impact on brain development. It is likely the first effects will appear in the brain development of children, as environmental factors play a large role in their neurological development (Sean 2018). High temperatures can alter nervous system features, including gene expression in neurons, neuron structure, and brain organization (recall the cortical fold shifts during the Ice Age). Additionally, an increase in environmental temperatures can influence the