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INTRODUCTION

Our democratic voting system is heralded as one of the greatest achievements of modern civilization. Wars have been fought, blood has been shed and many have died to ensure our right to vote. Yet, we need not look further than the daily news to see the serious threats democratic voting systems face. From foreign powers and nefarious agents to social media exploits, opaque meddling in the affairs of other countries is more prevalent than ever before. This has pushed our hard-earned democracy onto a slippery slope to authoritarianism. Technology is the common denominator behind all the recent forces putting democracy at risk. The creators of a technology can never foresee the unintended consequences their inventions can have years or decades later. Voting has been forever transformed by both technology and its abuse. Can the complex challenges be mended by changes in the political process alone, or must we also seek a technology component to the solution as well, to counterbalance the technological genie that has been let out of its bottle? In this book we investigate a novel concept called a Democratic Quality Vector (DQV), which is a technological tool which can help mitigate some of the serious challenges that plague modern democratic systems. At the same time, the DQV also has implications for information systems and improvements in the quality of decision-making in general.

If we closely examine the nature of these challenges which our democratic voting systems face from a data science perspective, we can characterize them as issues of two things: data integrity and trust. When bots create fake news, resulting in the false impression that a large number of people believe in, that is a data integrity and trust issue. When social media accounts are siphoned off and psychological profiles constructed to identify voters vulnerable to targeted manipulation, that is once again a data integrity and trust issue. When propaganda is mistaken for truth, that is a data integrity and trust issue. A more colloquial word for data integrity is truth.

The background story that leads to the discovery of the new DQV begins with a deep analysis of our most fundamental assumptions about truth. The question of how to make truth and trust resilient in the information age led us examine fundamental philosophical questions such as “What is knowledge?”, “How do we know

when something we know is true?" and "What establishes if something is true or not?". That in turn led us to open a can of historical worms. Today, the scientific method is the definitive technique for seeking knowledge and knowing what is real in the world. In history, the scientific method is closely related to rationalism, the fundamental concept that brought about the Enlightenment, the Industrial Revolution and led to the overthrow of a number of heads of states throughout history. Rationalism is the foundation of science, and of our modern society, but we puzzled at what has become of intuitive knowledge. Certainly we all still employ it, and intuitive knowledge has played an important role in much of human culture up until recently. Rationalist theories of scientific research have traditionally discounted intuitive knowledge as unreliable. But this view is beginning to change, paradoxically, because of rationalism itself. It is only recently that serious neuro-psychological research into intuition has begun to reveal its underlying operating mechanism. Intuition is a refined form of species instinct and biological systems are demonstrably at the root of much of it. The field of interoception is one of those that create the bridge between intuitive knowledge and the underlying biological systems that moderate the intuitive signaling. Rationalism is beginning to finally accept the legitimacy of intuitive knowledge, but only after its methodology has finally asked the right questions to reveal its secrets. The DQV is built on the logic of this new knowledge, and is designed to quantify intangible data, transforming it into a tangible proxy that can be used for rational decision-making.

We also take an excursion into psychoactive compounds because they have always played an interesting role in shaping human culture. They have always been a significant part of culture all throughout history and their mind-bending effects is bound to have implications for our perceptions of reality, ability to make new discoveries and even definition of knowledge. Because they allow us to experience the world in an entirely different way, they result in experiences that can have profound impact on knowledge creation and our understanding of the universe. These alternative experiences can shift our framework of what is true or not.

In politics, data integrity is tightly entwined with that other important concept, trust. For voting is an expression of trust in a representative to perform as promised. But powerful and ubiquitous information technology has exposed the Achilles Heel of representational democracy - the easy manipulation of data. It is this vulnerability which can easily concentrate political power into the wrong hands. A close examination of our most basic epistemological assumptions about these two fundamental concepts underpinning democracy, truth and trust leads us directly to the consideration of reliable, new way to value "one unit of social capital" in particular, and a new way of measuring the value of one piece of information in general. We call this the Democratic Quality Vector (DQV).

After the foundations of our measurement has been established as a baseline, we then propose our solution. Our solution is a new psychometric that is derived from the Laws of Biology. In the process, we apply this emergent metric to new more suitable forms of voting systems. We introduce a new voting system called the transferable voting system that builds on top of liquid democracy. As we explain in the foundational section, the fundamental mathematics behind the transferable voting system emerged out of applications of a new type of mathematics which is ubiquitously used throughout nature and has been used to organize and explain a full spectrum of natural systems including physical, chemical, biological and social systems. This gives the system a solid foundation upon which to rest.

However, this does not mean there aren't many questions concerning how to approach the design of a transferable voting system. How would it overcome the limitations of our current system? What is the best way to interpret accuracy, magnitude, and direction of a transferable vote vector? How do we assign a meaningful value to the magnitude of the transferable vote's social capital? Could we assign any value we want to it? If the unit of social capital is decreasing with each successive transfer, Does the sequence converge to zero? How do we assign weight to a voter in the chain? Who has more weight, an academic, a senior or a plumber? Can we trust the information which we use to make our decisions? Who is the best to assess the validity or truth of a statement, report, publication? Who decides what the "cold hard facts" are?

As we answer all these questions, we are led to construct a final transferable voting system called a Vector-Parametrized Information System (VPIS), and a special instance of VPIS for voting called a Vector-Parametrized Voting System (VPVS) which incorporates all the properties necessary to compete with our current representative democracy system.

A NEW WAY TO DECIDE

As humanity begins another chapter of its journey into the unknown, we are faced with tremendous challenges. However, with the right tools, we can transform those challenges into opportunities, into a better life for everyone. The Democratic Quality Vector holds significant promise of improving the quality of our decision-making process in business, politics and civil society. This book will explore this profound data shift and give us the tools we need to equip ourselves. This will not only ensure we not just to keep up, ride the wave of this change and come out ahead.

However, some of us might be happy with our Democracy the way it is, and wonder if a DQV is necessary. As we already know Social contracts within democracies protect the rights of the individuals living within them. Therefore, it is somewhat ironic that any person who is born into a democratic society initially has no democratic ability whatsoever to decide their fate in the world. The completely helpless condition of human newborns leaves us at the complete mercy of our caretakers and the social contracts that they choose to impose upon us. As we grow from a newborn into childhood, the normative social contract is deeply conditioned into us from the earliest age, in the form of the socially acceptable behavior of our guardians. All through our young life, we obediently adopt the normative values of the social agreement imposed and enforced by our caretakers and the state institutions that govern their behavior. We are encultured through explicit and dominant narratives repeated over and over in our families, schools, communities, and media and reinforced through peer behavior. When such a fundamental right is stripped away from children at an early age, and powerful conditioning applied, one can argue that such powerful behavioral conditioning is the most difficult thing to change.

For each one of us, the normative social contract is often one that was forged through a long history of dialogue, disagreement, and sometimes even violent insurrection. This social contract arrives at the doorsteps of our lives with the enormous inertia that history carries. It is the accumulation of generations of refinements of political rules, each generation better than the

previous, each one fixing some problem or injustice not previously spotted. In addition we strengthen the social contract each time we comply with the rules of our society. For example, each time we drive under the speed limit, we are reinforcing accepted norms. Each time we vote for a politician, abide by the law and court system, or pay our taxes, we are strengthening the rules. Often, we do not think we have a choice in this process.

Moreover, in spite of the incredible struggle to get to this point, the modern form of our social contract is still far from perfect. In reality, it can never be static, but rather is a continuing work in progress, as each new generation discovers its own set of social injustices that require policy changes.

There are dangers in this process. As the French thinker Paul Virilio has argued, the Industrial Revolution's technological inventiveness has unleashed a string of new kinds of catastrophes. The invention of the automobile gave birth to the car accident; that of the boat to the shipwreck and invasive species. Furthermore, the emergence of the airplane gave rise to the plane crash, and the threat of rapid global disease spread; the emergence of industrial food production systems has given rise to biodiversity loss, species extinction, eutrophication and cardiovascular and diabetes epidemics; and of course, fossil fuel contribution to climate change to name but a few.

Something similar can be said to take place in the political sphere. The French political philosopher Pierre Manent speaks of the phenomenon of the "organ-obstacle" or "instrument obstacle," whereby once beneficial policies become significant obstacles in themselves. We can cite two examples that Manet provides. First, the law, which has the aim of protecting the weak from the strong. often results in privileging the strong over the weak. Second, the sovereign state, which was founded to guarantee peace among individuals, has itself become a significant vehicle for declaring war.

With all of this in mind we might ask about conventional democracy itself and wonder whether it too has brought forth new kinds of political catastrophes. Does our democracy as we know it contain certain inherent harm that is not otherwise intended?

As It does not require a great deal of imagination to come up with a list of grievances and concerns about contemporary democratic practices, the answer to that question could be yes. For example, democracy is government of the people, by the people, and for

the people, as Abraham Lincoln famously put it. One, then, would naturally expect the very best among any given people to serve in its structure. Democracy should be an opportunity for the most talented at applying their skills on behalf of their fellows. Often, however, the opposite is the case. Thus, democracy can suffer from becoming a series of choices among mediocre representatives – or worse.

Another problem is that social media has also proven easy to hijack for nefarious purposes. Bad actors use phony accounts and bots to spread fake news that has created extreme political polarization and has even tipped elections. The short-termism of four-year voting cycles does not allow important long-term issues to gain any traction, resulting in the sidelining of essential issues.

The inertia of the democratic political process also creates long delays in passing legislation. Democratic governments are also infected with dark money that buys political favors, making a mockery of the democratic process.

Last but not least, the concerns of philosophers through the ages such as Voltaire, Socrates, Aristotle, and Plato seem to be coming true before our very eyes. In a climate of fear, looming ecological disruption, and identity politics authoritarian leaders rule the roost. Without updating and adapting democracy to the modern world with its myriad complexities and rapid rate of change, a democratic catastrophe awaits.

The events of the post-2016 US election cycle have demonstrated the potential of democratic catastrophes in the digital age. Information technology has become indispensable in the fabric of modern life, allowing for a truly informed public. Despite that, bad actors have exploited the power of digital technology to undermine democracy in ways that its founders could not even imagine. Now, everyone acknowledges that the system is broken, but no one is sure how it can be fixed. How can one initiate change and convince all sides of the need to steer democracy in the right direction?

Technology itself offers some potential changes, and any sustainable solution must include some changes in the technology itself. Because of the abuse, social media giants are being forced to authenticate user accounts and tackle fake news on their platforms. However, that isn't enough. That is just treating the symptoms. What we need are new tools that accompany in a bold, new idea that can captivate the imagination, and tackles the root problem.

What we are witnessing today is a global phenomenon of the system of democracy being outplayed and won by hegemonic power. This is the root problem. Such power has abused its privilege to accrue an unfair advantage. Their Capital allows bad political actors to buy access and engage in deception that circumvents democratic rules on two levels. First, information technology systems are being used opaquely to get around voter privacy and voter rights to accurate information. Second, once hegemonic actors are installed in a political leadership position, the existing laws of leadership are often too weak to restrain an unethical leader. Subsequently, the existing, weak rules are being co-opted to increase opaqueness that benefits and protects the hegemonic power. Within the current form of representational democracy, any candidate possessing the right combination of strength, cunning, and lack of ethics has a good chance of concentrating extreme power.

The system of representation itself is the problem. Because the ultimate outcome of elections within a representational democratic system is to install few people in control of a city, province/state, or entire nation-state, it comes with the danger of extreme power concentration. Unfortunately, the checks and balances of ensuring the integrity of a candidate are insufficient to rule out electing an authoritarian leader. This is because the weakness lies in the voting public itself. When a large proportion of the voting public is insufficiently educated, the wool can be easily pulled over their eyes.

Over two thousand years ago, the greatest philosophers of ancient Greece had already warned us about this very Achilles Heel of democracy. And yet, solutions have popped up throughout history also. As early as 1884, Lewis Carroll, the famous author of *Alice in Wonderland* gave us a hint of a better voting system based on transferring a vote to a trusted person.

Today, we live in very complex societies. There are thousands of issues that need focusing on in a modern government. Unfortunately, democracy does not produce nearly enough experts to govern all these issues effectively. Indeed, most elected representatives are not experts in the domain they are delegated to govern on. In fact, they may have political, legal, or a business background and then end up overseeing a field for which they are not prepared. Given that, a party of hundreds or even thousands of elected representatives does not have enough capacity to effectively govern over millions, especially when the elected representatives

are not domain experts. If our governance problem comes down to finding enough genuine domain experts to make collective decisions for effective governance, then a swarm approach that produces just the right number and quality of representatives could be the solution. The common name for this kind of democracy is delegative or liquid democracy.

Instead of artificially constraining the elected representatives to be of a small number and the elected representative to be the winner of a popularity contest, liquid democracy is more likely to produce governance based on both merit and the expertise required to make an effective collective decision. This may sound attractive, however, the DQV is not conventional; it takes all the types of Democracy and improves them in a new way. The change we are talking about is nothing short of a cultural shift and a complete overhaul of the current democratic structures.

This book explores the tools that will make such a system possible. The challenges of progress necessitate that human beings, as toolmakers, continue our tradition as innovators in all areas of life, and continue to refine and improve our tools, not least of all by the adoption and creation of new ones.

The challenges of both direct and representational democracy have been known to humanity since the days of ancient Greece, and the formative principles of liquid democracy emerged in the late 19th century. It has been seriously explored in Academia since 1969 when James C. Miller published "A program for direct and proxy voting in the legislative process," and many researchers subsequently added to the body of knowledge, such as computer scientist Bryan Ford, who proposed delegative voting in 2002. With the emergence of blockchain technology, the possibility now exists to finally create a modified liquid democracy system that can be secured and therefore enable a transferable vote system.

We will begin our journey into the tools that can expedite democratic reform by examining our most basic assumptions about knowledge itself. For a voter to make the right decision, whether to select a potential elected representative or to weigh in on an important political issue, we need to understand what the facts are. As we shall see in the course of this book, however, that disagreement on what a fact is half the problem.