Stanford MediaX Keynote 2017

a talk built by John Seely Brown (jsb) and Ann Pendleton-Jullian (apj)
delivered by JSB April 20, 2017

Sense-making in our post AlphaGo world

new mindsets & lenses may be required.

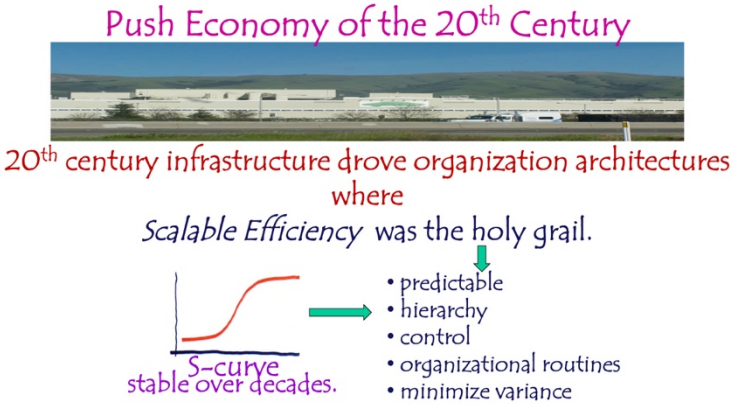
Sense-Making in Our Post AlphaGo World

The game has changed. The real question is: "have we?" From my point of view, the act of sense-making changed last year when a deep learning computer program defeated a human professional at the abstract strategy game of Go. In March 2016, Google DeepMind's AlphaGo defeated Mr. Lee Sedol, winner of 18 world titles and widely considered the greatest Go player of recent history. It was a moment that I think quite honestly shocked the world, and one that causes us to step back and rethink what we do, who we are, and how we create meaning. In this post AlphaGo world, what are the new mindsets we should be adopting? What are the new lenses that may be required to make sense out of the complex and exponentially changing world we're in?

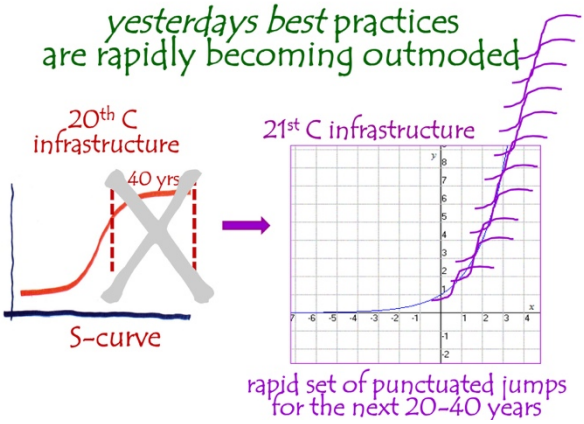
OUR PAST CONTEXT

Looking at our past context, the 20th century was a century dominated by a push economy. Almost all corporate strategy and organizational architectures were based on the notion of scalable efficiency. We could anticipate with relative accuracy what we'd need, build huge numbers of products, put them in warehouses, and distribute them efficiently.

Working in a 20th century context required predictability, hierarchy, and an understanding of organizational routines. All actions were driven toward minimizing variance. When a new technology came onto the scene and disrupted the status quo, the response took the form of an "S" curve with time on the x-axis and productivity on the y-axis. It took several years to understand how best to use the technology and integrate it into our business and organizational structures, but once that was mastered, productivity skyrocketed before eventually plateauing over time. This whole process would take approximately 40 years until another disruptive technology was introduced and the process started all over again. In this environment, the "Holy Grail" was scalable efficiency. If you mastered that, you were set. Almost all corporate strategies were simple variants of that.



Then the big shift happened. We were suddenly in a world of exponentials. Instead of stabilizing after 40 or 50 years, technological change has been never-ending. The adjustment period for a technological innovation decreases from several years to several months. The new exponential curve that emerged was driven by many fast and punctuated evolutions lasting an average of about 16 to 18 months, each one changing the game slightly. One simple consequence of this is that yesterday's best practices are rapidly becoming outdated. Our best practices from just two years ago, let alone 20 years ago, need to be updated. Perhaps more interesting is that our institutional architectures and even our ways of knowing are becoming outdated. Infrastructure is not just technology! How might we develop new practices, institutions and mindsets to address this?



This accelerating cycle of obsolescence is addressed in Kevin Kelly's wonderful book called The Inevitable: Understanding the 12 Technological Forces That Will Shape Our Future. He states that the average lifespan of a phone app is becoming as low as 30 days; you won't have time to master anything before it is displaced. Do we really call this progress? We have to think about this dilemma in new ways, different than we have in the past.

The Inevitable by Kevin Kelly

"The cycle of obsolescence is accelerating (the average lifespan of a phone app is a mere 30 days!), you won't have time to master anything befc splaced."

And you call that progress???

So, let me zoom out for a moment and look at this slightly more broadly. What does it mean to be in this kind of world? I want to look at this post AlphaGo world through three different lenses. The first is through an operational lens, then an epistemological lens, and finally an ontological lens. The answer to how we live in this world comes from the composite of knowing how to look at this through all three.

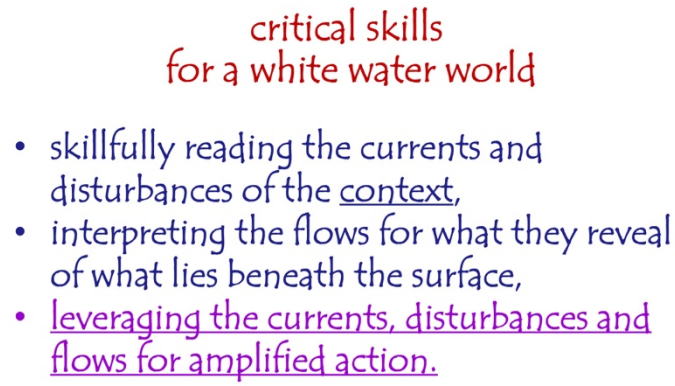
AN OPERATIONAL LENS

Let's start back down this crazy path, first through the operational lens: a new way of doing things. I think it can be characterized by three quite different eras, and the learning strategies and ways of leading required to be successful in each. The first era is my parents' generation. When I was growing up, I approached my career like a steamship, deciding where to go and simply powering through the challenges with grit. The survival strategy was to practice a lot of steady persistence. That was how many people of my age were taught to behave in order to be successful.

But I love sailing and I began to find, starting my career in the early digital age, that the successful career trajectory of my generation required a different approach - playing with the winds like a sailboat instead of powering through the water with engines and throttle. Using naturally occurring forces to an advantage. In a sailboat, when you get blown off course what do you do? You tack. Then I came to Silicon Valley and learned that tacking is called pivoting. So, what do you do? You pivot. I found it was a lot easier (and more interesting) than just plowing ahead.

But now we're living in a networked age that requires a quite different approach than that of a sailboat or a steamship. My colleague Ann Pendleton-Jullian and I think of today as a world of whitewater in which the sailboat metaphor is replaced by that of the whitewater kayaker.

This era is no longer about just deepening individual expertise within a silo. In this increasingly fast, radically contingent and hyper-connected world, it is much more about participating in, and shaping, knowledge flows. It is a question of how one participates in these chaotic flows all around us? How do we ride them? How do we work with them? How do we stay balanced and embedded when all is in flux?



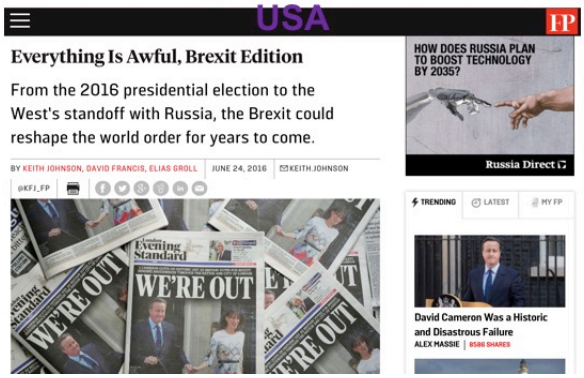
There may be three critical skills for being a kayaker in this whitewater world: 1) skillfully reading the currents and disturbances of the context, 3) interpreting the flows for what they reveal beneath the surface and 4) leveraging the currents, disturbances and flows for amplified action.

How does one read the currents and disturbances of the context? If you are a whitewater kayaker you learn to read context, otherwise you're dead. It is as simple as that. Understanding your own center of gravity is essential to navigating the flows because you're inevitably going to get caught up in the turbulence and knocked over. Not everything works smoothly, but there is a kind of authenticity that enables one to live in the moment. You will get used to being thrown for a loss, rolling, coming back up and gliding on. You do not have time to think, so you must act in the moment – be in the moment, and act through that kind of focused engagement. It is this kind of authenticity and a different sense of knowing oneself that is an essential part of success in this whitewater age.

Reading context may be, at the very least, as important as reading content. How do you look at the surface to read what's beneath the surface? What can you assume about the rocks below? How do you read the ripples? Paul Saffo and Stewart Brand talk about this in terms of pace layer thinking. How do we look at ripples up here and see what is perhaps going on down below? What do the flows and ripples really reveal? How do you play with that? We must be skilled in reading the currents or context of any given situation, looking at the disturbances and from those disturbances getting a glimpse of what kind of deep structure is underlying the surface.

The other catch is how to leverage these flows and disturbances for amplified action? how to amplify our agency in this kind of world? Like in kayaking the turbulent rivers, there is an art and a discipline to it. It's easy to understand, but in practice how does one work with the system to cause things to happen?

As we've recently experienced in Europe & USA



Reading context is far from simple. We in the U.S. and in Europe have already experienced tremendous challenges in reading context. Almost no one saw Brexit coming and very few anticipated the outcome of the 2016 U.S. election. Even those of us with infinitely powerful data visualizing tools, deep learning algorithms, and advanced technology didn't see enough. A lot of us thought we understood how to read the signals, but we did not read the context right. That's to say data analytics – which many of us worship, starting with me – can't do everything. Data is not the same as information. It's not the same as beliefs and it's not the same as values. Knowing the right questions and understanding the profound differences between data, information, beliefs, and values is key.

Data analytics can't do everything.
Knowing what questions to ask is key.

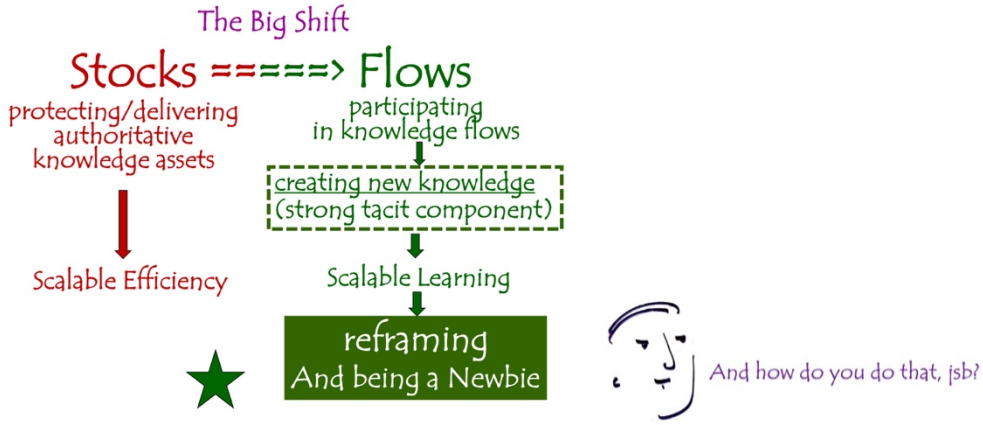
data ≠ information ≠ beliefs ≠ values

I'm going to argue that to be able to see more we have to re-acquaint ourselves with the power of imagination. The imagination is what enables us to escape the tyranny of the present; it allows us to see beyond what our present assumptions define as possible. Almost all our training about how to look at the future extrapolates the present. How do we begin to blast out of that?

Given the relentless
pace of change & disruptions.

Incremental learning will no longer suffice.

I think it's fair to say that this relentless pace of change and disruptions suggest that incremental learning will no longer suffice. Unfortunately, that's what we are well trained to do. We are all skilled at incremental learning. So, a significant part of this big shift is about learning to move from a world of scalable efficiency to one of scalable learning in the sense of participating in flows, generating new knowledge on the fly, and testing it in action. And for scalable learning to be effective, we have to embrace the unlearning of old habits, old assumptions, and even old modes of inquiry. I think this is a thing that many of us find almost impossible to do. How do we start to reframe? How do we accept becoming a newbie? Not becoming a newbie just one time, but over and over again? This is the world most of us have just walked into.



It's fair to ask how one should go about doing this. To answer this, I want to take you through two quick examples before we move into some deeper epistemological issues. One example that has really impressed me is how Jack Hidary, technology and financial entrepreneur, co-founder of the Auto X Prize and one of the architects of the Cash for Clunkers program, and sometime political candidate, approaches learning new things. While addressing a group of CEOs in Aspen, he raised a very simple question to the room: "How often do you get out of your comfort zone?"

Getting out of your comfort zone is increasingly important in this global world of constant change. In fact, maybe it's getting out of your comfort zone that really matters the most. But how do you get out of your comfort zone and learn anything?

On another occasion at the Aspen Institute, I ran into Jack and asked him what he was doing there. It was an energy conference and he doesn't work in energy. He sat down next to me and told me about a very simple practice he has built that blew my mind. Every year he chooses a conference to go to on a subject that he knows nothing about but wants to engage with. The first day he attends all the lectures. The next day he doesn't go to any of the lectures, but instead, hangs out around the coffee in order to pick up the genres of communication being used in that particular community of practice. He learns how they talk to each other, how they ask each other questions and the little subtleties of speech that are key to this community. Then on the third day when he has figured out enough about the content and the interactional patterns, he takes the risk, dives in, and, despite the potential for exposing his ignorance, engages in conversation. He risks looking like a fool very often, but that's how he, not only gets out of his comfort zone, but learns at an amplified rate.

What's even more interesting is that at that conference he picked up enough to be able to make a significant impact. When he returned to New York City he used the new information he'd gathered from the energy conference and spoke with mayor Bloomberg about the need for more energy efficiency in public transportation. This eventually contributed to Bloomberg launching his hybrid taxi initiative in New York City. Two months later, Hidary went down to Washington and helped to get the Cash for Clunkers program through Congress. From just those three days, using his social protocol, Jack learned enough about the energy landscape to foster a sense of agency and to ultimately make positive changes by leveraging the flows happening around him. There's something very interesting there I think. He has mastered not only getting outside of his comfort zone, but also learning from it each time and making a direct impact with that new knowledge.

We've traditionally been taught to become "experts" who treat knowledge as stocks rather than as flow. Experts today tend to isolate themselves from flows of new knowledge and the people creating them. According to Hidary, most people become too dependent on one facet of their lives and when one facet takes up 80 percent of someone's total exposed surface area, they tend to become defensive and protective of it. This old way of doing things will no longer suffice.

When I think about starting to reframe, I often come back to surfing. It's stunning to me how world champion surfers do almost exactly what Jack does but within their own domain. They're constantly moving around the world to pick up new things. They talk to their board makers to create tools and equipment for continuously trying new things. Each time they get in the water they're grappling with the variability of the wave, their board, and their own capacities and limitations; all encounters require that they listen deeply to the reciprocal forces and responses. If you want to be the highest performing person in something like surfing you have to do that.

So, I think the catch, more generally, is how do we think about honoring and amplifying the serendipity of encounters? How do we orchestrate serendipity for maximum learning? There are many ways to orchestrate serendipity into our lives more often, like Jack, so that we're more comfortable navigating uncertainty when it arises. By choosing serendipitous environments, developing serendipity practices and enhancing serendipity preparedness we can practice deep listening and adapt ourselves out of the old ways of doing things. Choose to immerse yourself in conferences, institutions, geographic "spikes," social networks, or communities of interest dedicated to unfamiliar topics. Practice getting out of your comfort zone, exposing your surfaces and adopting a beginner's mindset. Enhance your ability to deeply listen, develop a gamer's disposition, and strengthen your exploration and relationship skills.

This brings me to my second example: the power of reverse mentorship. We have so much to learn from what I refer to as 'the kids'. It can be a strange experience at first, because it can be very humbling. For me, reverse mentorship was a personal experience that was a real eye-opener. When I stepped down from XEROX PARC in the year 2000, I wanted to enter the world of videogame design and master the multiplayer games like World of Warcraft. I gave a talk and J.C. Hertz, a 24-year-old that was the New York Times' critic for games, was also on the panel. We both gave pretty good talks, and she came up to me afterwards and said, "John, that was a really great talk but I can tell you don't understand anything. You got the topic right, but it's not in you. You don't really get it." Interested, I spoke with her about it more and she said, "I'll tell you what, you seem clever enough and open enough that if you want, come apprenticeship with me." I said, "In New York City?" She said, "Yes. If you fly out and do everything I say, about a year from now you will be accepted by many of the great game designers in the United States." So, I said, "Game on."

Reverse Mentorship – JC Hertz agrees to mentor jsb in game design in 2002

game critic – New York Times

It turned out to be one of the most shocking experiences of my life. For the next year she mentored me and introduced me to all kinds of people in the gaming community. On one of my first assignments I felt like a little kid, because she was the teacher and I was the student, but as you probably gathered, after a year I became much more engaged in World of Warcraft and I've written a fair number of papers on it since then.

And be an amazing source of insight but can also be humbling.

The Inevitable by Kevin Kelly

"The cycle of obsolescence is accelerating (the average lifespan of a phone app is a mere 30 days!), you won't have time to master anything before it is displaced, so you will remain in the newbie mode forever.

Endless Newbie is the new default for everyone, no matter your age or experience. That should keep us humble."

The power of this kind of reverse mentorship became very interesting to me. This idea of the "endless newbie" has to be, to some degree, the new default for everyone no matter your age or your experience. All of us – every one of us – whether we choose it or not, will need to be endlessly a newbie as we act to keep up with the accelerating pace of change. Reverse mentorship is a powerful way to keep us humble and it turns out to be amazing how much we learn from people in younger generations. That is something we can all do today to start building comfort with this whitewater world.

AN EPISTEMOLOGICAL LENS

Besides looking at this complex challenge operationally in terms of habits, we must also step back and look at it epistemologically. This is a shift from knowing (the what) to understanding (the how and the why). We talked about how incremental learning will no longer suffice, but now I'm going to claim that beyond continuous learning we must also be willing to constantly reframe our understanding of the world. We must regrind our conceptual lenses, and regrind them often. To say it somewhat differently, how do we come to build understanding, living in this global networked age where change is exponential and everything is densely interconnected? We used to be able to isolate things and learn about them in isolation. Today that no longer works.

How do we form understanding
given the pace of change & dense interconnectivity?

Incremental learning will no longer suffice.
AND
We must be willing to
regrind our conceptual lenses, often!

Most of us are pretty good at assimilating things that fit within our current frames – our current worldview - but we're not so good at breaking frame. In psychology, we call that 'fitting of things into current frames' assimilation. But we need to move from assimilation to accommodation. We can force fit almost anything into our current frame, often through denial of those aspects that don't fit, but our real task is to construct or appropriate new frames, ones that challenge our current beliefs and honor the essence of the situation we are presented with? In other words, how do we take seriously accommodation in this post AlphaGo world?

Living in exponential times
in the global networked age
that is densely interconnected
many of our problems
are wicked problems.

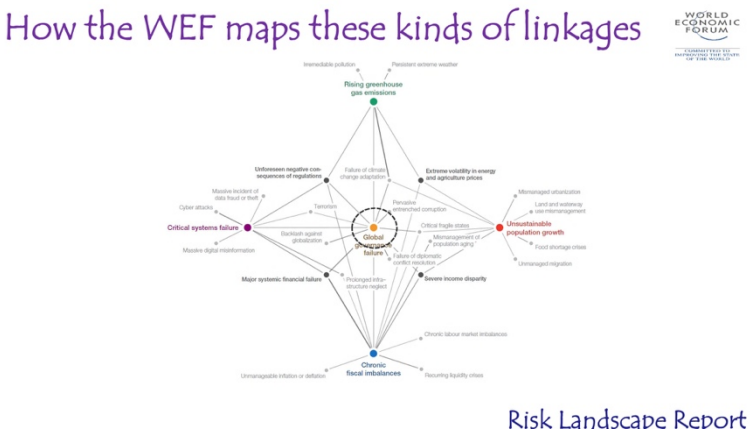
They are complex, not just complicated

I think it's fair to say that in this exponential, globally interlaced world where everything is densely interconnected, our problems have moved from being semi-linear problems to complex ones. That is to say, these problems are no longer just complicated. Everyone is used to dealing with complicated problems, but we have to take seriously the fact that complicated is not the same as complex. In starting to understand how to deal with a complex, non-stable problem we must understand that simply touching or probing the problem will likely have unintended consequences, thereby changing the problem, itself.

Parag Khanna, the international relations expert, global strategist and best-selling author, articulates this well in The Second World, "There is no special sphere of the environment, no distinct lands of oil, no detached global economy, no separate issues of public health…When we try to pick out any one issue by itself we find it hitched to everything else in the universe." "Because of this, it is increasingly important to understand the world as a single organism in which actions in one place often affect events in another and small moves, smartly made and well placed, can have disproportionate impact beyond their effort. We recognize the world as one that is in the midst of unique and fundamental changes – as one that is radically contingent upon contexts that evolve, conditions that change and a multitude of interconnections that emerge and reform in dynamic ways." (This last bit from my colleague Ann Pendleton-Jullian who has been working on these kinds of problems for years now.)

In the World Economic Forum's Risk Reports, every year they create a series of diagrams of the risk landscape. In these, they try to draw the linkages involved in major crises

around the world and you can begin to see how entangled everything becomes. Everything impacts everything else. For instance, global governance failure is one geopolitical center of gravity, depicted at the center of the star in the diagram below. As you can see, it is highly interconnected and a contingent risk to three critical connectors and three other centers of gravity. This linked and contingent perspective is a major new epistemological lens for beginning to be able to build understanding of these types of entanglements, and it is necessary in order to make progress on these complex problems.



As shorthand, these types of complex, interconnected, volatile, uncertain, and ambiguous problems, have been called “wicked problems.” The classic notion of a wicked problem comes from Horst Rittel and Melvin Webber observing that as soon as you attempt to solve these kinds of problems, they morph. The “Catch-22” of wicked problems is that you cannot learn about the problem without trying solutions, but every solution you try has lasting unintended consequences that are likely to spawn new wicked problems. Examples of wicked problems include global warming, financial crises, terrorism, environmental design, homelessness, and so on.

Said very simply, we need new ways to move from mechanistic thinking to understanding contexts and problems that change and evolve because of entangled sets of exchanges with complex feedback loops. Think dynamic attractors, network affordances, and contextual propensities. Think clouds, not clocks. As Karl Popper, the great philosopher, said, "All problems are either clouds or clocks. One of the problems we have as a culture is that we take clouds and we pretend that they're clocks. To understand a clock you can take it apart, look at its individual pieces, study the pieces, and then you can understand how the clock works. A cloud you can't take apart. A cloud is fundamentally a dynamic system. A cloud you can only study as a whole.” This is one of the major epistemological challenges we're walking into. These are the new contexts that we are playing in.

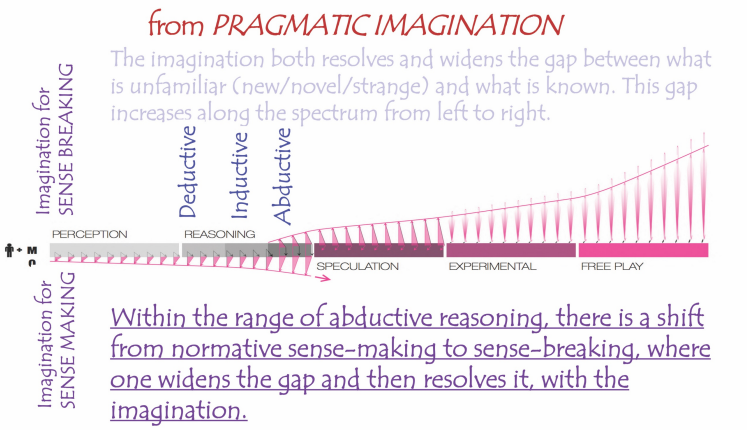
Perhaps this whitewater world may require a new sense, a “seventh sense” as Josh Cooper Ramo calls it. We understand the current road through our six senses. Maybe we need a seventh sense that understands what it means to be embedded in these network flows that I was talking about earlier. In his new book titled Seventh Sense, Ramo says, “The seventh sense is the ability to look at any object and see the way in which it is changed by connection (let alone hyper connection). Whether you're commanding an army, running a Fortune 500 company, planning a great work of art, or thinking about your child’s education.” These are all deeply interconnected problems today. But underlying all this, working against our progress, is a crisis of imagination. We need to see – to imagine - the ways in which everything is changed by hyper-connectivity. How do we start to find ways to imagine those kinds of interconnections and what they entail?

Crisis of Imagination

We need to see the way in which something/everything is changed by hyper-connectivity.

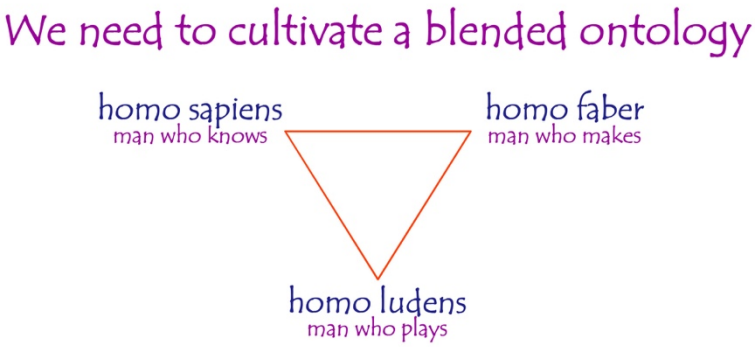
The imagination is the power or capacity of humans to form mental images of objects and situations, whether visual, auditory, or motor images. The imagination does some amazing things for us. It closes the gap between what is novel and what is known. It finds connections between things that are not obvious. It plays with boundaries. It lets thoughts and partial thoughts jump fences. It engages in sense-breaking – as opposed to just sense-making – in order to make sense in a new way and see new possibilities. In seeing new possibilities, imagination helps us escape the tyranny of the present.

We're operating in a time where the tyranny of the present is the game. So, imagination, my colleague Ann Pendleton-Jullian and I want to argue, is not a fluffy bunny (her words) add-on. It's not just relevant within the domains of the arts and humanities as an embellishment, but rather it crosscuts the entire cognitive spectrum. And it is necessary for radical reframing to make progress on complex problems and the evolution of society more broadly.



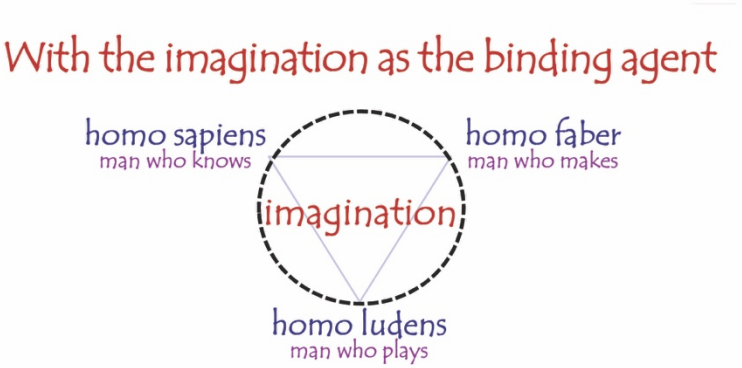
AN ONTOLOGICAL LENS

We now shift from the epistemological issues we've been talking about to look at this ontologically. To construct deeper understandings today we need to develop a new way of being – a new ontology. We're talking about something very fundamental here. This new ontology is a blending of two traditional ways of being and a newly elevated one: *Homo Sapiens,* man as knower, *Homo Faber,* man as maker, and *Homo Ludens*, man who plays.



In the education world and in much of the science world we know how to slip back and forth between the two boundaries of *Homo Sapiens* and *Homo Fa*ber rather easily. Yet, we don't talk much about *Homo Ludens*, man who plays. Play has several dimensions to it. One of these is about how you begin to understand the play of a system. How much can I push this system? How much of these entanglements can be pulled apart? That's what is really required to figure out how to do something new. There is something very interesting about how you get a feel for something by seeing how it pushes back. But play is also about playing with the rules that guard our sense-making; one plays in order

to help break sense, in order to be able to reframe. So, this new way of being – this new ontology - is a blended ontology of Homo Ludens as much as Homo Faber where most of us are brought up thinking that Homo Sapiens defines us. This has been one of the foundational concepts that has emerged from the work my colleague Ann Pendleton-Jullian has been doing to redefine the design brief for the university of the 21st century and work with Georgetown students in the setting of her 'wicked problems' studios to design the University of 2033.



What we really want to argue is that in this new ontology for the 21st century, all three are critical equally and that they are bound together by the imagination. We tend to think of imagination as only generative mental activity that artists and creatives work with, but the imagination plays a very fundamental role in all cognitive activity. The imagination serves diverse cognitive processes across an entire spectrum of activities. That is the first principle of our book, Pragmatic Imagination. Therefore, the imagination is critical for how we are as Homo Sapiens, Homo Faber, and Homo Ludens.

If we take the new norm of constant flux seriously, we have to work towards a new ontology, a new way of being, where we may actually exist in a constant state of becoming. If you can own and embody that new ontology, then constant change becomes a friend. The constant state of flux is not seen as something to fear, but as an adventure.

"the imagination serves diverse cognitive processes as an entire spectrum of activities."

(1st principle, *Pragmatic Imagination)*

A BLENDED ONTOLOGY WITH HUMAN & MACHINE

Now, I want to come back to where we started. The game is changing. If we take this blended ontology seriously, then how do we make sense of where deep learning and machine learning are going? How do we now account for intelligent augmentation and artificial intelligence in this blended ontology? Merely taking a technological perspective to looking at these challenges is not enough. We must move away from "techsplaning" everything and instead use radical humanism to come to terms with the problems that we ourselves are creating with and for the world. The unique power of the human imagination comes in part from its ability to integrate opposing qualities like emotion and reason, curiosity and certainty, or man and machine.

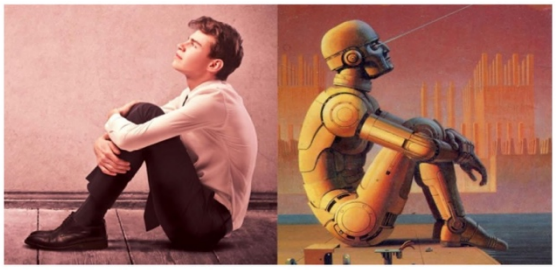


Illustration: Streetwise Media

The Real Moonshot of Our Time

Instead of "techsplaining" the future, we need radical humanism

Tim Leberecht

I'm really struck by the example from freestyle chess. We all know we can build amazing machines that have beat some of the world's best chess players, but what isn't talked about as much is the freestyle chess tournaments where human players can use any augmented technologies they choose. What surprised me is that a moderate chess player coupled with a moderate hacker – working deeply with each other – can beat a world champion chess player and any known chess machine. The combination of creativity and

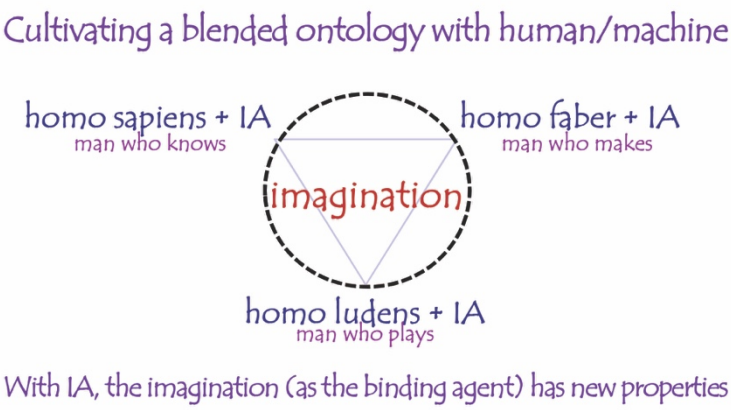
Freestyle chess tournament

The winners racing with the machine
as a generative dance between us and machine.

Zack Stephen and Steven Cramton

machine intelligence allows them to play like never before. There is something magical about combining the free imagination of one, which doesn't have to worry about being correct and logical, with the incredible computational power of the other. The beauty of this example of freestyle chess is seeing them work together in the field, seamlessly complimenting each other, achieving almost a new state of being. So, maybe there's a new kind of blend between man and machine that we haven't talked enough about yet. This simple case is an eye opener.

As we think about new ways of being, how might we include artificial intelligence (AI) and intelligent augmentation (IA) tools in this new blended ontology? Suppose we go back and take our triangle of Homo Sapiens, Homo Faber and Homo Ludens and now add IA.



What we have is something quite different because we now have ways to have specialized IAs increase the capacity of each point of the triangle. The way IA devices work in a Homo Sapiens context are different from the ways they will work with Homo Faber and Homo Ludens. IA systems in all three contexts will be completely different. So, somehow these three things – Homo Sapiens, Homo Faber, and Homo Ludens – augmented in unique ways by different kinds of IA and fused by imagination, start to produce things that are quite unimaginable.

Now, it is easy to think about how to augment the individual in a way that is a blend of knowing making and playing, but I want to push us to think about how to realize these tools on a greater scale. These tools that we're dealing with are themselves part of a much more complex networked world and all of us, whenever we do anything, are connected to others as well. How do you create a kind of distributed community of practice that has a sense of interconnection enough to be able to create something quite new called a networked imagination? How do we make sense of what this new blended ontology is capable of?

But let us not be naïve because data and algorithms operate as black boxes especially in deep learning systems.

But I want to encourage us to not be naïve, because in doing this augmentation, both individual and collectively, we have to be aware that the data and some of the algorithms we're using tend to operate as black boxes. This is especially exacerbated when done with deep-learning systems because we know that the data used carries all the biases with it that it was generated from. And the unknown biases underlying deep learning can be advising the actions. Sense-making here becomes interesting because the old techniques and assumptions don't work.

Think of a case where a loan was denied. Now why was this loan denied? We trust the machine because we see it as an unbiased third party, but the data used by the machine was curated in a way that reconstituted redlining. Redlining – the denial of a loan or insurance because the person seeking the loan lives in an area that is deemed to be a poor financial risk - is a Federal offense, but the data used had come from this unspoken practice. In essence, this machine reinvented redlining. There was nothing in the code that told the machine to redline. Nor was there any explicit way to see the inherent biases in the data. We are now confronted with having to generate new forms of forensics in order to tell what might have been unknowingly encoded in the behavior of the system. Our challenge is in recognizing that we're not going to get there this by looking at the code alone. We need to be cultivating a better social awareness of how the data used to drive these systems is collected and curated.

And just why is her loan being denied?

So, let me suggest that there may be a blind spot in AI research. Kate Crawford and Ryan Calo eloquently outlined this in an issue of Nature where they said, “A social-systems analysis is needed that draws on philosophy, law, sociology, anthropology, science and technology studies…Only by asking broader questions about the impacts of AI can we generate a more holistic and integrated understanding.” This is especially true with respect to the curation of data used to train these deep learning systems. We're not trained to think holistically and yet we have created the very technologies that now demand that we’re able to do that.

Let me also suggest another problem to be aware of. Many of these new infrastructure innovations exhibit an asymmetry between those developing the technology, creating the protocols and building the gateways and everyone else whose futures will be shaped by these infrastructures. How do we begin to balance out this asymmetry? With new capabilities, there arises new conflicts and with new challenges also come new opportunities. We already see Google and Facebook engaged in this conflict.

There are the radically new infrastructures that are disrupting the present and redefining our future: artificial intelligence (AI), intelligent augmentation (IA), big data, cloud computing, cognitive computing, deep learning machines, augmented reality, the Internet of Things (IoT), the Internet of Internet of Things (IIOT), blockchain (e.g. bitcoin) and biotech (e.g. CRISPR). We are tracking most of these, but here is the real fact; these forces interact in unforeseeable ways. While they’re mostly synergistic, each will amplify the others making their impact and consequences even harder to predict.

Considering the unexpected emergent outcomes from being in a networked, whitewater world, we must learn to navigate these operational, epistemological and ontological shifts. Our challenge today is to understand what sense-making is in a world that won’t stay stable for our standard strategies to be effective. Most of our pressing problems today are wicked. Our tools are increasingly opaque. Our models and frames, by and large, are fundamentally outdated. We need to escape the tyranny of the present and meet head on the crisis of imagination in this post AlphaGo world.
Thank you.