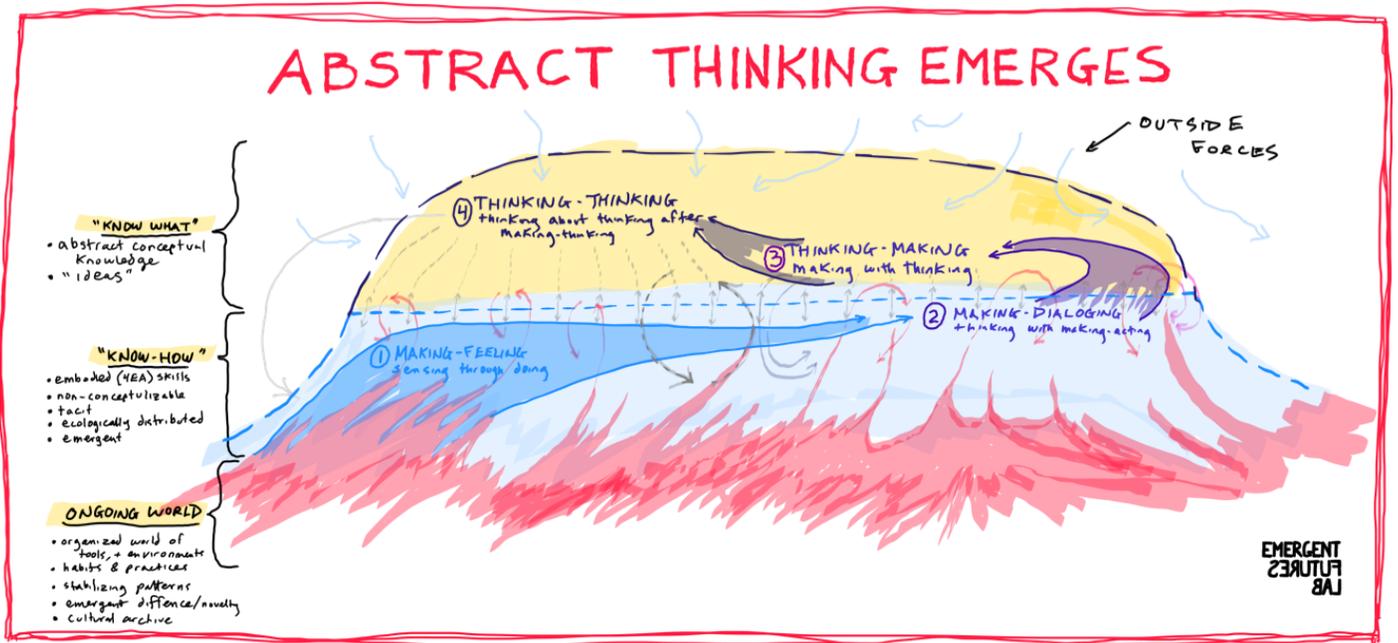


The New Cannot Be Seen or Thought

By Iain Kerr Jason Frasca



Abstract Thinking Emerging from Doing

What Happens at the Beginning of the Creative Process?

To understand how to be creative we need to go backwards from what is recognized to be a creative outcome to the initial moment the new first meets us. If we only look at the finished product we will have a very skewed notion of the process.

What is happening at this initial moment when a glimmering of the new meets us?

How does it meet us?

To answer these questions we need to say a few things about creativity.

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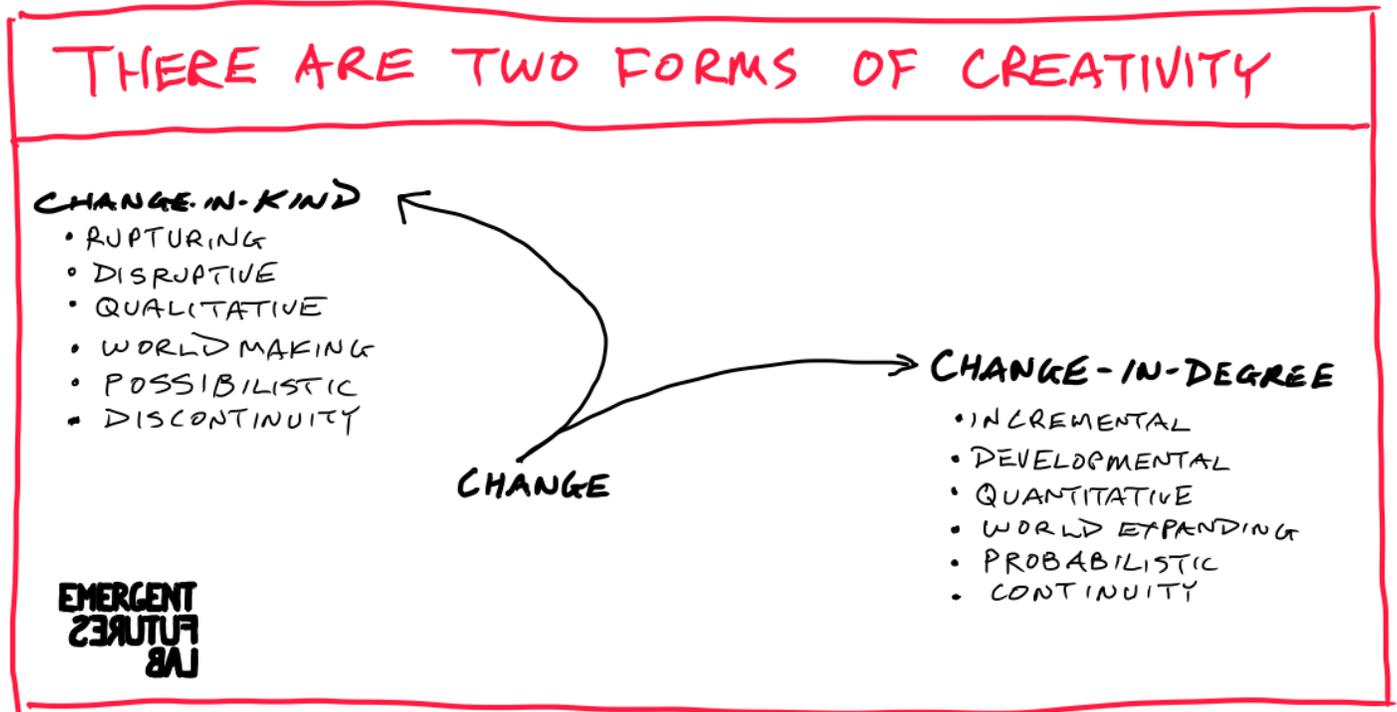
What is the New?

Creativity is the process by which something new comes into being.

The “new” is a difference that was not there before -- some form of new difference -- it could be anything: a concept, a tool, a virus... Now a new difference can be thought of as a unique change -- an alteration that was not there before.

In philosophy, change has two distinct forms: change-in-degree and change-in-kind.

- Change-in-degree is incremental
- Change-in-kind is qualitative



2 Forms of Creativity - Change in Degree and Change in Kind

The radically new is something qualitatively different or something that possesses the potential to be qualitatively different. The qualitatively new is something that fully and totally sits outside of existing logics and concepts -- it is a qualitative discontinuity. It will become something that has its own novel concepts, practices, and logics.

The Creativity Paradox

As something qualitatively different it exceeds our existing categorization or conceptualization schemes. For if we could identify it and carefully categorize it -- it would not be qualitatively new. We would be able to meet it with a sense of recognition -- we would be able to identify it as a known quality.

But if we meet something qualitatively new can we recognize it as such? Can we see it? Can we put it into concepts? Can we grasp it in thought? We cannot.

This is the **creativity paradox**: *how can you recognize what has never been seen?*

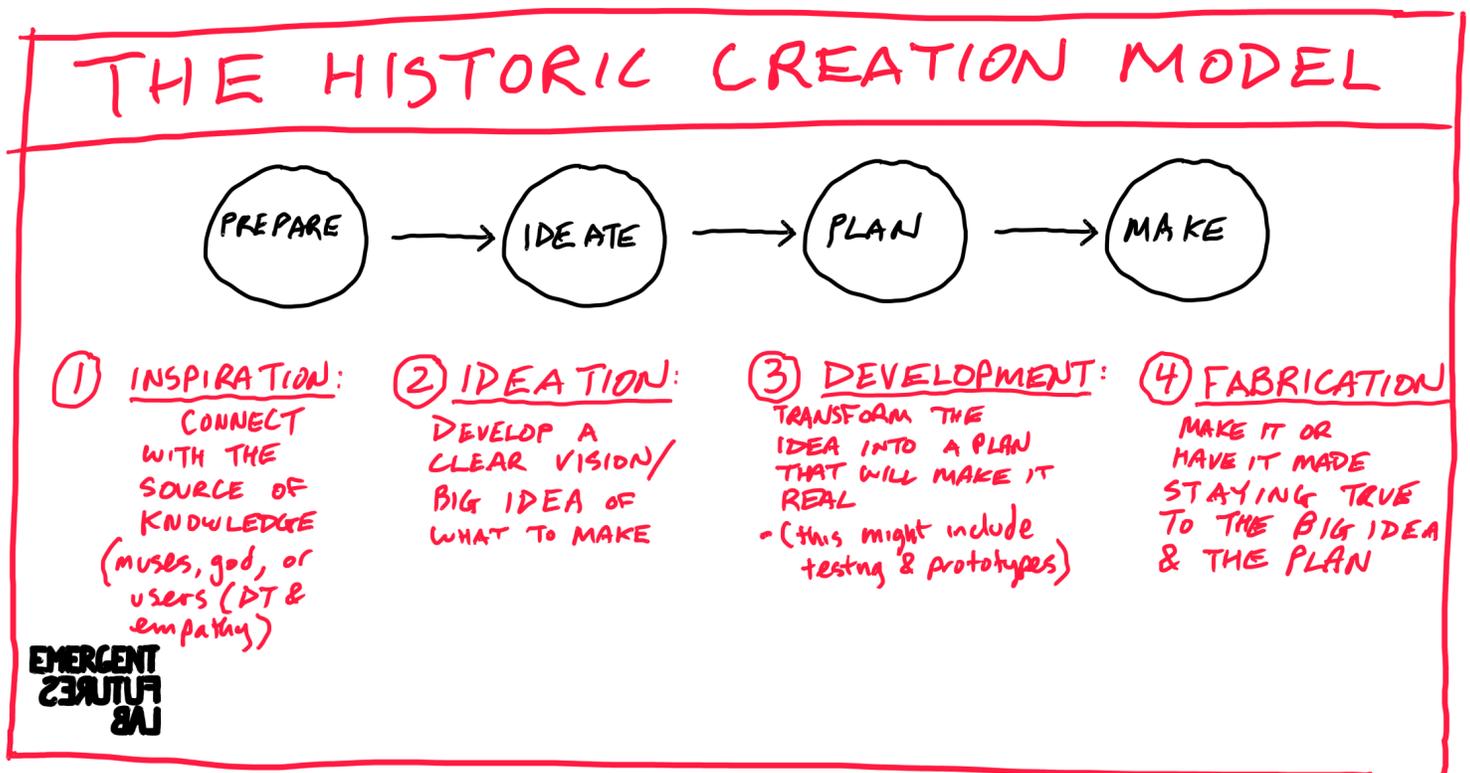
This means something fascinating and truly challenging for anyone engaging with creative practices:

If something is genuinely novel it cannot at first be conceptualized. Radical novelty at its birth is a-conceptual and non-representational.

Humans cannot independently think their way to the new...

Ideation is not an Early Stage of Creativity

The difficulty, the crux of this paradox, is that we believe that creativity is something to do with ideas that happen inside our heads as thoughts. In the western tradition, creativity has been understood to be primarily about thinking differently and developing new ideas.



4 Stages of Creation Models

This approach has developed into a four-step “ideate first” model of developing novel outcomes (the focus of part two in this series: “[Where did your Big Idea come from?](#)”).

But the “Ideas First” model falls apart: starting with, and focusing on, ideation will never lead to genuine qualitative novelty. And moving through a linear sequence of Prepare, Ideate, Plan, and Make is logically antithetical to creativity.

Here is where the central problem lies with “ideation first” models of creativity: the modes of thinking that ideation relies on are highly concept and representation-dependent. They are most often inductive or deductive forms of conceptual reasoning. And these concepts pre-exist the activity of ideation and fundamentally shape it. Ideation is thus inherently tied to the past and what already exists. And if it already exists it cannot be considered to be novel, which means: *ideation cannot directly lead to novelty.*

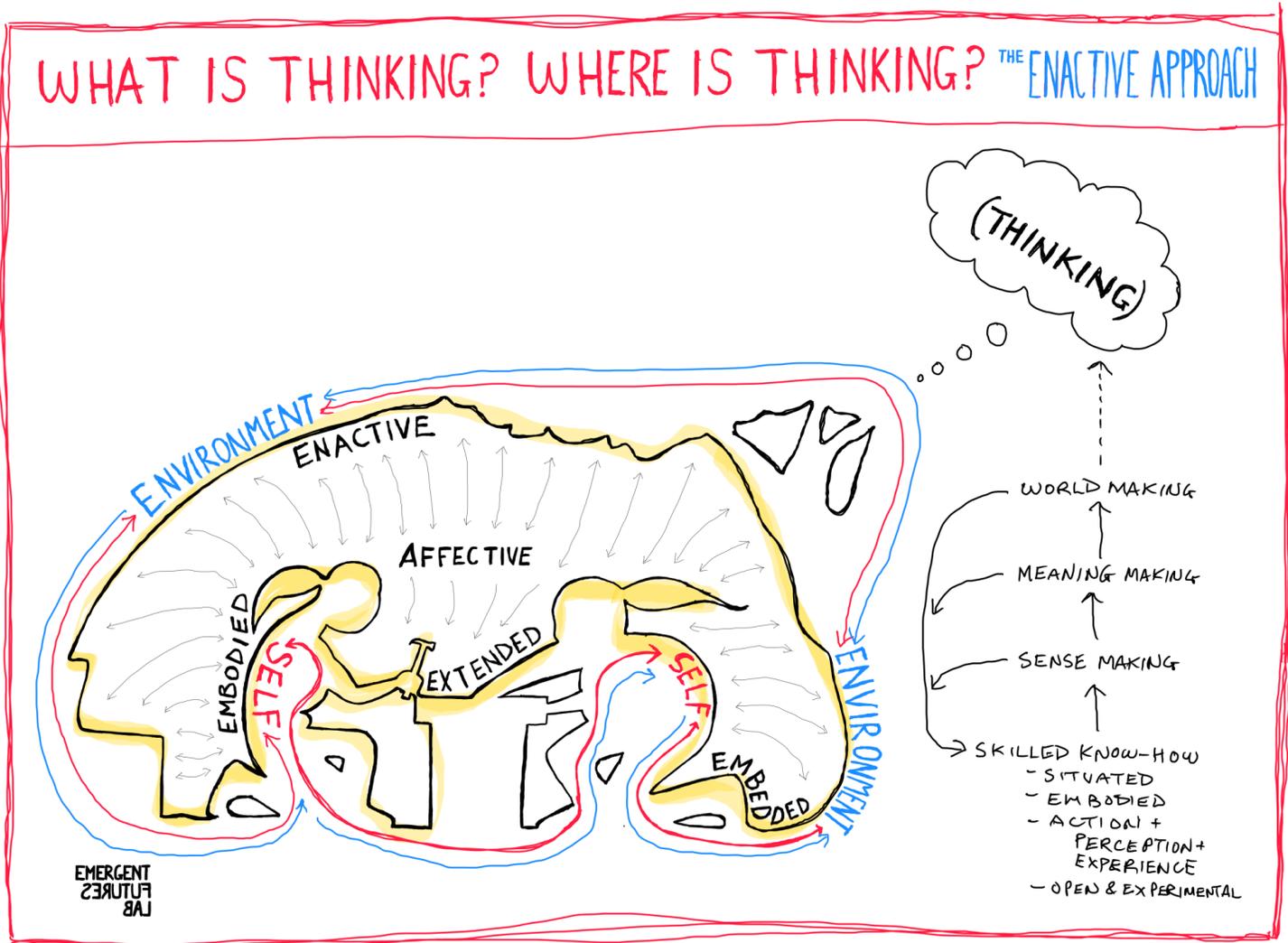
Ideation, and thinking in general, is by its very nature a fundamentally conservative activity.

How Do We Cut the Gordian Knot?

What if we change our basic assumptions:

1. Thinking is not in our heads -- *it is a worldly phenomenon*
2. Thinking does not begin with clear concepts -- *it begins in embodied, embedded, and extended doing and sensing* in the midst of an ongoing reality full of emerging novelty
3. Novelty is not a human generated phenomenon -- *but a fundamental quality of all reality*

Now the Creativity paradox vanishes: If we are not having to independently ideate the qualitatively new at the beginning of the creative process, and novelty is an emergent worldly phenomenon that we participate in -- things look and feel very different.



What is Thinking and Where Does Thinking Come From

You might be perplexed -- How is thinking not in our heads? In our previous article "Part Three: **Thinking is not in your head**" we went into detail about this critical concept from the Enactive approach to thinking (it is worth a read). To summarize:

Thinking requires a brain, but that alone is insufficient. Thinking is a relational property of a tightly networked system of an embodied, embedded, and extended being enactively co-shaping the world. In this making -- doing and thinking are always conjoined and participate with a world.

Know-How not Know-What

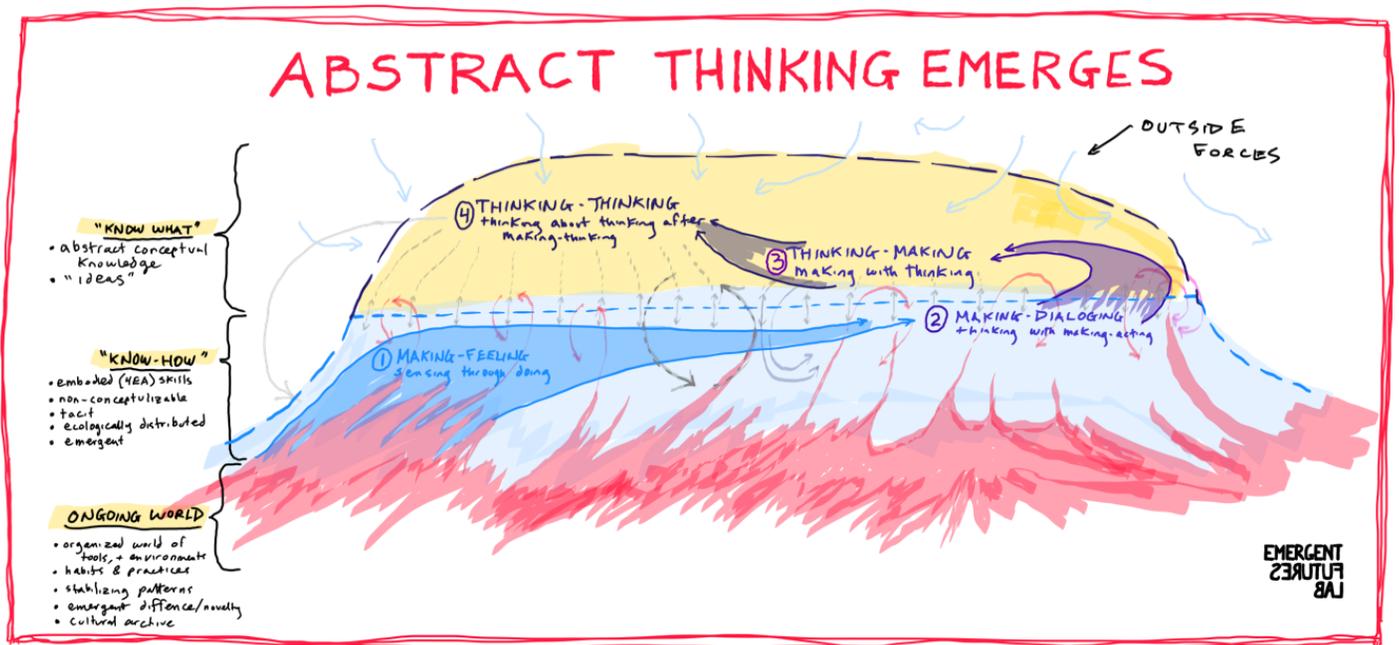
If we return to our initial question:

What is happening at the initial moment when a glimmering of the new meets us?

Francisco Varela, one of the founding theorists of the Enactive Approach to cognition, in a wonderful short book **Ethical Know-How** proposes a helpful model of how thoughts emerge from embedded and embodied action *that cannot be made explicit* -- this is what he calls "know-how". The world of know-how grounds and gives rise to what we would call thinking and ideas -- and this realm he calls "know-what".

Here Varela and the Enactive Approach draw upon the work of Phenomenological Philosophy which argues that what can be theorized, and conceptualized (explicit knowledge/thinking) arises from and is supported by a world of embodied engagement (a way of life) that is fundamentally non-conceptualizable.

This model is really helpful with our question, because for Varela conceptual thinking does not first arise from other conceptual thinking but from the world of Know-How -- the realm that is not explicable with clear concepts. And it here that we first meet and engage with novelty. Spontaneously arising differences meet us in our ongoing doing. And only via a process of engagement, that is at first non-cognizable, does the new slowly emerge as something that stabilizes and can be conceptually thought.



4 Stages of Emergent Abstract Thinking

We can lay this out as a series of steps (see above diagram):

1. Novel thinking first emerges from embodied novel actions in novel environments as a vague sensation that accompanies action (Making-Feeling). It is something felt as a disturbance in our embodied sense of “know-how” (Know-how is all of the knowledge that is in our bodies, environments, habits, and practices that is non-conceptualizable).
2. As we engage with things and their embodied affordances vague sensations transform into hunches and quasi-thoughts (Making-Dialoging)
3. These affordances and embodied hunches slowly take a more understandable and distinct shape via further activity, environment shaping, tool construction, practice formation, and worldly experimentation and become something like what we would call an unformed idea (Thinking-Making)
4. Concepts — those fully formed things that are tossed around in brainstorming or ideation sessions are the final step in this process (Thinking-Thinking)

What of Ideation?

Does this mean thinking and concept generation have no role in creativity? Of course not. Thinking and concepts matter. But it is a question of when, in what form, and in relation to what other ongoing activity.

The mistake is forgetting how thinking arises and where it occurs. Thinking is an embodied and distributed process. It is engaged, it requires moving and doing. It is environmental and tool-based.

We need to spend less time in the world of language, high-level concepts, sterile board rooms, and brainstorming sessions early in the innovation process and more time in the messy perplexing world of highly engaged experimental doing.

Here we meet differences as differences -- unknowable but just ever so slightly sensible as something odd.

Do you have favorite techniques for this? We would love to hear your thoughts.

This is the fourth of seven articles critically deconstructing the concepts of creativity and innovation as they have historically developed in the west with the goal of proposing alternative approaches.

Part One we look at how creativity, in the sense of the making of something genuinely new, was not part of the western tradition until the mid 1800's. And that for the previous 2,000+ years to create was to copy.

Part Two we delve into "**Where did your Big Idea come from?**" We go on a genealogical journey to discover how we came to believe those big ideas are both the source and goal of creativity and innovation.

Part Three we unearth the overlooked "**Thinking is not in your head**" - Thinking, especially creative thinking happens in the middle of *acting* and *doing*.

Part Four we examine "**The New Cannot be Seen or Thought**" -- so how does the new emerge if it cannot be seen or thought?

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Part Seven - **Creativity is Less** - dives deeper into affordances introducing constraints and how they are the unheralded secret to all innovation

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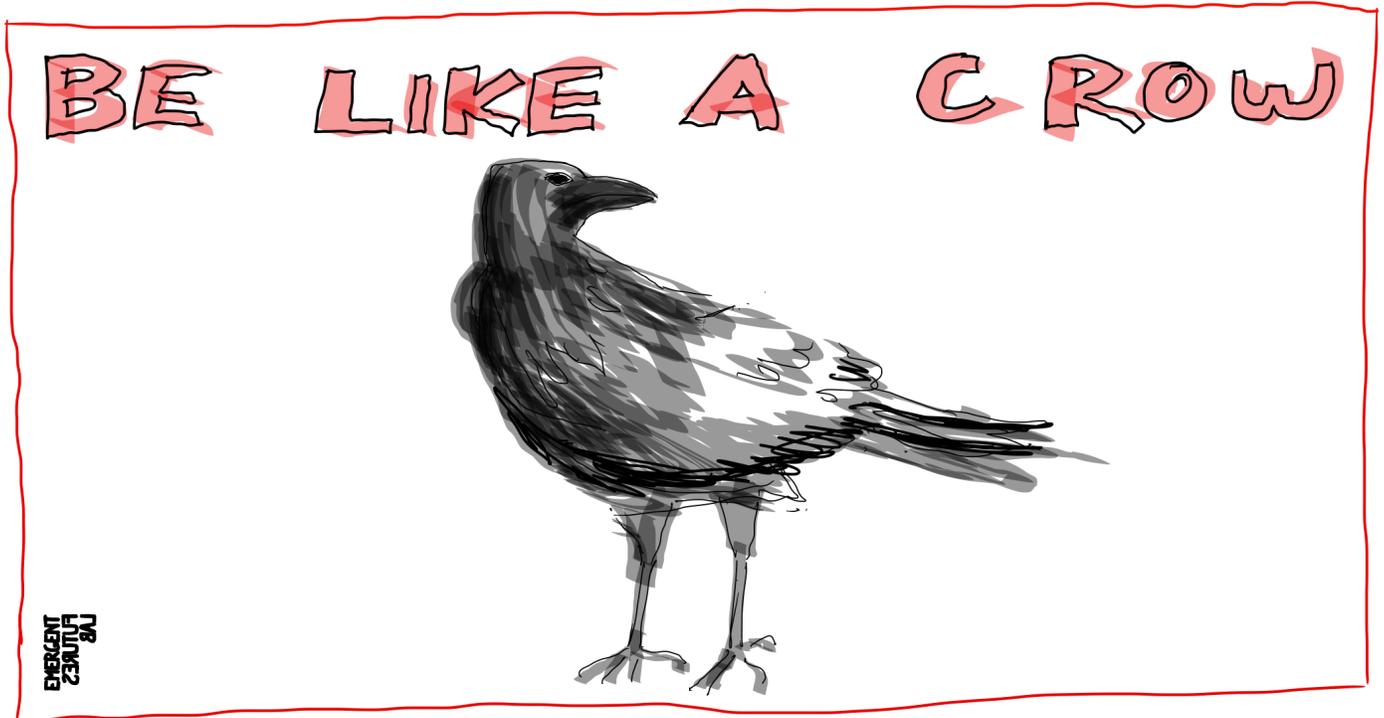
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Creativity “And What Else Can It Do?”

By Iain Kerr Jason Frasca



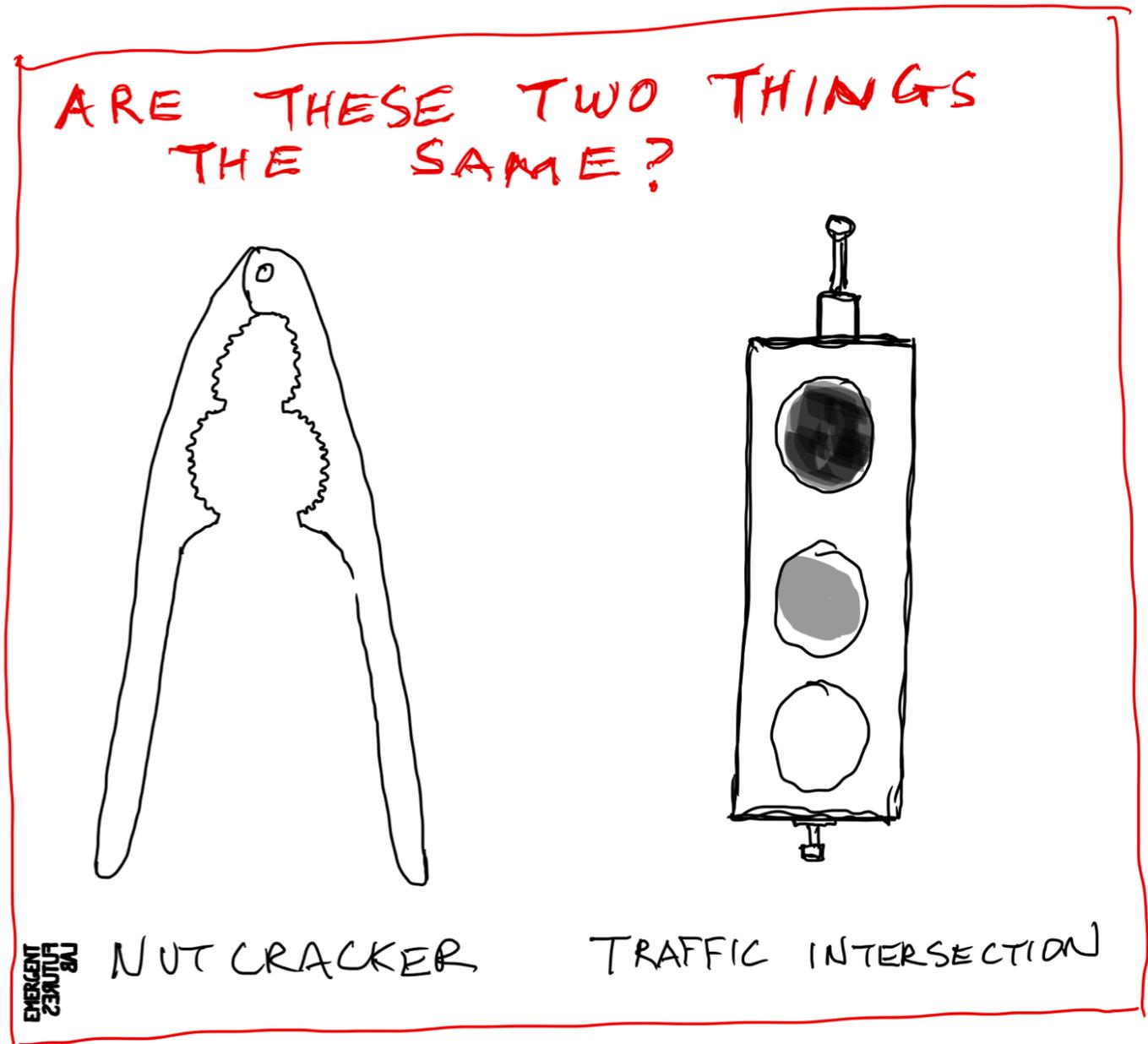
Crows ask: “What Else Can This Do?”

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Creator: Forget your Intentions! (the crows are coming)

Here is a question for you: *are these two things the same?*



Are These Two Things the Same: A Nutcracker and a Traffic Light

On the left is a normal everyday nutcracker and on the right is a busy intersection with traffic lights and cars (you are going to have to imagine this -- we are not that good at drawing!).

We get it if you are hesitant to answer — the scenario has the set-up of a trick question, and who wants to fall for a stupid trick...?

Not only that -- what do we mean by "the same"?

Obviously, they are superficially the same — both are made of atoms, both are images...

If we put these highly abstract or philosophical approaches aside for a minute: Clearly they are designed for quite different purposes.

But is that the end of the story? Are these simply two very different things?

On the surface it would seem that way:

One is small and just cracks nuts, the other is large and quite complex and keeps the flow of traffic safe and efficient.

Perhaps you are thinking ironically and humorously: *they both crack things. One cracks other cars and the other nuts!* One intentionally cracks things and the other unintentionally...

Stupid humor is the site of great insight: If we ignore intentionality: both have a similar *capacity, crushing*.

Now you might think this is equally abstract, far removed from everyday life way too philosophical.

But if we were hanging out at the right intersection debating this, in the midst of all of our crazy talk, crows would arrive.



COMMON CROW

A Common Black Crow

They are now sitting above us on a powerline. What someone designed with the intention of carrying power has also become a perch.

The crows are taking flight and landing directly in front of stopped car wheels. We see the light is red and as odd as this is, the crows are safe. They drop something and fly back up to their perch.

Shortly the light turns green, cars move, there is a series of loud cracks. But then the light turns red again, and the crows spring into action. Landing back on the road directly in front of the cars they start eating. Those were nuts they had placed on the road!

So why is this an interesting story for innovation?

It has to do with the simple and radical fact: nothing -- no object, no idea, no system is its purpose or identity. Or to be more precise nothing can be reduced to its intended purpose. Everything is far more than that. The crows were in no way concerned with understanding what a traffic intersection really is.

From the perspective of a crow -- and innovation, *it does not matter what something's identity or designated purpose is*, all that matters is:

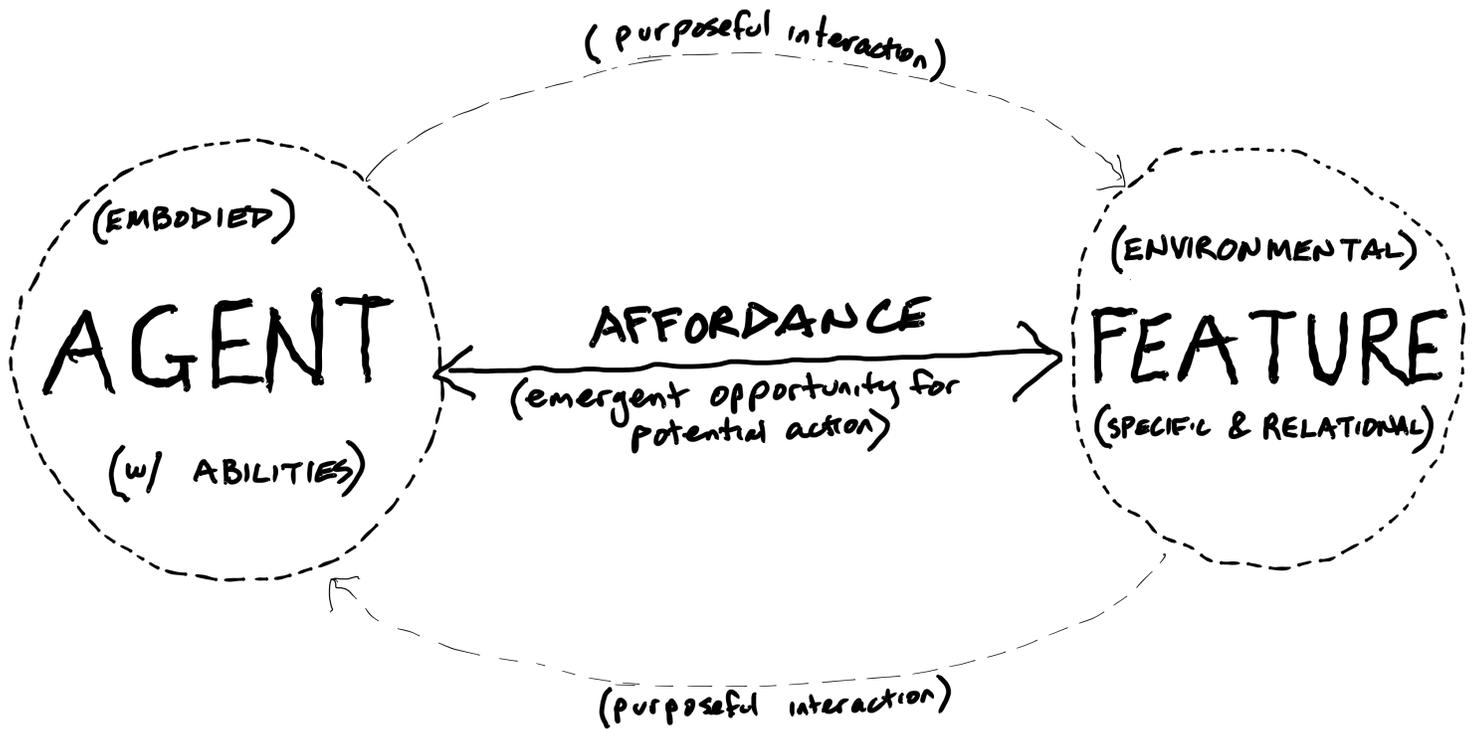
What can it do? What does it afford?

On Affordances

We might be admiring how creative and smart crows are, which is only fair, they possess many complex reasoning skills we admire. But it would be a mistake to think what just happened is unique in the sense that only crows ignore purposes and discover other uses for things.

All living things are directly enmeshed in their environment in this manner. They are embodied beings in action connecting with what is around them by what it directly *affords* them. This is not done via thoughtful introspection but directly and immediately: a squirrel darts under a rock, and we lean our elbow on a table to rest our heads.

Affordances are the emergent possibilities of a total situation. When cars, traffic lights, roads, trees, and crows come together in a specific manner the situation affords the crow the novel creative possibility of nut-cracking.



Affordance is an Emergent Opportunity for Potential Action

The Gibsons, who developed the concept of affordances and co-founded the approach of Environmental Psychology, were adamant about this point: Affordances step out of and negate the subject-object divide. An affordance is neither in the thing nor is it in us: it is the outcome of a situation. Thus an affordance is best thought of as a directly sensed “opportunity for potential action”.

Features only show up as what they “are” in action. (This connects back to our Crow — things or in this case features are what they can do in a certain context for a certain subject (the crow for example).

Features are relational.

You cannot “see” them by being a disinterested neutral observer of reality — they only emerge in action or when following action (use).

Think of how often in the course of the day we use whatever is handy to do things: we step on a chair to change a bulb, or a dishcloth to grab a hot pan, or a large mug as a smartphone speaker. In these moments we see the world around us directly for what it *affords*.

Tools are Stabilized Affordances

If the world around us is experienced directly in this manner that means every *thing* we engage with is experienced in this manner. A coffee cup, the table, the chair -- look all around you: everywhere affordances -- opportunities for potential action.

One could easily push back: these are intentionally made things *that have a purpose* -- they are fixed, obvious, and objective.

But, while it is true they are intentionally made: the coffee cup handle is only a “handle” if you have a hand. *The features of things or creatures that we are talking about are not neutral, obvious or objective* -- they are situated relational emergent capacities (A chair “seat” only exists for those who could sit in it — no spider or crow thinks of a chair as being a tool for sitting. “Chairs” don’t show up for spiders or crows).

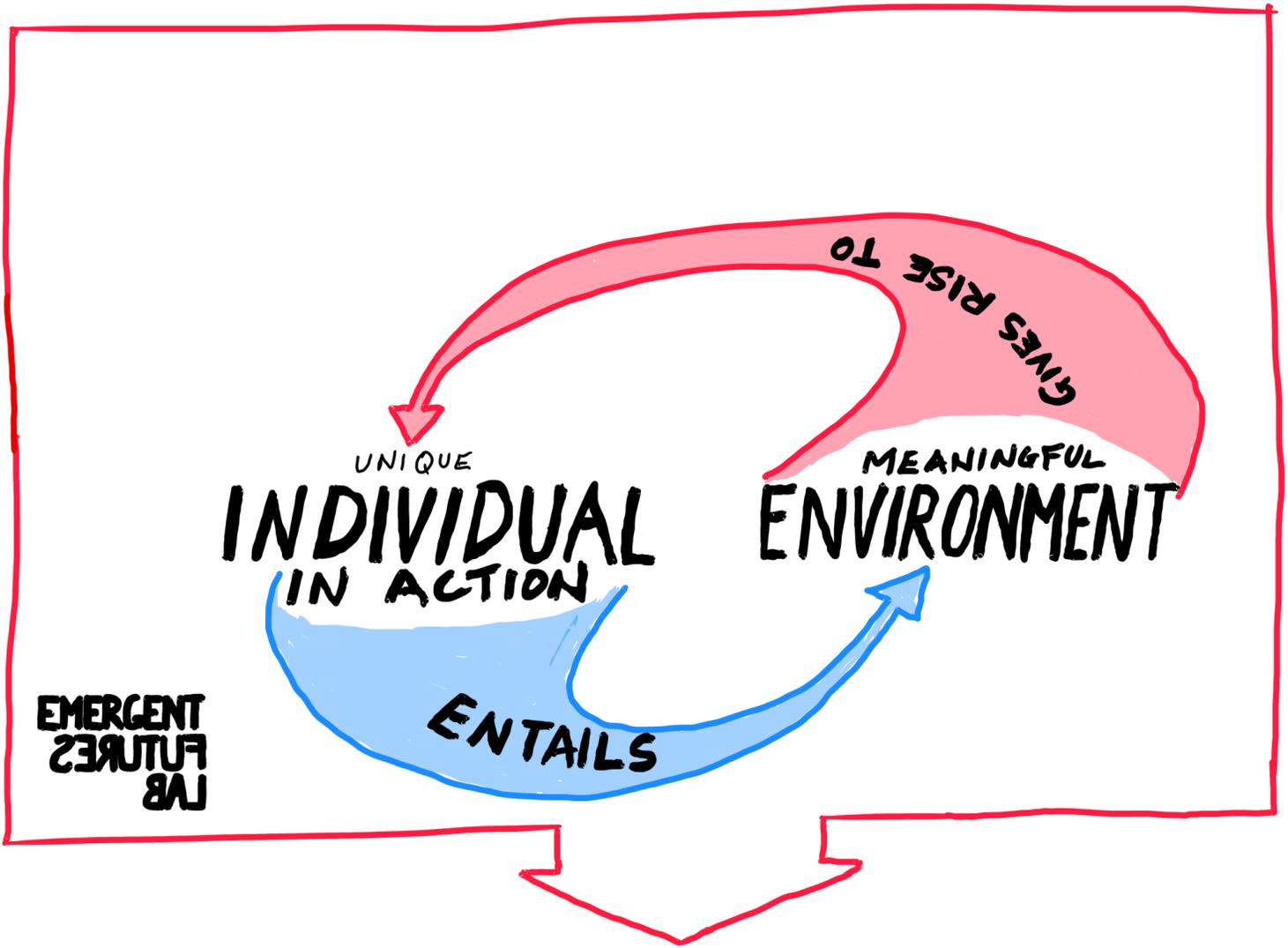
Things -- objects that we have designed with a purpose in mind *are transformed and stabilized affordances*. We, like the crows, move from a noticed affordance to stabilizing them via tool making.

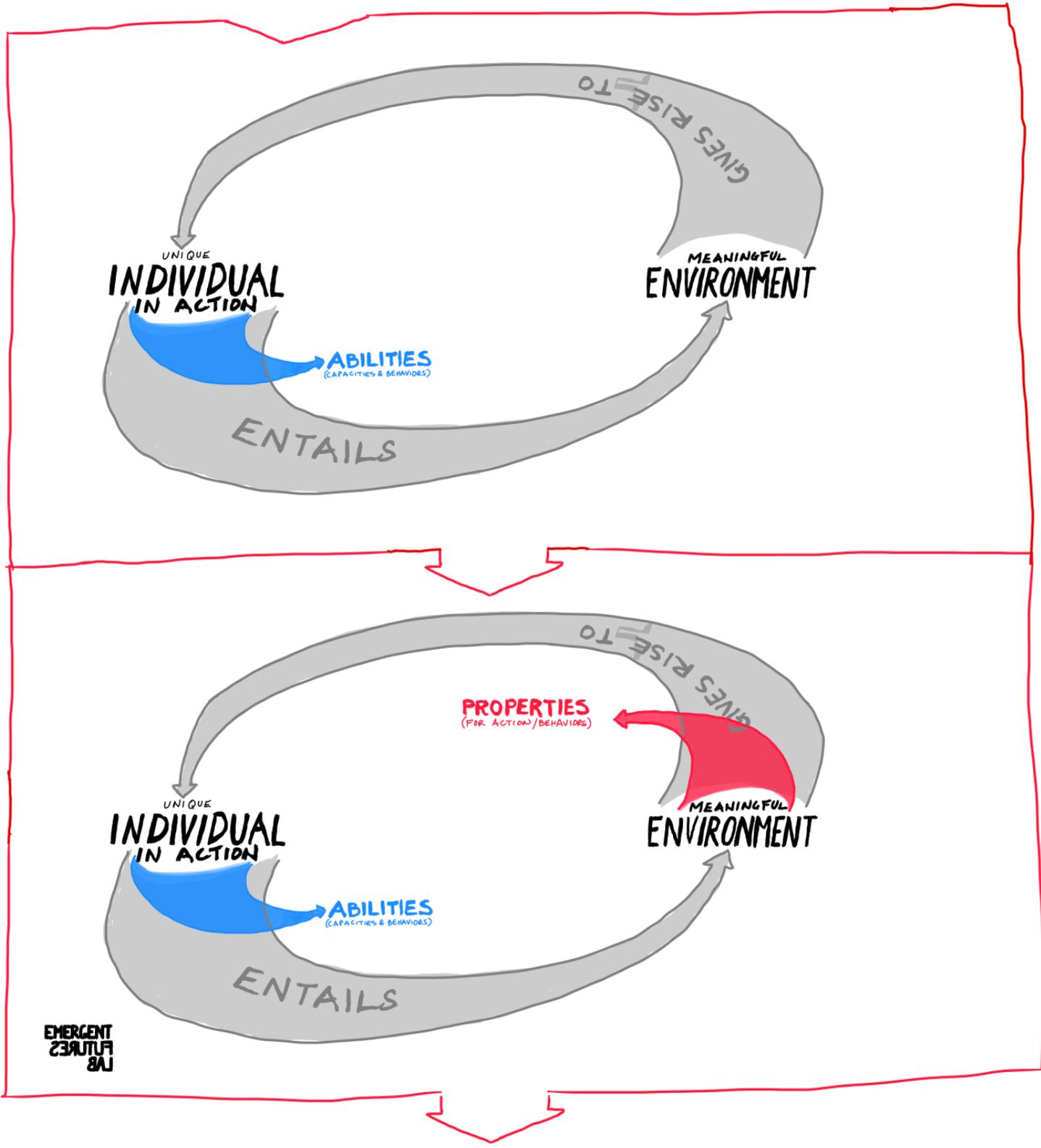
And if objects -- tools -- are stabilized, transformed, and materialized affordances, then concepts (what some might call “ideas”) are abstracted and stabilized affordances that accompany stabilized and transformed environments and tools.

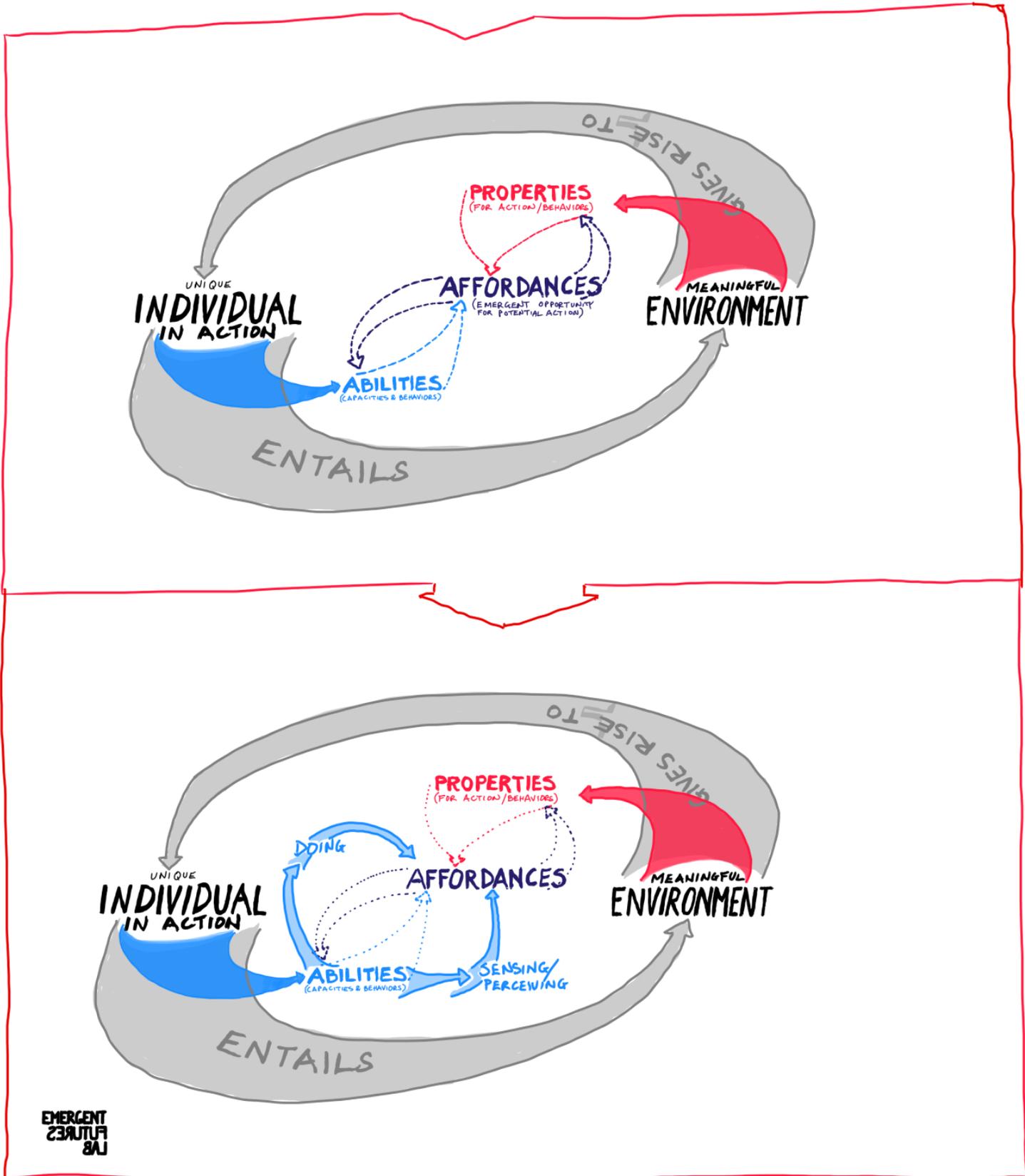
Thinking dwells in the midst of affordances that allow for and ground all of our ongoing actions.

We stabilize and transform these from raw objects into tools and concepts. Consider how a found stone was once used as a hammer, and that noticing both how it works and how the rock breaks -- it afforded shaping and transformation into a hand axe. Accompanying this emergent tool were habits, practices, transformations of the immediate environment, and the emergence of proto-concepts: hitting, crushing, cutting...

In our previous discussion of embodied cognition and the self-organizing nature of reality (see parts three, four, and five in this series) we laid out how conceptual thinking arises in a distributed manner from acting and doing --situated know-how which itself is embedded in and arises out of the spontaneous and self-organizing processes of reality. Now with the concept of affordances, we can add a clear diagrammatic explanation of how that process works:







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Here perhaps it is useful to amend our earlier quote from Micheal Anderson ([Newsletter #7](#)):

“ We are [embodied] social environment-altering tool users [*directly engaging with and supported by a dynamic highly creative self-organizing reality*]. [*Engaging with this creative*

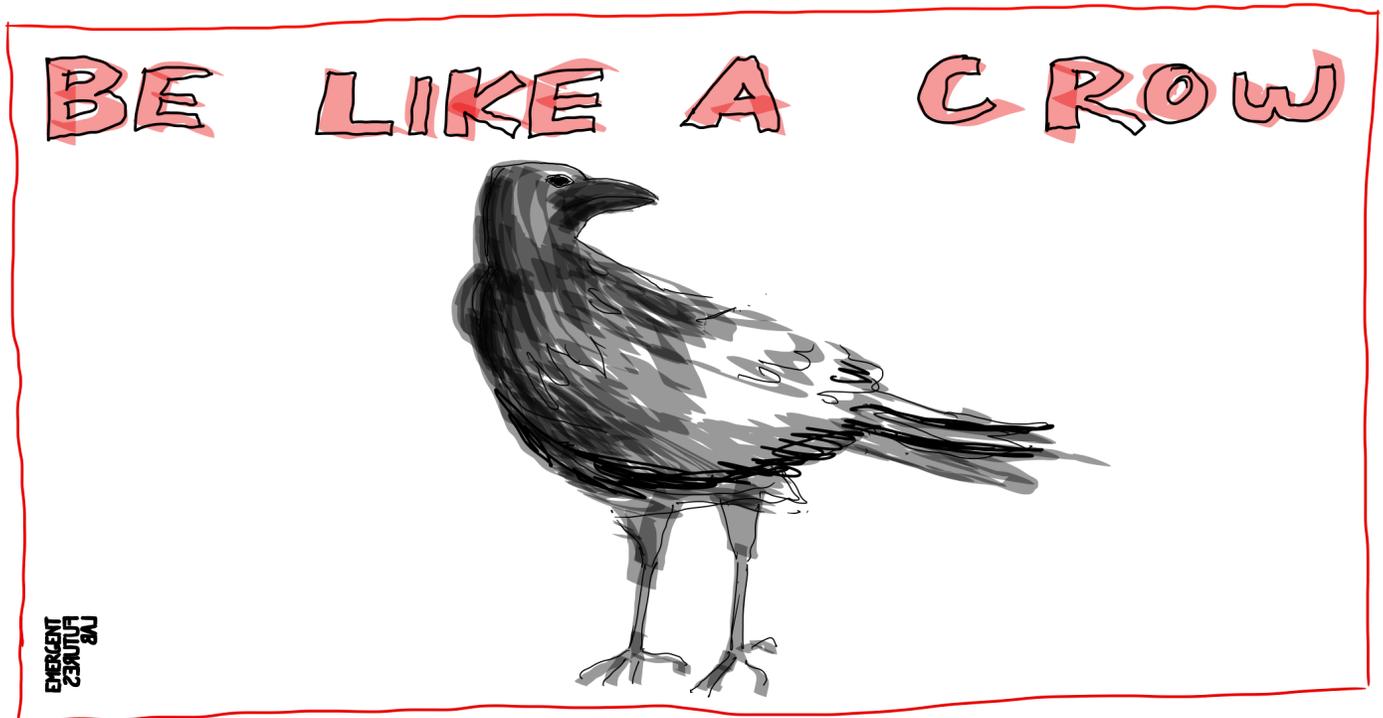
novelty infused reality via stabilizing habits and] tools give us new abilities, leading us to perceive new affordances, which can generate new environmental (and social) structures, which can, in turn, lead to the development of new skills and new tools, that through a process... of scaffolding greatly increases the [novel] reach and [creative] variety of our cognitive and behavioral capacities."

This never ends:

As we saw with the traffic intersection, all intentionally designed things have as much potential for becoming a new affordance as bare rock. While my coffee mug has a fixed form and purpose, it is infinitely haunted by as yet non-existent possible affordances. If we change our habits, practices, or even our mode of embodiment this will lead to the emergence of radically novel affordances. These will be events at the edge of our perception and sensing -- that oddness whispering to us:

Here is another path...

Here is a portal to the new...



Be Like a Crow - Look for Affordances in all you Encounter

Really Be Like a Crow

To “Be like a crow”: don’t fixate on purpose, intentions, or identity — rather start using things in novel ways to discover what all else they might afford. But don’t stop at one possibility — keep experimenting to discover more and more non-intentional possibilities.

For us, becoming a crow is to realize that:

1. nothing is reducible to its seeming purpose or intention
2. the discovery of new possibilities can only happen through our experimental *use*.
3. The new will not emerge as a concept
4. Sensing novel affordances is to sense a provocation for action
5. Late in this adventure novel concepts might start to emerge
6. It’s not about “ideating” but doing and following while keeping the difference of a novel affordance alive long enough to allow it to make a world

From “What Is It?” — to “What Can It Do?”

We, as innovators, are ultimately simply interested in affordances and effects and working with these to have a novel effect on something. We wish to judge things not by “what they are” in perfect isolation — but by what they afford and what effects they can produce in specific circumstances.

Not “what it is” — but “what can it do”...

But this never stops: “And what else can it do?” — This question keeps repeating as novelty emerges in experimentation...

Developing a way to “be like a crow” — a “crow becoming” so to speak is a critical first step of innovation.

And what all else is possible?...

This is the sixth of seven articles critically deconstructing the concepts of creativity and innovation as they have historically developed in the west with the goal of proposing alternative approaches.

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Creativity is Less

By Iain Kerr Jason Frasca



Creativity is Constraints

Part One: More on Affordances

Affordances, as a technical term, means: *the latent opportunities for a particular set of actions of a correctly skilled subject "in" an environmental feature.*

Think about the coffee cup you are holding as you read this on your device of choice. It affords many potential actions: grasping, tilting, and sipping. It also affords easy stable placement. It affords keeping the coffee reasonably warm and not burning your lips.



Steaming Hot Cup of Coffee

Affordances make up our immediate world. Look around you, everything is “affording” you effective streamlined action. The very floor under your feet being smooth affords

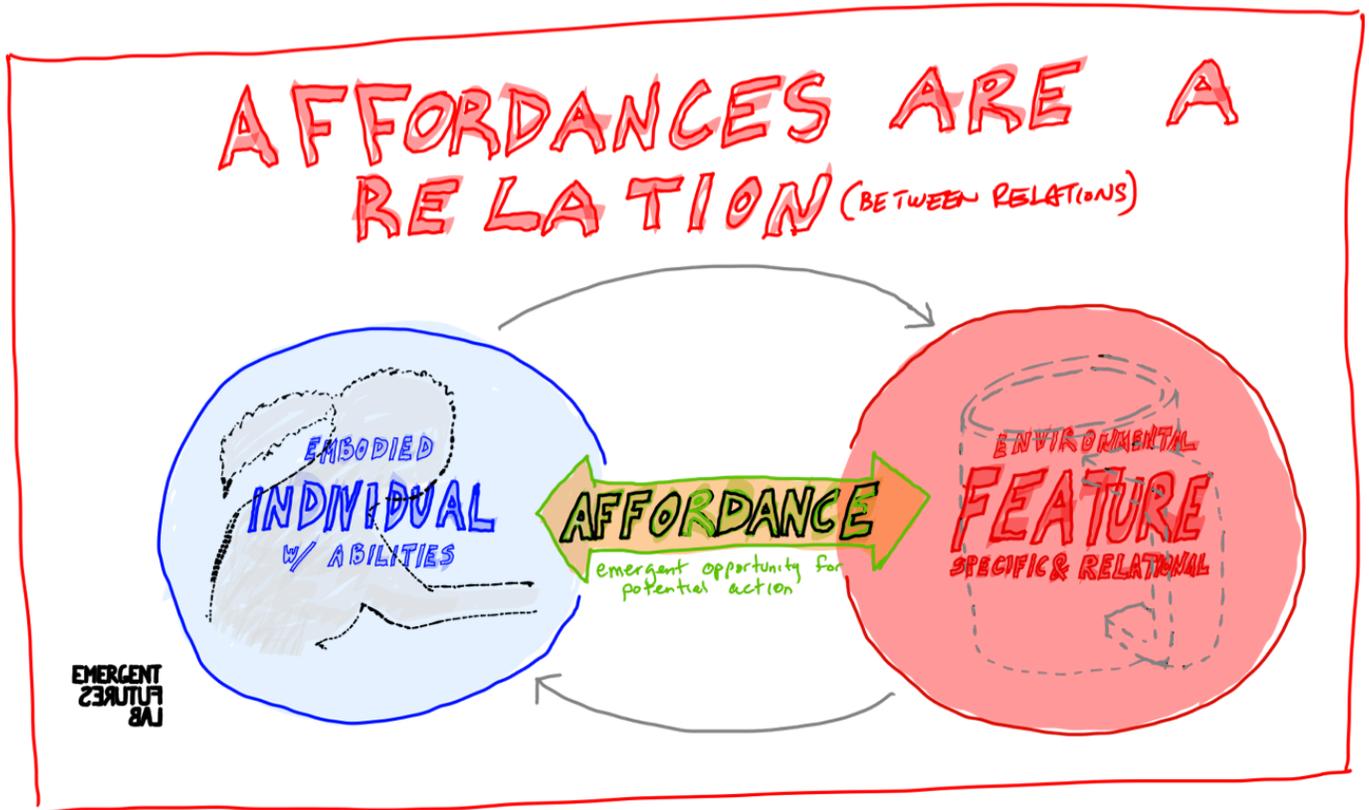
unconscious efficient movement without looking.

All living things are directly enmeshed in their environment in this manner. They are embodied beings in action connecting with what is around them by what it directly affords them. This is not done via thoughtful introspection but directly and immediately: a squirrel ducks under a rock, and we lean our elbow on a table to rest our heads.

This is a critical point, most of our knowing and understanding are of this kind: it is our skilled know-how directly engaged in activity with what the environment directly affords us.

Affordances Are Not In Anything

But is the affordance really "in" the cup?



Affordances are Relational Between object and Individual

Could you have this affordance of grasping if you had cat paws or crow claws?

The coffee cup affords us, with our particular physical bodies and skills, grasping.

The Gibsons, who developed the concept of affordances and co-founded the approach of Environmental Psychology, were adamant about this point: An affordance is neither in the thing nor is it in us: it is the outcome of a situation. Affordances step out of, or negate the subject-object divide. Affordances are the relation -- the dance and dialog that has stabilized between us and things.

“Features” can only show up as what they “are” in action. Environmental *Features are relational. It is as if part of “us” is in the feature and part of the feature is in us:*

This is precisely why the Embodied tradition of cognition talks about how we are Embodied, Extended, and Embedded:

- Our particular unique embodied physical beings matter
- What extends us out into and connects us with the environment (shoes, glasses, knives, smartphones, etc.) matter.
- The surrounding material landscape in which we are embedded matters.

AND when you put it all together what emerges is not simply a coming together of neutral physical elements -- but the ENACTMENT of a directly meaningful environment -- a holistic world of affordances. A seemingly magical world that “works”.

It is precisely an *Enacted World* because one cannot “see” it -- or them (the affordances) by being a disinterested neutral observer of reality (if such a thing could even exist) — this world only emerges -- is enacted -- in action.

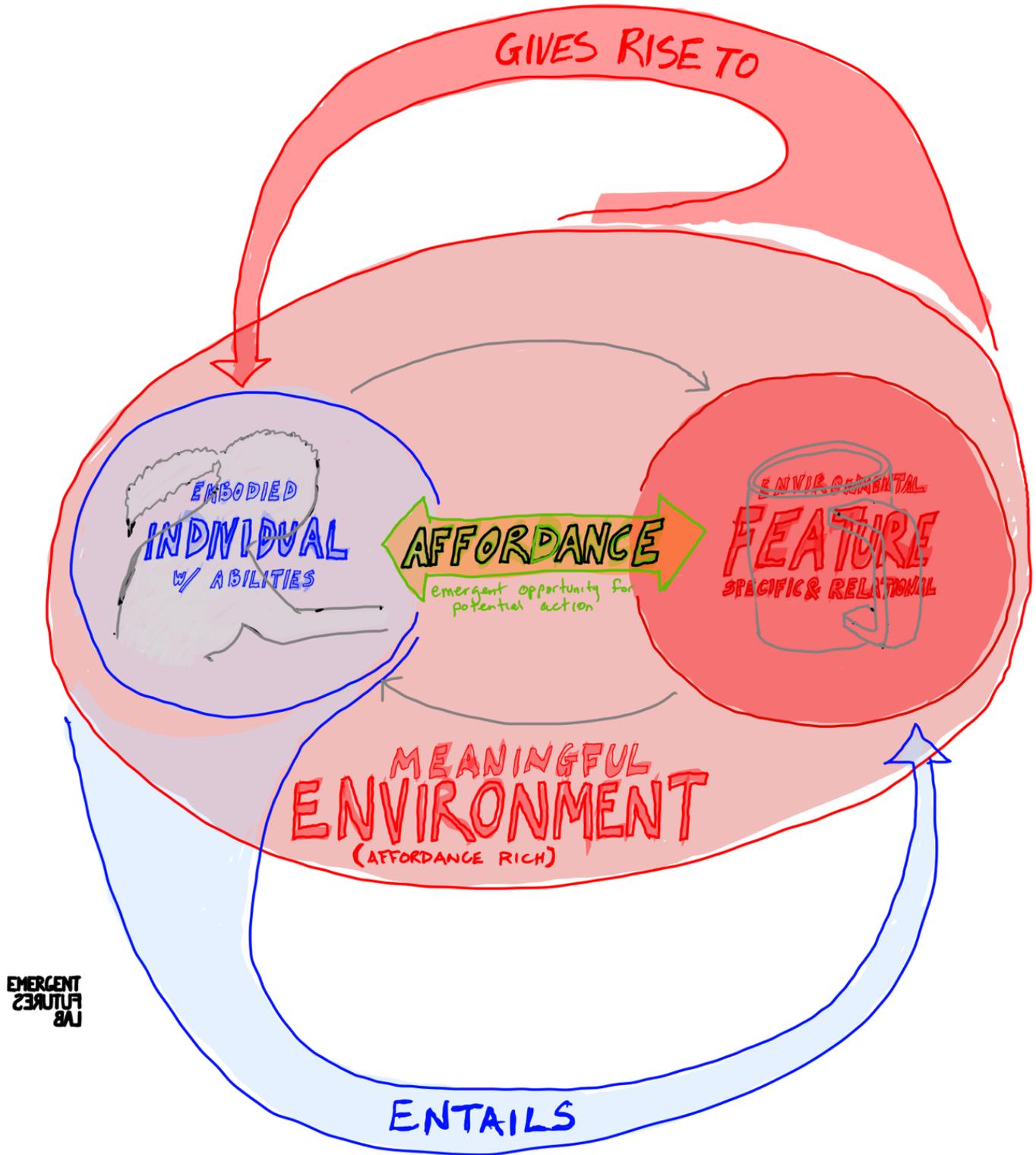
The dance and dialog is *worldmaking*. A world that emerges from the middle. Literally: once we put together Embodied + Extended + Embedded the “system” snaps into a new state: a world of affordances emerging and always growing from the middle.

Think of how often in the course of the day we use whatever is handy to do things: we step on a chair to change a bulb, or a dishcloth to grab a hot pan or a large mug as a smartphone speaker. In these moments we see the world around us directly for what it *affords and we can sense the web of a world -- our world.*

Surfing a Dense Web of Affordances

We live in an environment that we have transformed to be totally loaded with affordances.

But we are not unique in this: All living beings live in similar environments that they have played an active role in shaping. All life is to some degree enactive -- it is intimately and irreversibly conjoined with an environment that it co-shapes. All life lives as coupled beings: subject-environments in the dance of action and co-shaping.



Affordance is an Emergent Opportunity for Potential Action

We humans are hyper environment shapers. We have shaped every part of our immediate worlds. This is not inherently a bad thing or a destructive thing, for after all to be alive is to be

and to co-shape an environment. To be able to act whatsoever is to be an environment-in-the-making. To be able to think whatsoever is to be an environment.

It is worth pausing on this for a moment. ***You are not a discreet individual.***

You're an individual [+] environment [=] coupling.

And you're a very, very, integrated couple -- you and your environment. This integration both allows for creativity and also makes it very hard (as we will return to something).

Tools are Stabilized Affordances

If the world around us is experienced directly in this manner that means *everything* we engage with is experienced in this manner. A coffee cup, the table, the chair -- look all around you: everywhere affordances -- opportunities for potential action.

Things -- objects that we have designed with a purpose in mind are transformed and stabilized affordances. We move from a noticed affordance to stabilizing them via tool making.

What does it mean to stabilize something -- first we are talking about the process of creation and creativity, and secondly, we are talking about the process of constraining the possibilities. This is a critical point: creating, and creativity involve seeing processes emerge that afford possibilities and then constraining the dynamic system so they become stabilized and do not dissipate (we will come back to this shortly).

Part Two: Constraints

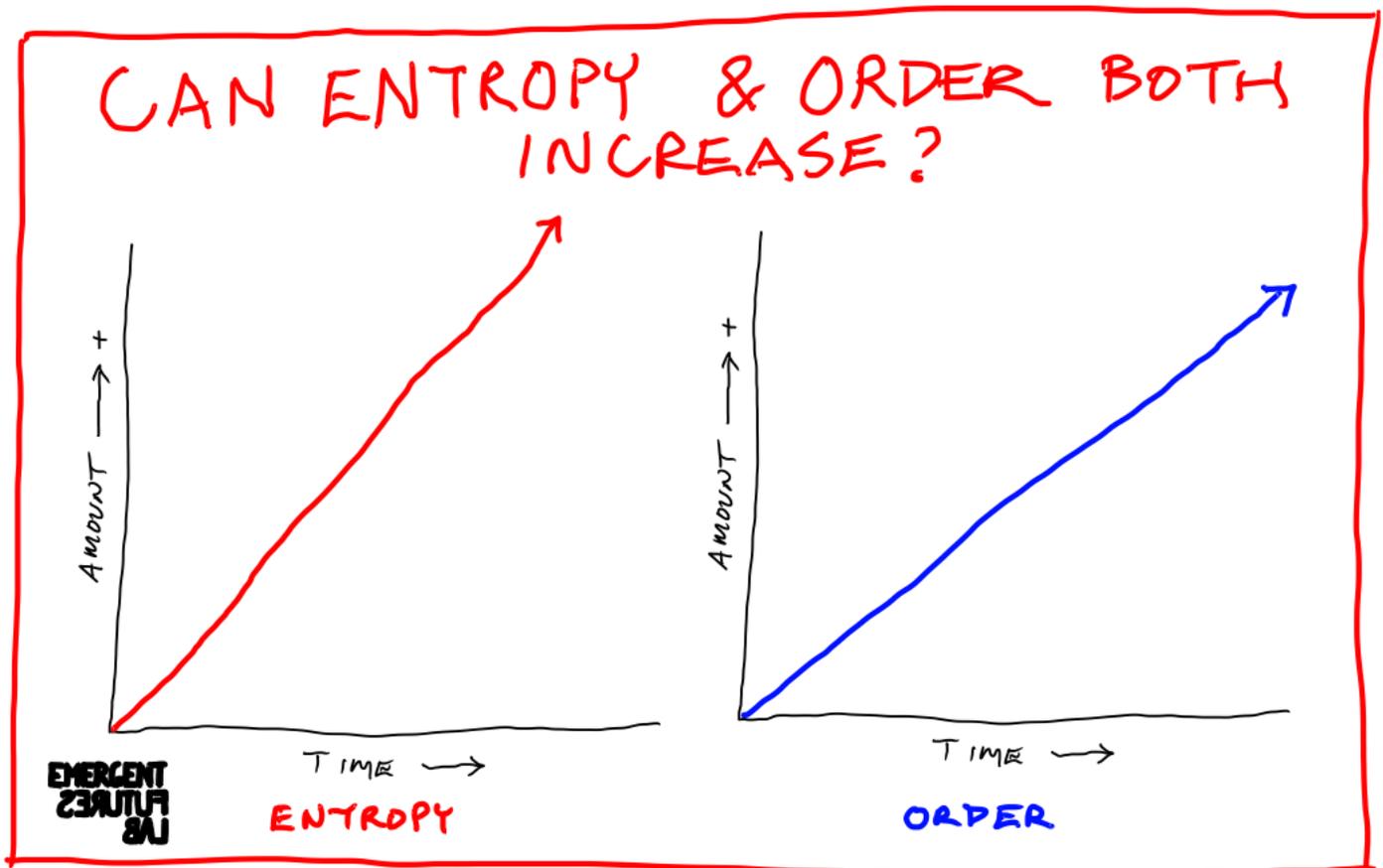
Constraints are clearly critical to making things -- we need to constrain the clay from dissolving to get a coffee cup. We need to constrain the coffee from cooling down too fast to get a good cup of coffee. We want certain affordances we notice to become more "real" -- our forms of creativity are all about sensing potential affordances and making them more present by constraining their dynamics so they do one thing and not another.

Everything Dissolves and Everything Organizes

The basic law of the universe is that entropy is increasing. Everything is falling apart, energy and order are dissipating and eventually, the universe will become a homogeneous near nothing. That's the second law of thermodynamics. The universe is moving towards homeostasis.

But all around us, we see order -- things seem pretty organized and pretty creative: mountains are forming, new life forms are emerging, and a new version of candy crush will be out any day now.

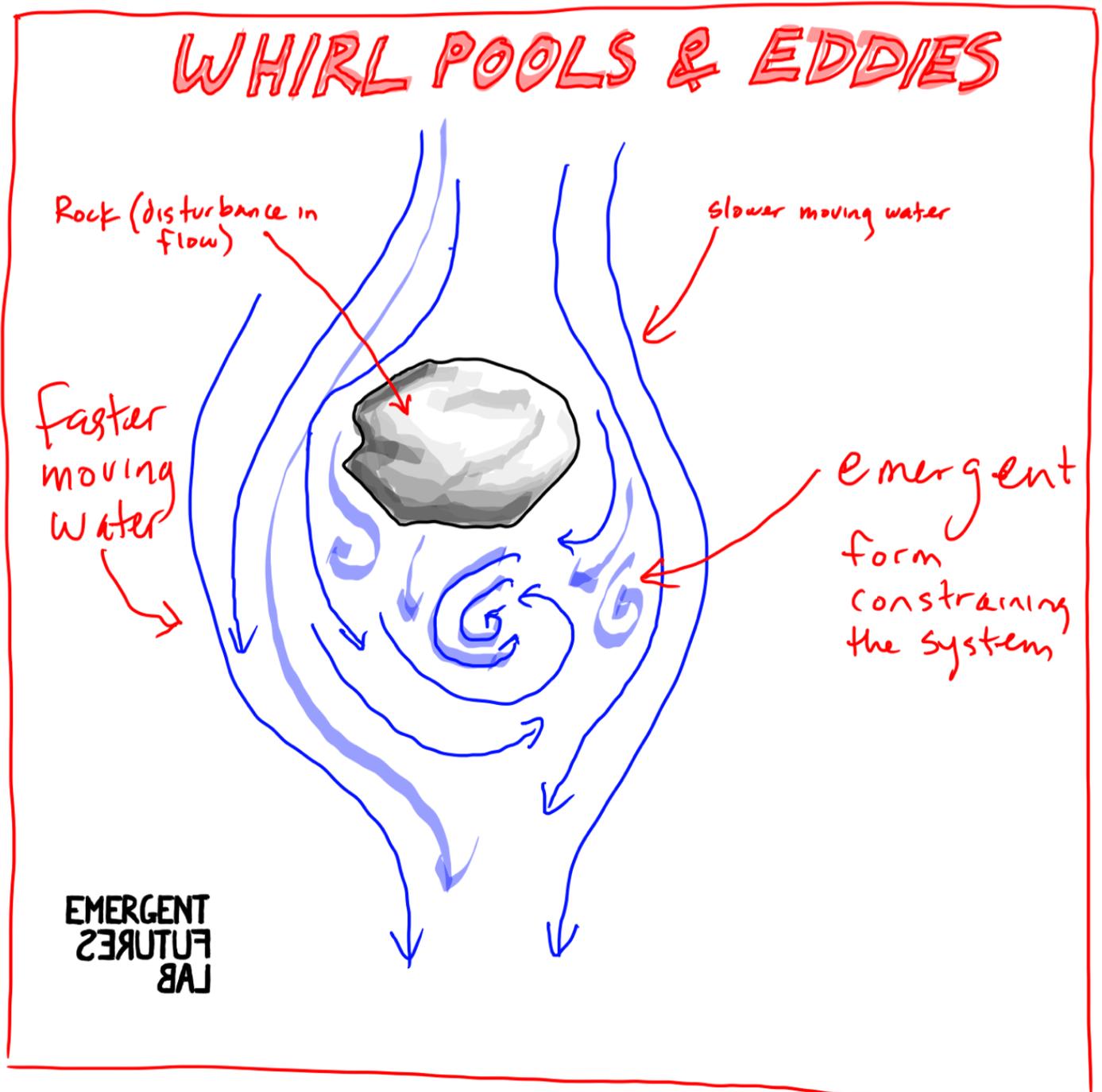
All around us we see non-living matter self-organizing spontaneously (the morphodynamics of self-organizing systems) into forms and living things maintaining themselves, evolving, and propagating. Creative dynamic systems are everywhere and everywhere more creative.



Entropy and Order Both Increasing

How can this be? How can the universe be dissipating and organizing at the same time? How can both be true?

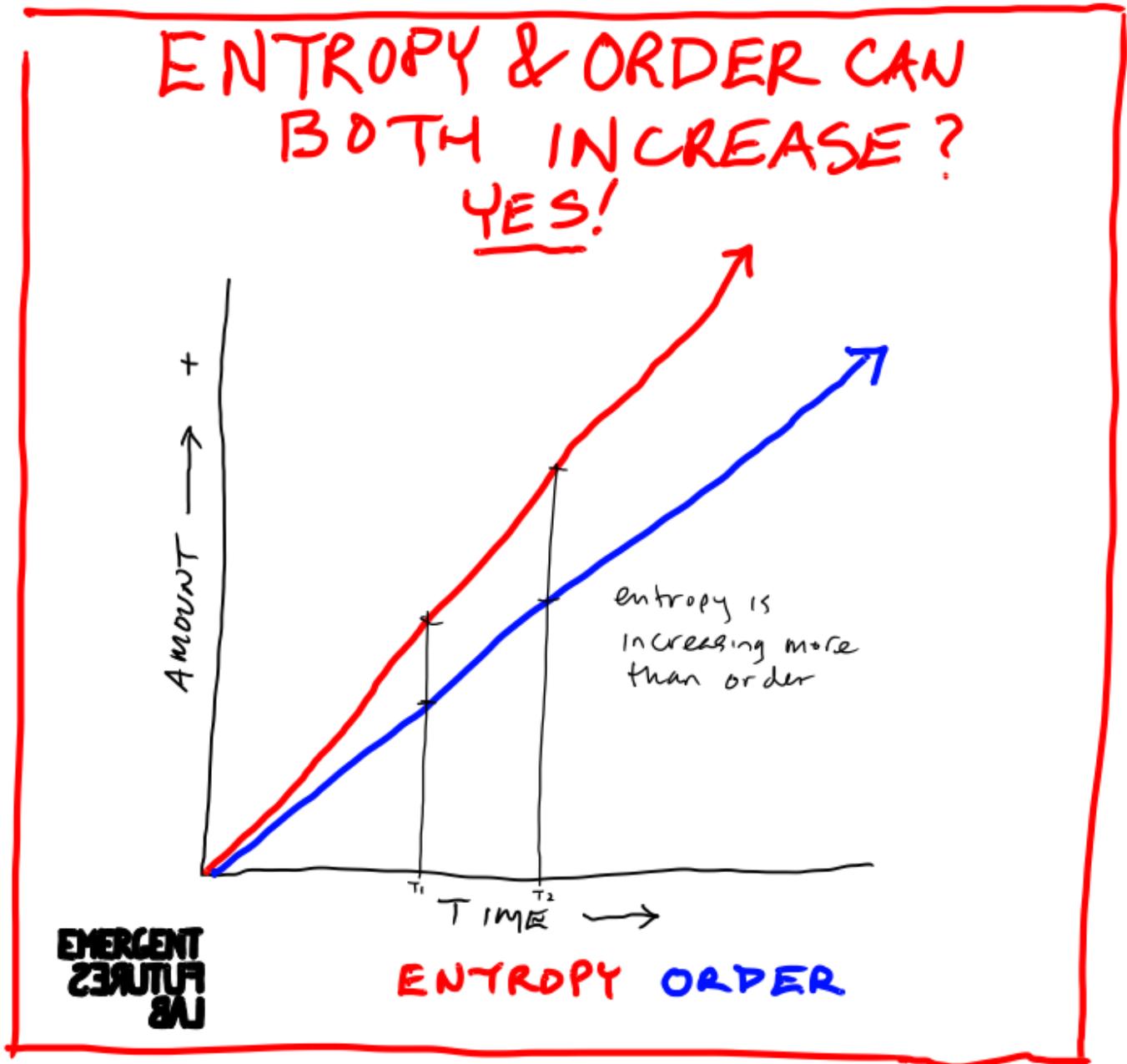
It turns out that, as Ilya Prigogine pointed out, this is not so hard to explain in the big picture: Energy is more efficiently dissipated by order.



A Whirlpool and Eddie Created by a Rock in a River

A whirlpool is a great example of this. The whirlpool is created by a disturbance in the chaotic flow of water and forms as a system that takes a specific semi-stable form by limiting all of the possibilities of where water could go to one pattern, but in doing so energy is dissipated faster than it would be if the system was less coherent.

There is always an excess of entropy and spontaneous order. Entropy is increasing more than order, but this does not mean that order is not also increasing -- it is just increasing at a lesser rate.



Both Entropy and Order Can Increase Simultaneously

We live in an excessively creative world with ever more order and creative and novel order emerging continuously.

What matters to us is that the dynamics of order is *constraining* the infinite dissipation of entropy. Self-organizing systems are types of constraints on all the dynamic possibilities that stabilize boundary conditions and through the use of energy persist.

This most basic form of creativity -- the forming and persisting of a dynamic system is based on limiting and constraining possibilities of how something can occur. The more is becoming less.

Creativity is about doing less.

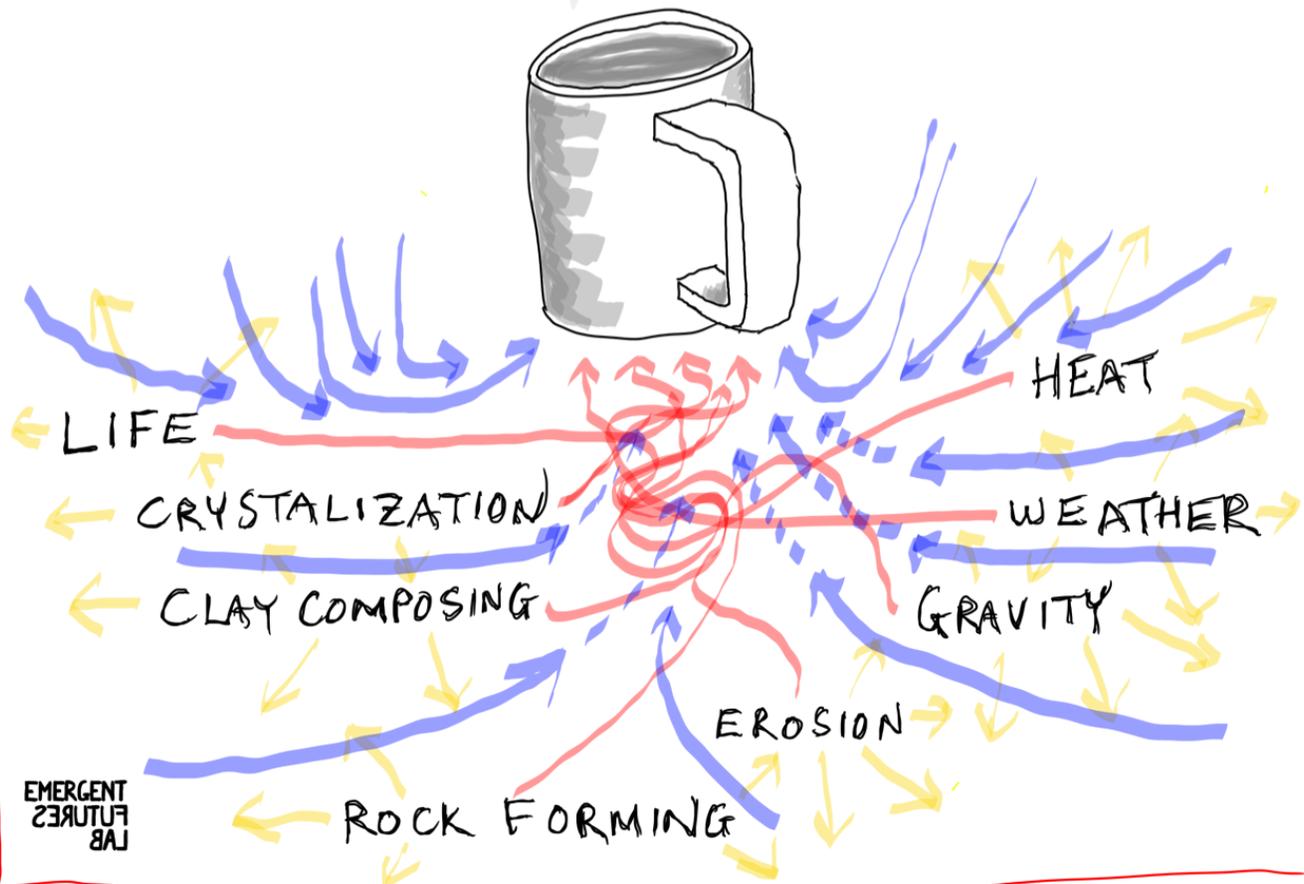
This is a critical addition to our initial definition of creativity as the process of making the new. Now we can say:

Creativity is the development of new forms of constraining system dynamics to produce novel constrained dynamic systems.

Why does this matter?

If we come back to Affordances and our coffee cup.

INTENTIONAL FORM COMES FROM FOLLOWING & CONSTRAINING SELF-ORGANIZING PROCESSES



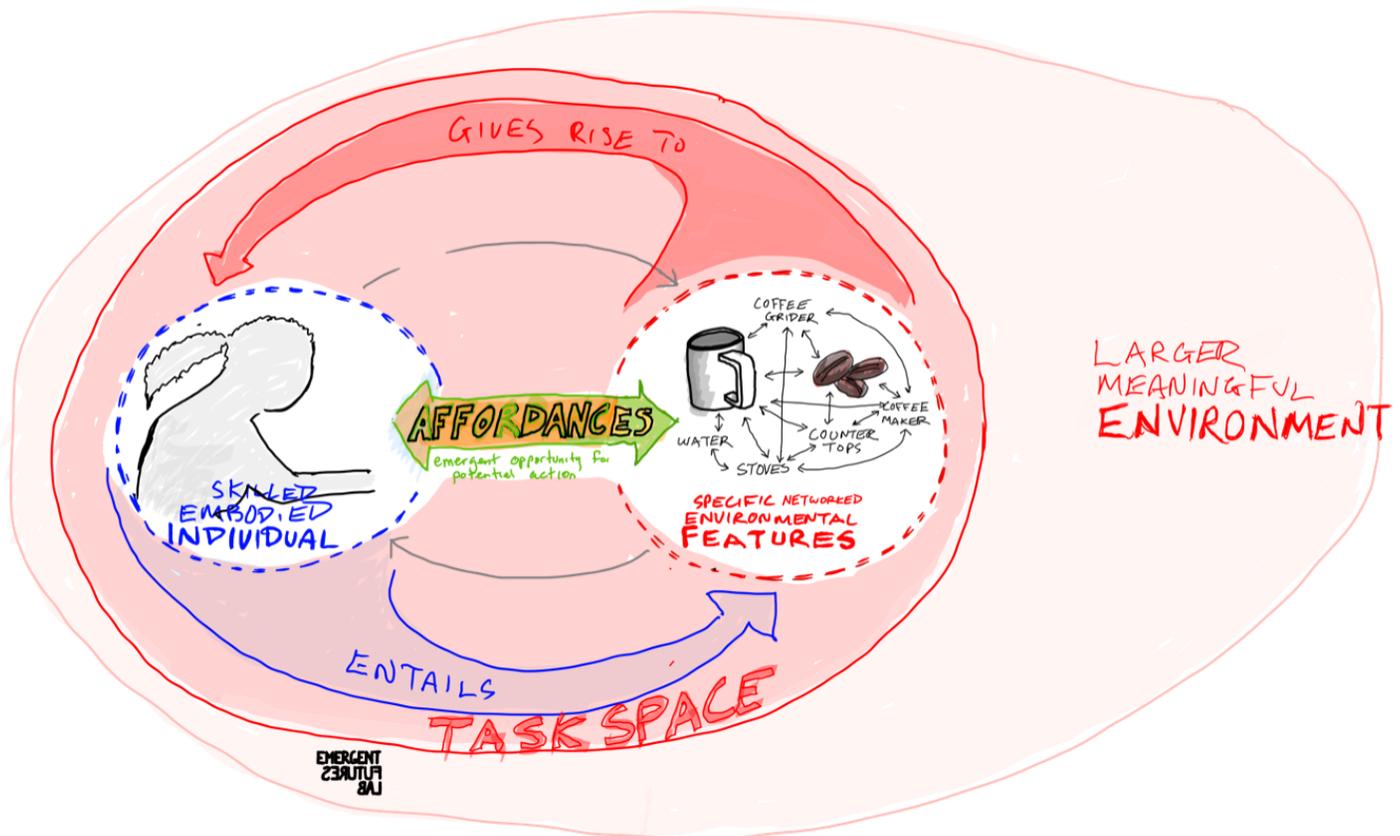
Coffee Mug as a Constrained and Self Organizing Form

It is as a material thing the outcome of constrained self-organizing processes that were never intended to make a coffee cup but have been harnessed and stabilized via a complex set of further constraining and stabilizing practices to take on a form.

This form is constrained to maximize certain affordances: holding liquids, keeping them warm, meeting our mouths, meeting our hands, meeting our surfaces, etc. In this way, we have

creatively gone from more to less.

From more to less and different: the first cup.



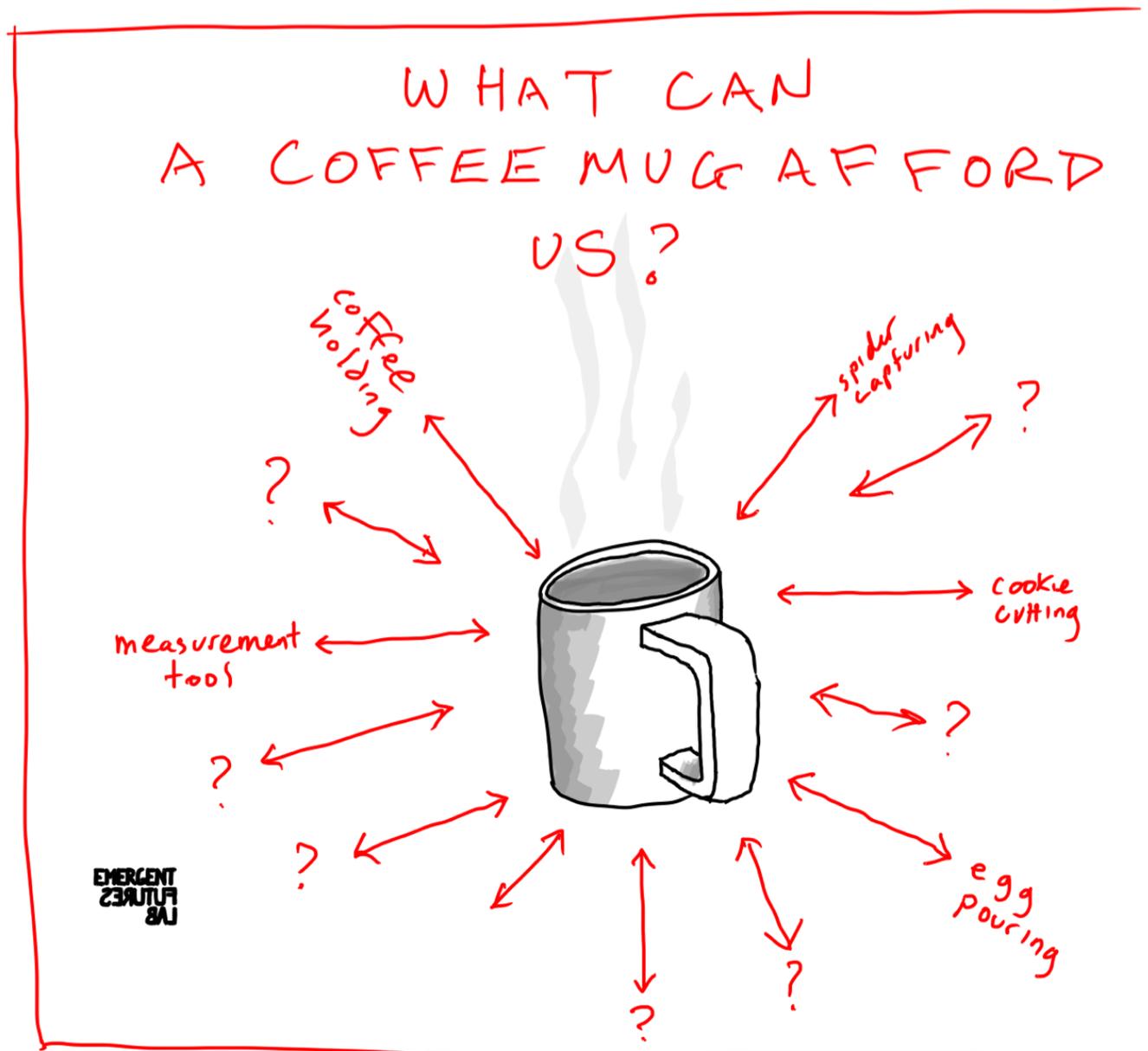
Affordances Live in a Larger Environment Called a Task-Space

This cup is part of an invention and creation of a set of practices, habits, concepts, tools, etc. that form a specific environment that constrains and holds together the pleasure of coffee making and drinking. This dance of co-shaping of the dynamic system “canalizes” -- makes it easier and more streamlined. The careful shaping of an environment into a task-space off-loads memory, skills, and know-what into a highly regulated (constrained) environment that strongly affords certain practices.

We are again stabilizing the many novel possibilities as a novel few possibilities.

Affordances Are Not Creative

But this cup -- this specific set of carefully bundled affordances that makes our morning so wondrous is haunted by an excess of possible linkages to other spaces and other affordances.



Affordances of a Coffee Mug

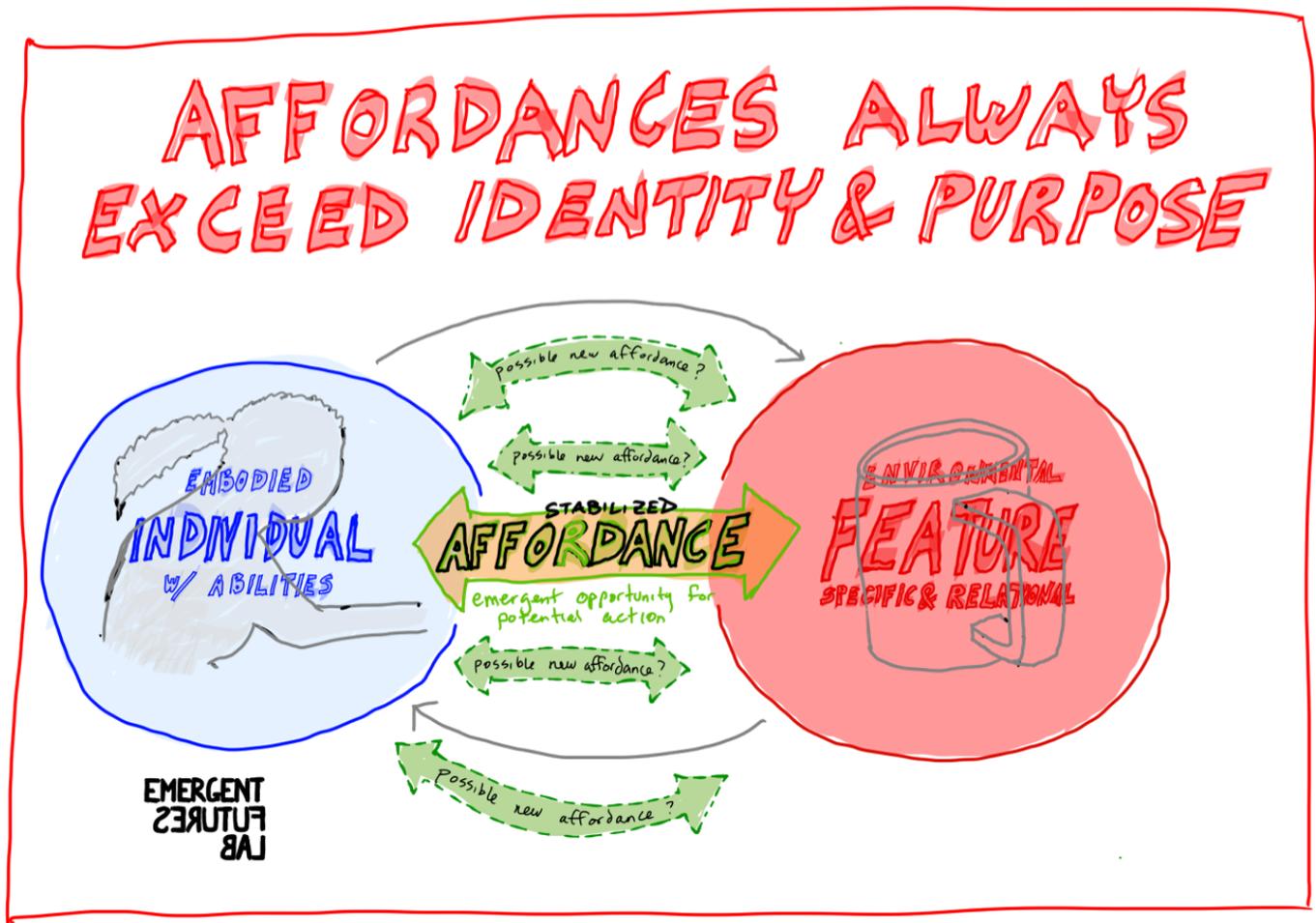
It could be used for anything from a ladle to a measurement tool, to a pen holder, to a spider catcher, to a hammer, to a percussion instrument.

These are new uses for the coffee cup -- but are they genuinely new affordances?

Not really. We are just using one existing thing (the coffee cup) to do some other already existing actions (store pencils, measure flour, cut cookies, etc.) based on its more-than-coffee affordances. We are taking an intended affordance (containing) and using it for an unintended but similar purpose. While there is some novelty in this, it is a type of repurposing that does not in itself introduce real disruptive novelty into the situation.

We do also take *unintended affordances* and put them to new but existing uses. For example, we could flip the cup upside down and use it as a candle holder, and the small lip on the bottom, which was designed to afford resting without wobbling on uneven surfaces, unintentionally can now serve to collect and stop the dripping wax from spilling onto the table. Using it as a percussion instrument would be quite similar -- the unique sonic resonances that it affords were never intended.

These are new uses for the cup but are they genuinely novel?



Affordances Always Exceed Identity & Purpose

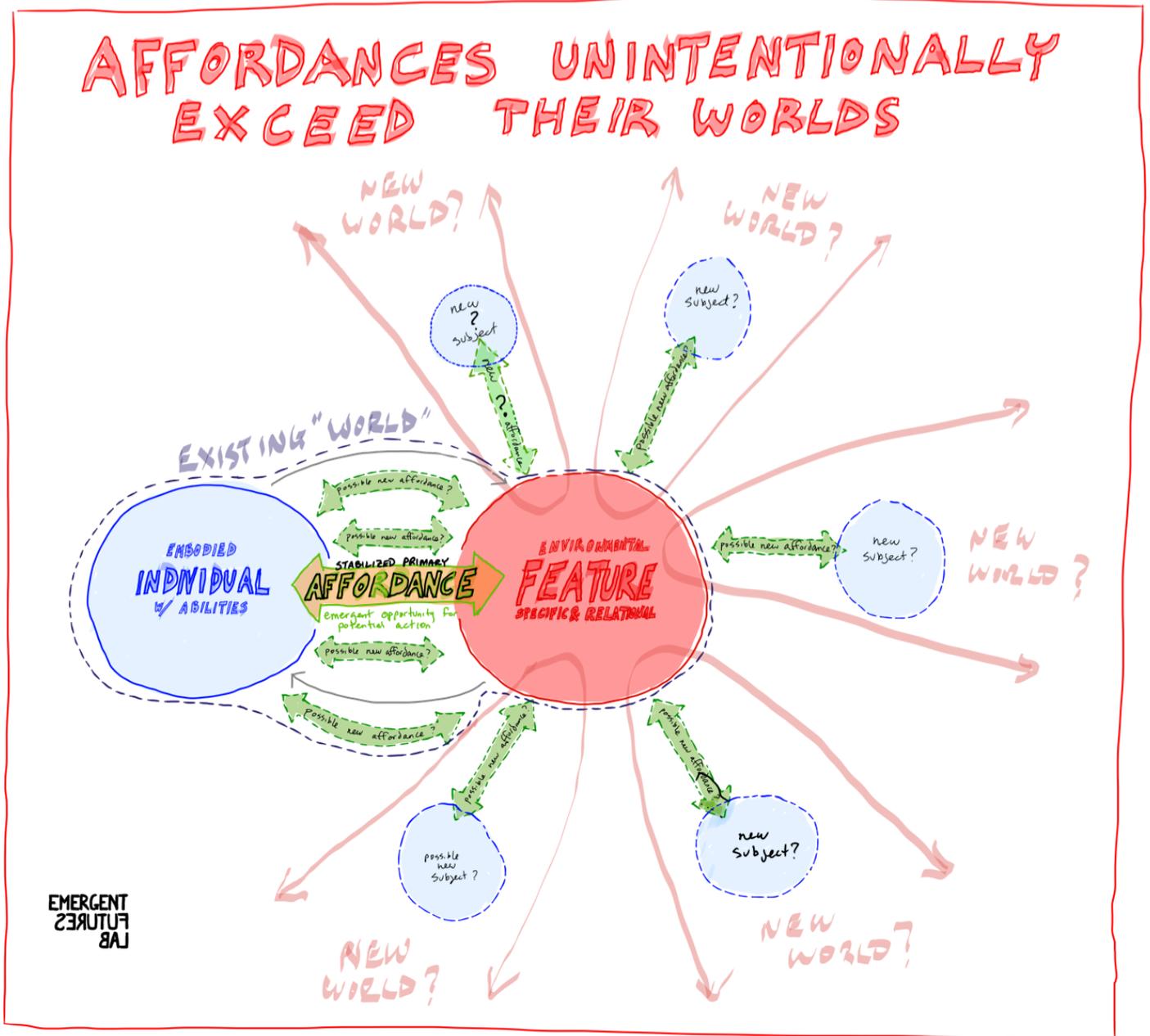
They are not. Ultimately they all connect us back to existing actions and practices that sit inside task-spaces, environments, our abilities, and identity. This is where it is critical to understand that we are not discreet individuals but are individual+environment couplings. The constraints that create this system and make it persist are not in our heads but held across the system. It is never, change your mind and the rest will follow. The intense entanglements of the totality of the system mutually create, constrain and stabilize a mode-of-being -- a world.

This environment/world is perfectly constrained to allow for all sorts of forms of change-in-degree, but not changes in kind.

This is why genuine novelty is really hard: we live, see, and sense affordances -- our intimately coupled self-environment realities.

Affordances are Creative

But how can we sense an affordance that could push this constrained dynamic system into a new stable but totally distinct dynamic? How can we go from world preserving and expanding to novel world-making?



Affordances Give Rise to New Worlds - Unintentionally

How could a new constraint arise that would constrain us to become other than what we are?

Is there an emergent self-organizing constraint that we could sense as an affordance that could perhaps iteratively usher us into the new?

This is the seventh of seven articles critically deconstructing the concepts of creativity and innovation as they have historically developed in the west with the goal of proposing alternative approaches.

Part One we look at how creativity, in the sense of the making of something genuinely new, was not part of the western tradition until the mid 1800's. And that for the previous 2,000+ years to create was to copy.

Part Two we delve into "**Where did your Big Idea come from?**" We go on a genealogical journey to discover how we came to believe those big ideas are both the source and goal of creativity and innovation.

Part Three we unearth the overlooked "**Thinking is not in your head**" - Thinking, especially creative thinking happens in the middle of *acting* and *doing*.

Part Four we examine "**The New Cannot be Seen or Thought**" -- so how does the new emerge if it cannot be seen or thought?

Part Five is an examination of **Reality is Creativity** -- on creativity being a fundamental aspect of reality itself.

Part Six questions **Creativity: "and what else can it do?"** -- introducing the concept of affordances and its relevance to creativity so that you can be more creative and innovative.

Part Seven - **Creativity is Less** - dives deeper into affordances introducing constraints and how they are the unheralded secret to all innovation

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Creativity: Constraints, Fields and Systems

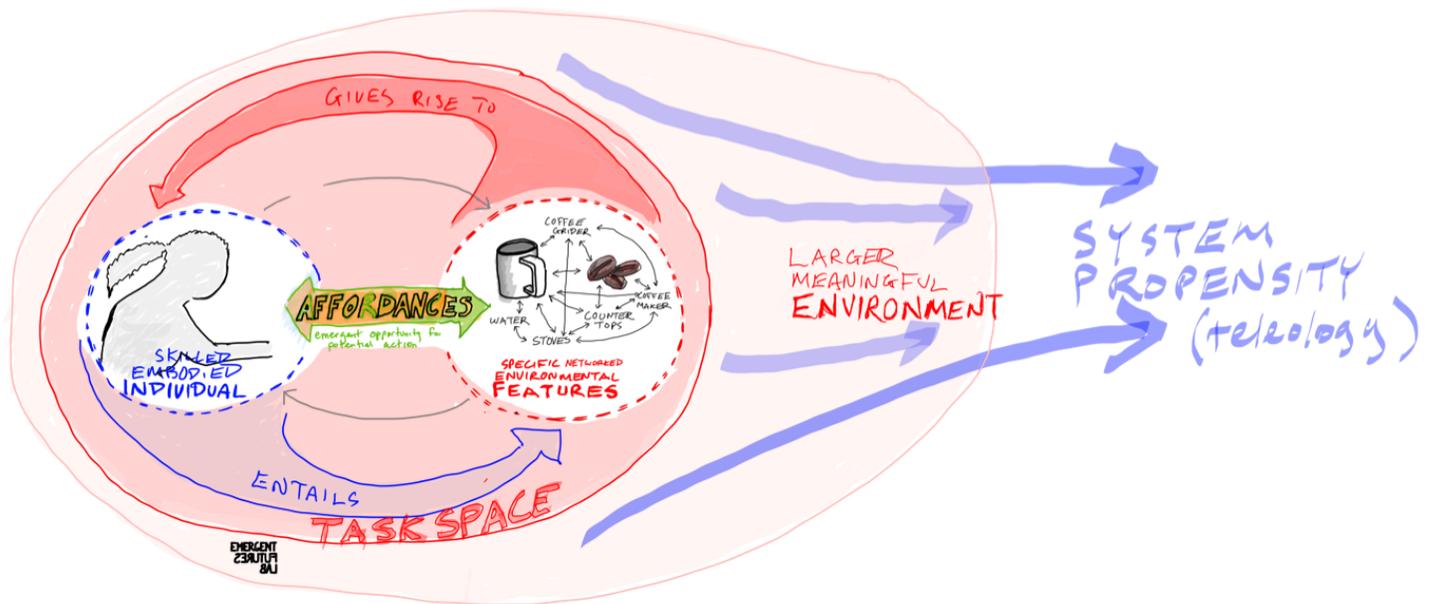
By Iain Kerr Jason Frasca

You need to disrupt the ingrained behavior of your stakeholders. Where to start? We offer 10 approaches to impact change and elevate creativity and innovation.

But first we must understand that the total system must be engaged to achieve novelty. Which leaves us asking: how do you see and find this system? Below we explore where virtual fields exist so they can be harnessed for the most innovative outcomes.

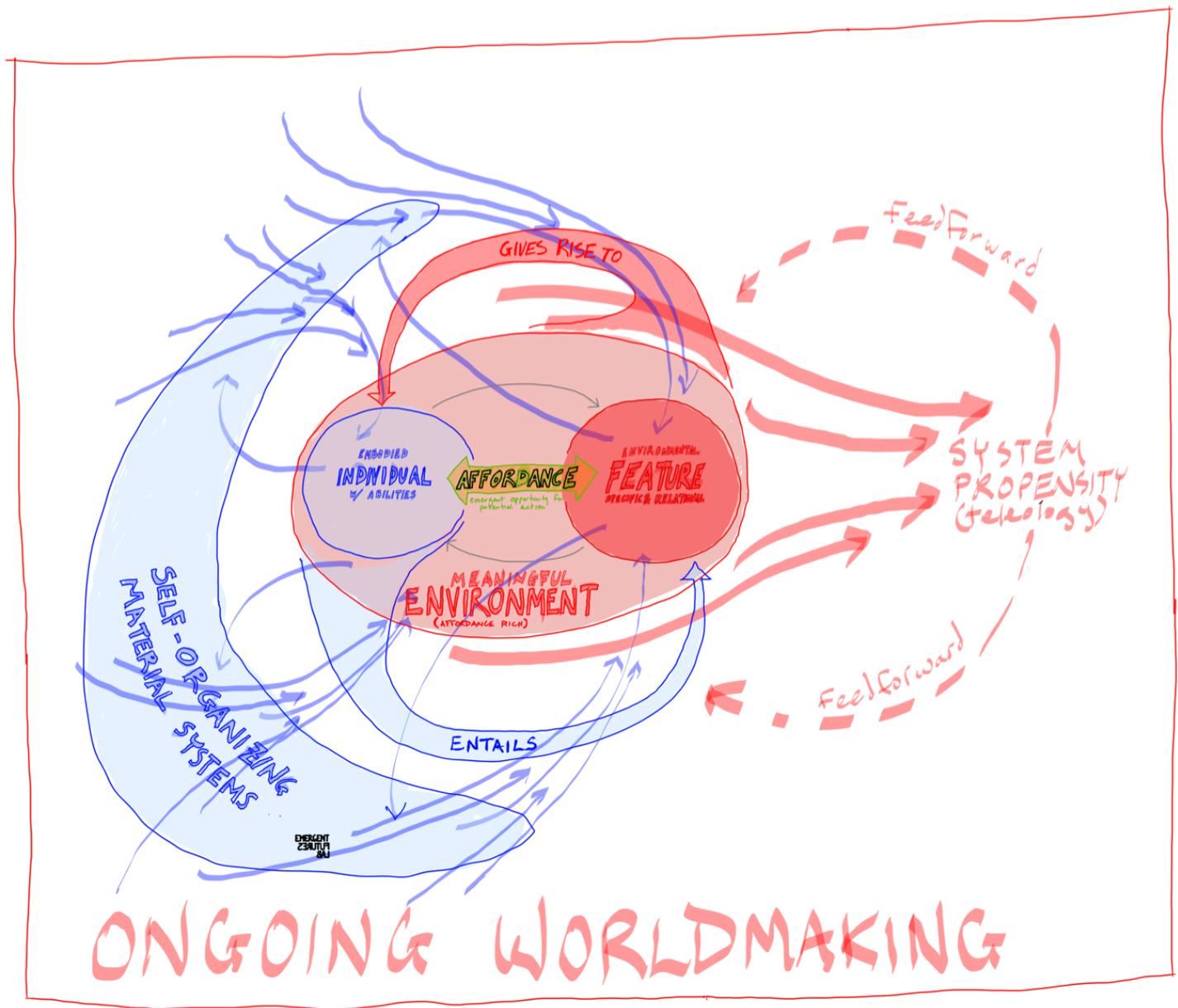
Part One: On Constraints and Taskscapes

To be alive, active and creative is to be an embodied being embedded and extended into an environment that we have shaped and is shaping us. This coupling of self and environment make a single dynamic unit from which action and thought arises. The dynamic unit is not a static thing but a system with a propensity to go more in one direction than another.



Affordances and their Environments

This propensity is the outcome of a set of nested constraints that act not like a set of fixed rules but statistically -- it is more likely that things will tend one way over another. These nested tendencies which begin at the level of self organizing matter are further constrained by practices and actions that solidify into stable environments, tools, habits, embodiments and concepts. As these ever larger patterns accumulate and feed back into the system and themselves stabilize as a more general tendency that give shape to a world.



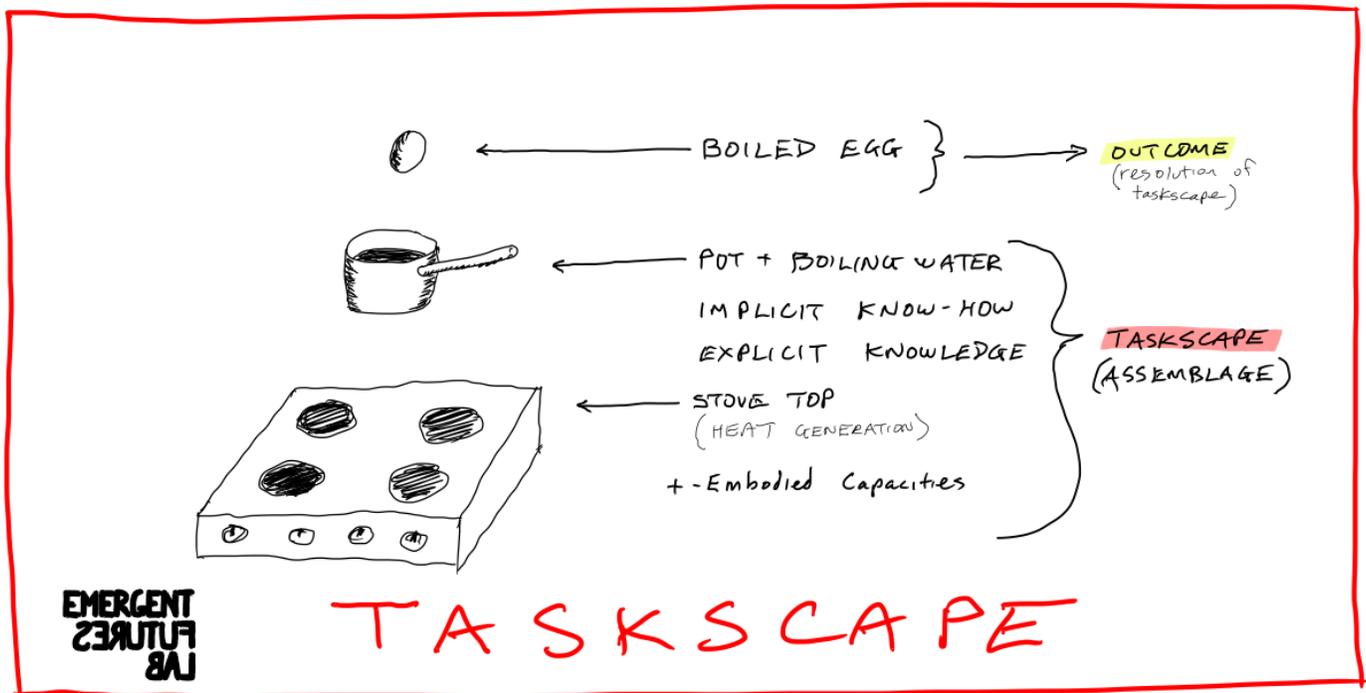
Worldmaking is an Ongoing Process

Innovation and Creativity begin by understanding that it is this total system that must be engaged to achieve novelty. But how does one go about doing this? We know that logically ideation, because it relies on existing concepts will never give us radical novelty. The alternative is to engage directly with the logics of the holistic dynamic systems. This can become overwhelming -- where to start?

Let's start with what is already in front of us and what we're already directly part of -- our immediate environment.

The most immediate scale of our everyday activity happens in a “task-scape.” This is where a set of tools, in a specific environment, is intertwined with practices, habits, embodiments and concepts that constrain and affords certain outcomes. We are always deeply intra-twined with task-scapes: offices, bedrooms, cars, clothing, etc.

The kitchen is a wonderful place to begin to explore the question of taskscapes and creativity: Take boiling an egg - you need a number of things to make this possible - the egg of course, a pot, water, a working stove, a spoon, and somewhere to drain the water. You additionally need a body that can both use these tools and eats eggs. There needs to be skills, habits, and concepts as well. Once you have these in place you can set about boiling your egg with great ease. Most of the time we are so fluent in our use of task-scapes that they recede far into the background and we only notice what they afford us: egg making, writing, thinking, etc. But to understand creativity we need to keep them at the forefront of our awareness.

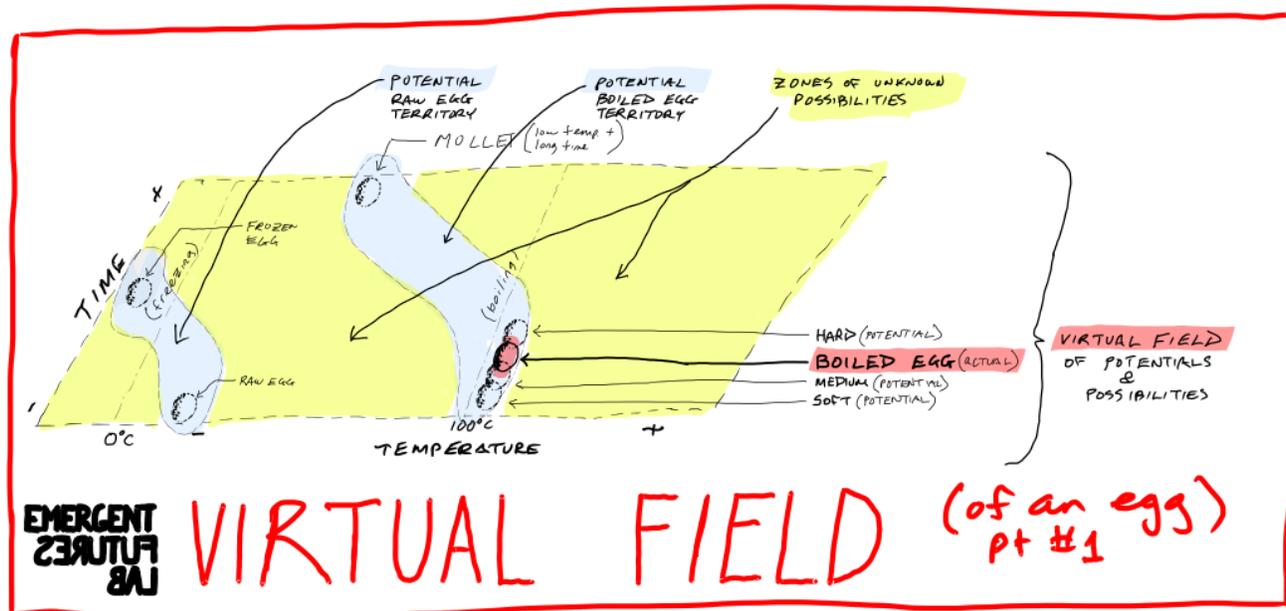


Boiling Eggs within a Taskscape

From Taskscapes to Emergent Fields

Our simplified egg boiling kitchen task-space affords many possibilities beyond this single boiled egg. Even if this was the first time we cooked anything, and all we knew how to create was this solitary very over cooked boiled egg, “surrounding” this egg would be an nascent emergent field of possibilities. Adjacent to our overboiled egg is the potential for a less boiled egg. *If we had just cooked it less other possibilities would be realized: soft boiled or medium boiled.*

We could map this quickly in terms of the constraints of time and temperature and see where the dynamic system constrains and affords different forms of boiled eggness to coalesce.



Cooking Eggs Across a Virtual Field of Possibilities

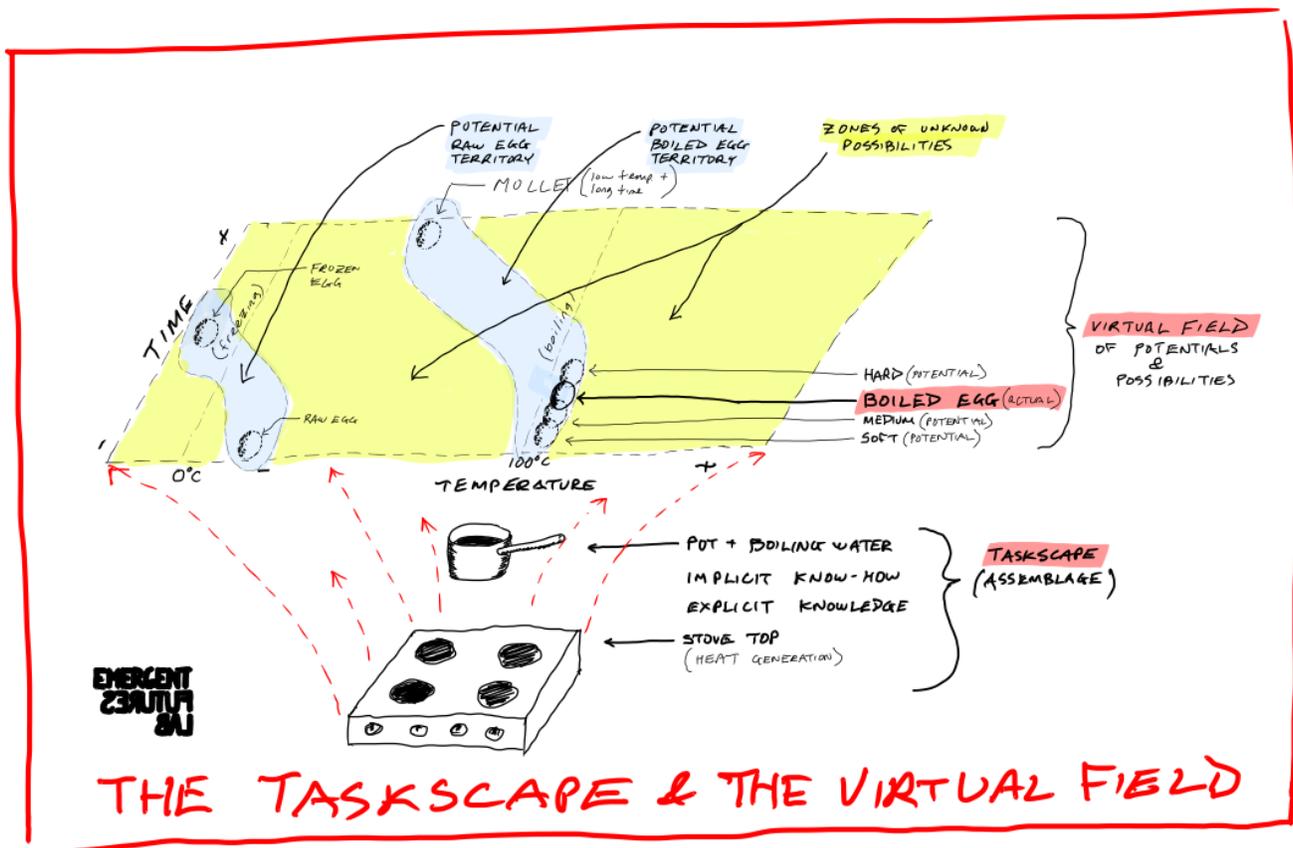
Once a task-space has come into being, *even before anything is done*, a field of possibilities is emerging. This field is as real as the physical components of the task-space but it is not yet actualized: this is a type of virtual field of potential forms. Everything that exists is “haunted” by a virtual field of potentials that is far greater than what it is. The virtual field can be expanded via experiments that probe and stabilize its possibilities. We wander into the virtual

field with the questions: What else can it do? And then what else can it do? What happens when we do more or less? What thresholds of difference emerge and can be stabilized?

Having created any one thing -- this boiled egg for example, is to do far more than make a solitary product. That one thing is only one point in a far larger virtual field of all the emergent possibilities.. Becoming aware of this act of potential worldmaking that haunts all things is the beginning of creativity. In making an over-cooked egg a portal to a world has been instantiated. A virtual world with its own logic, constraints, tendencies and affordances.

Creativity: Below Above and Beside

To properly understand what this task-space is doing (nesting constraints) it is important to go below the level of the equipment and sense the self organizing potentials that it is harnessing. Water has a series of states (frozen, liquid, gas, etc.) that can be accessed by constraining and stabilizing these via heat. The egg similarly has a set (of unintended) thresholds and states that come about via heat (liquid, gel, solid, etc.) transforming long protein strings to shrink and entangle in tight bundles.



Boiling eggs in the taskscape and virtual field

The task of cooking is to work via a taskscape to stabilize self-organizing capacities into an actual outcome.

What makes a creative cook?

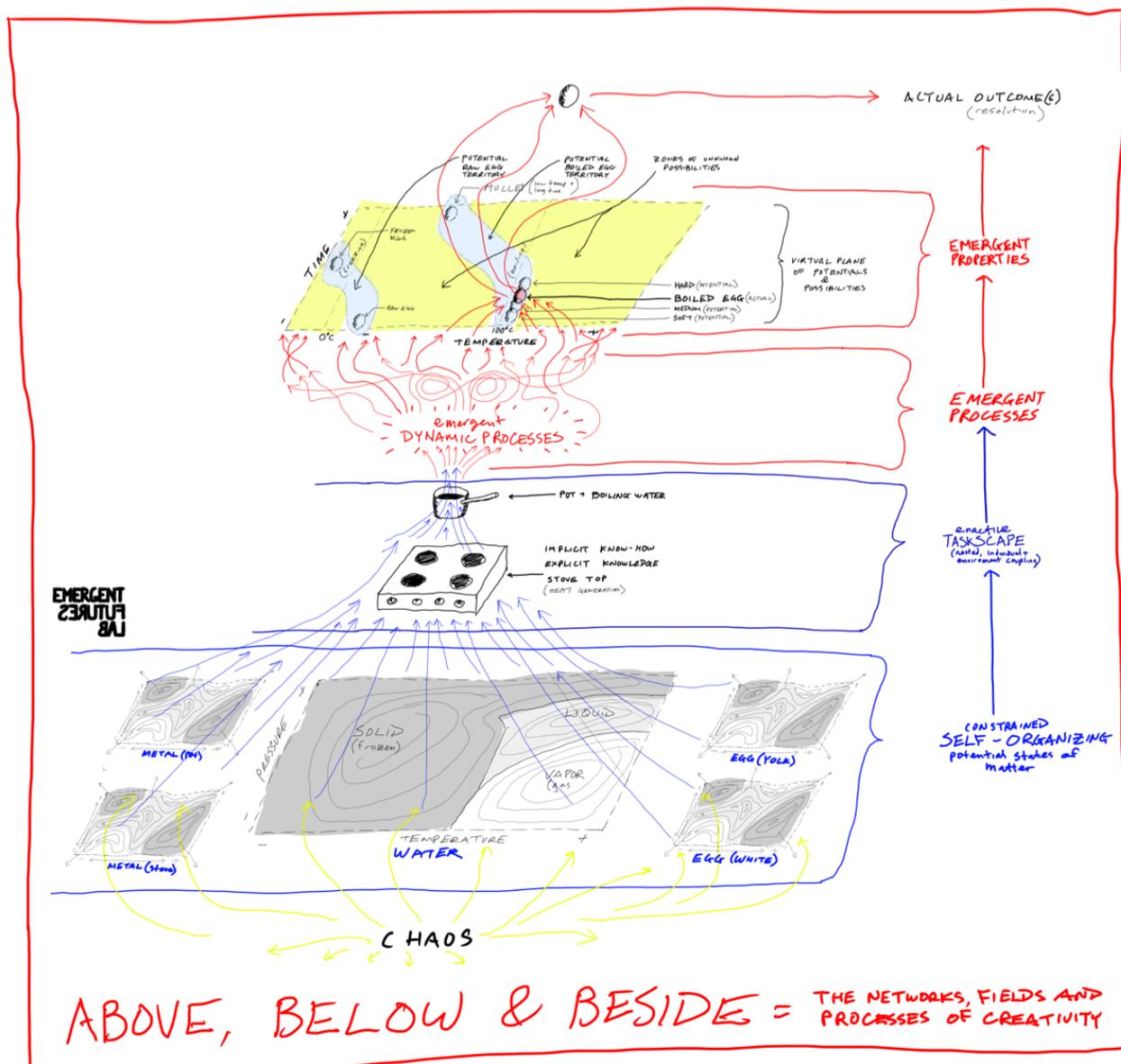
Perhaps, it is easier to say first what makes a non-creative cook: someone who understands cooking as recipe following. That all there is are fixed products, established processes and known outcomes and every known outcome is distinct and has a distinct recipe (set of rules). This is the space of ideation and identity: there are known outcomes and we are choosing one over another. This is the space that is accessible to us via brainstorming, ideation and problem posing.

What makes a creative cook?

It is someone who senses that there is a dynamic virtual field below and above the taskscape that precedes the outcome. One is stabilizing the affordances of self-organizing matters potential into a field of possibilities that can be explored.

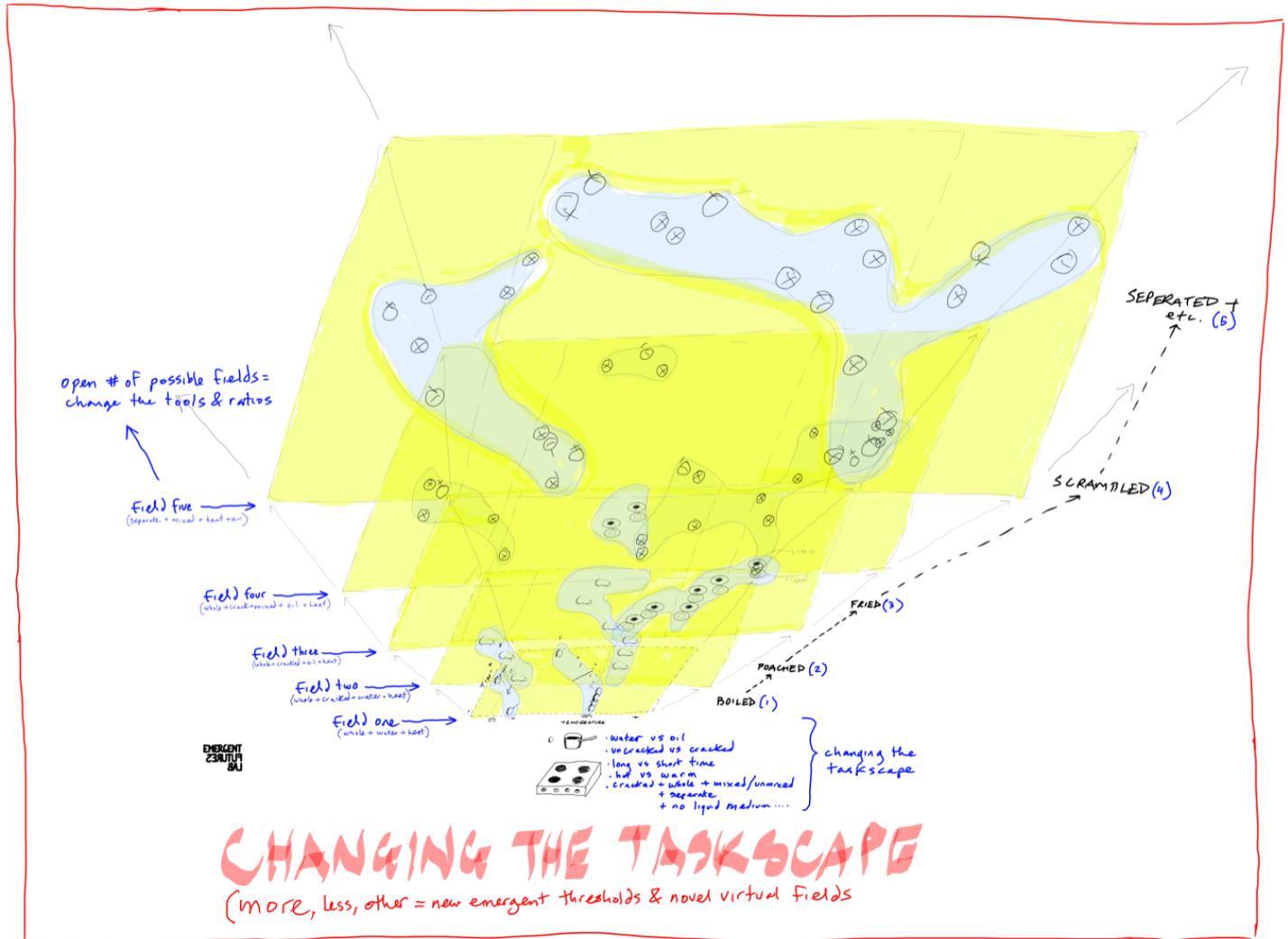
What makes a really creative cook?

Sensing and experimenting with how changing the constraints of the task-space transforms the virtual fields below and above. What happens if we crack the egg? What happens if we substitute oil for water? With each of these actions, as the task-space changes so too do the virtual fields of potential. New worlds begin to emerge.



Process of Creativity, Networks and Fields sit Above, Below and Beside

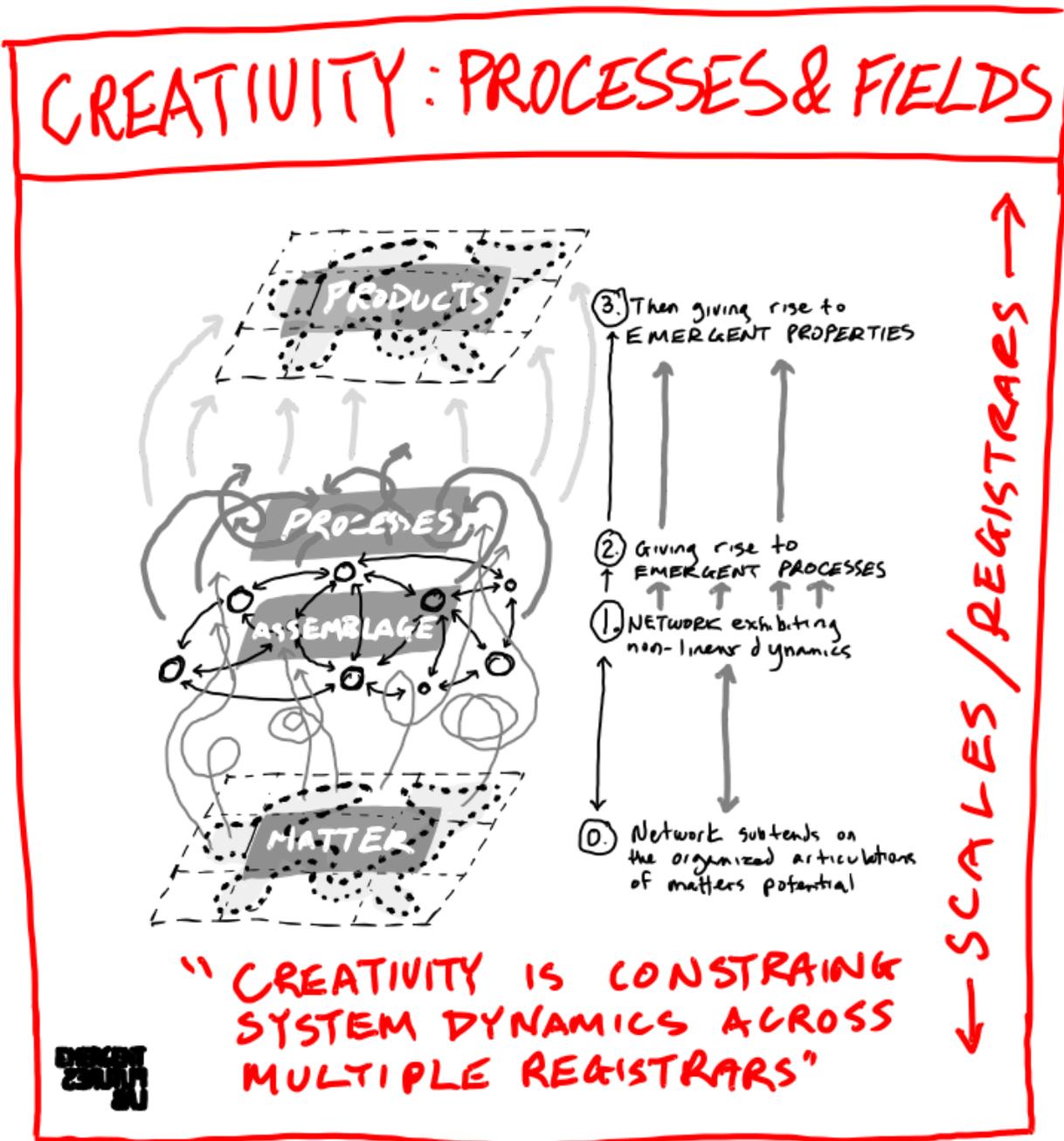
Creativity happens when we see that we are working on multiple registers to constrain, entrain, and stabilize fields and processes that give rise to emergent “products” -- and that this total system -- this emergent world is the locus of creativity.



Changing Variables to Cook Eggs as Seen Across a Changing Taskspace

In our prior [articles on innovation](#) we expanded our [definition of creativity](#) to: “**Creativity is the development of new forms of constraining system dynamics... “**

This week we expand this further: “**... across multiple registrars to stabilize novel worlds”**



Creativity is Constraining System Dynamics Across Multiple Registrars

We are always of an environment -- intimately connected to multiple taskscapes. Our agency arises from the middle -- thinking and acting arise from the middle.

This middle is not a place. It is not in between two things: our bodies and the world. This middle is an emergent dynamic multi-scalar field and process.

To be creative to live the field and process -- it is about attunement, sensing, probing, pushing, stabilizing, co-creating and co-emerging across forces and processes.

10 Ways to Impact Innovation, Creativity and Change

Ok, so this is a great model if you wish to explore cooking -- but how does it help with other forms of change, creativity and innovation?

Here are 10 takeaways:

1. Focus less on ideas, ideation and other forms of “recipe choosing” (this is confusing one path with the system’s total potentials).
2. Read the recipe but don’t follow it (block/constrain it).
3. Move beyond imagining that creativity is about ends: products -- and move from ends to making processes and fields.
4. Experimentally block the knowns on differing registers to allow the unknown to emerge
5. Explore the adjacencies in the fields beside the things we know and recognize -- what else can it do?
6. Instead of dwelling on ideas and outcomes manipulate the system (the taskscape or assemblage) and then explore the fields that emerge
7. Exchange solution thinking for problem invention, exploration and exploitation.
8. Work at multiple registers of this process to make new worlds possible.
9. Nothing can be genuinely known in advance about all that is possible prior to experimentation and probing.
10. Define your virtual field. Go above, beside and below.

Ideation and brainstorming limit our ability to disrupt stakeholder behavior and develop genuinely creative changes. The outcomes are predictable.

Leveraging systems and virtual fields [open doors to untapped novelty](#), differentiation, and genuine worldmaking possibilities..

We'd welcome your feedback: What are the virtual fields you are operating within? What approaches are you using to impact your organization's change, creativity and innovation? Send us a note and let us know what you are working on.

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Systems are Creative: On Emergence and Creativity

By Iain Kerr Jason Frasca



Novelty is Emergent

How does the new come about? This is the fundamental question of creativity.

For a long time the answer to this question reflected a strong divide between the sciences and the arts. While the sciences pursued answers from evolution, systems, complex histories, and self-organization, the arts held onto the concept of creativity that was hyper-individualistic and mind centered.

As the historical divide between the sciences and the arts has reconfigured, new answers and approaches to the question have emerged. Critical to most of these answers is the concept of emergence.

Emergence is a technical concept that first developed in the study of complex systems. It developed out of the need to explain why some complex systems— such as living beings are so radically different from simple systems such as machines. For example, you cannot take a living being apart and put it back together. Unlike a simple machine it exhibits a distinct wholism — what we call livingness. This property is not one we could trace back to any single feature. It is seemingly a property of the “whole”. Mental activity is also something emergent — it is a systems property. The impossibility to trace a feature to a single cause led to the development of a new approach to causality— emergence.

Gary Tomlinson gives us a good simple definition to begin from: “Emergence denotes the presence of properties, features, behaviors, or capacities that appear in systems but are not easily traceable to their component parts.” (Tomlinson)

“Emergence denotes the presence of properties, features, behaviors, or capacities that appear in systems but are not easily traceable to their component parts.” - Tomlinson

This quality of “not being easily traceable to a specific source” becomes the definition of emergence. In some cases of emergence it’s not only difficult trace a feature back to a specific source, it is fundamentally impossible — the feature is truly an emergent property of the whole.

From the “parts” a whole emerges. And this “whole” becomes distinct from and irreducible to the parts. And ultimately the “whole” starts to even shape the parts.

While life and consciousness are good examples of emergence, so too are all sorts of organizations. Such as:

- art practice
- a corporation,
- an individual
- a social movement
- or a police force

These are all examples of complex systems that can be said “to have a mind of their own.” In each case (the individual who is alive or the art practice or the organization or the police force) there is a tight interdependent network that “individuates” or can be said to produce an operational separation from a related “outside” (that it also co-shapes).

In regards to [creativity this is a radical shift](#): no longer can we point to a single instant, source or individual and say they invented this — they are the creator — rather we now have the conceptual tools to both understand and more importantly [do creativity differently](#).

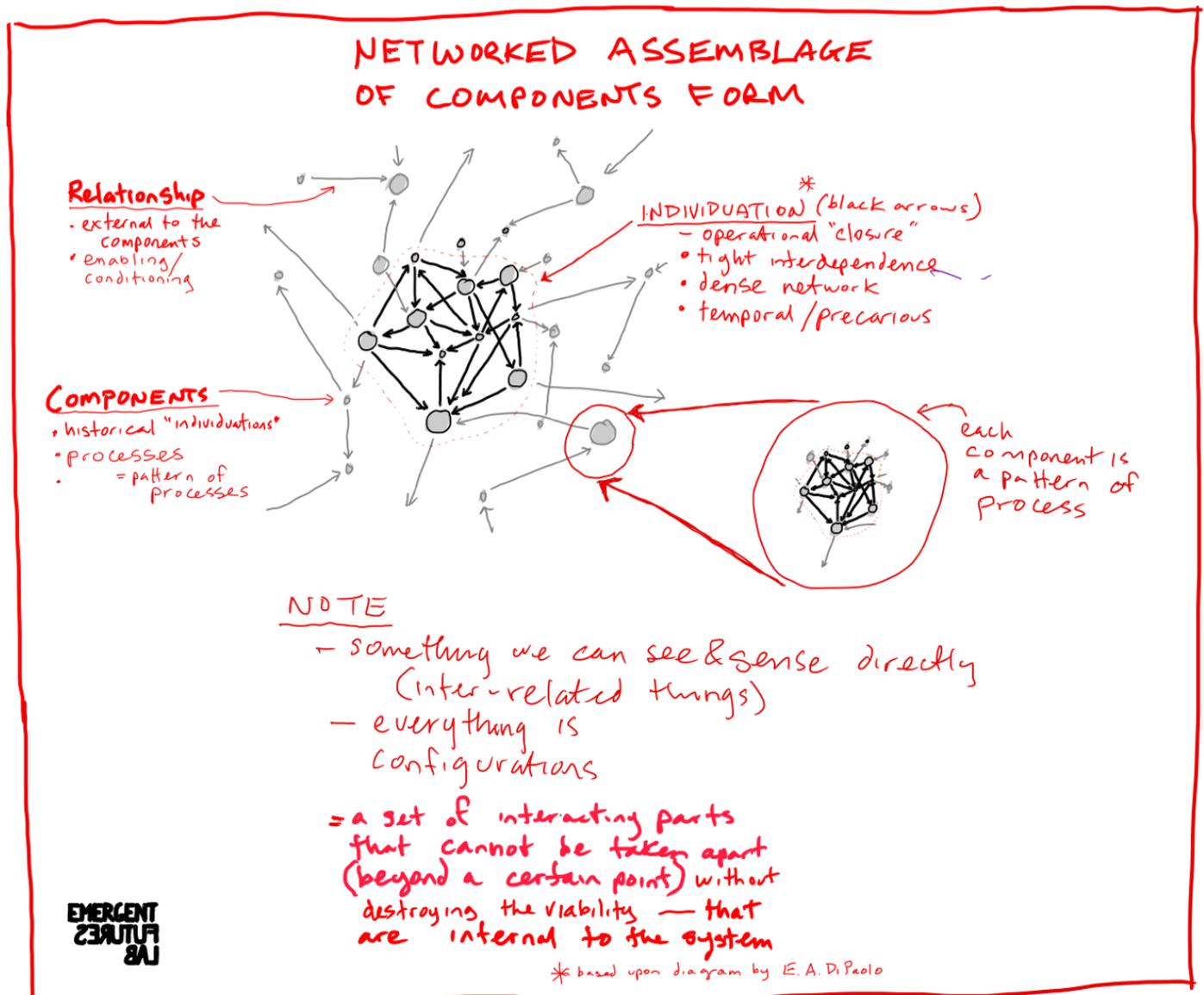
Understanding emergence in detail offers us a whole new set of tools to approach creative processes without falling back on individualism and the hunt for ideas. There are three main concepts to understand with emergence:

1. Assemblages
2. Non-linear causality
3. System causation

Let’s now turn to these and explore how they can transform our approach to creative processes:

Assemblages and Networks

All of reality is connected and organized in networks of processes. Nothing is solitary— everything is configurations— an organized and stable pattern of process. These webs of process entangle everything. But reality is not simply one massive undefined web of relations. Networks of relations individuate, and have a distinct character. Some of these networks form in ways that cannot be easily separated. These are distinct assemblages. The human body is this type of assemblage, so too is a crowd, or an art practice. The diagram below gives one a sense of this.

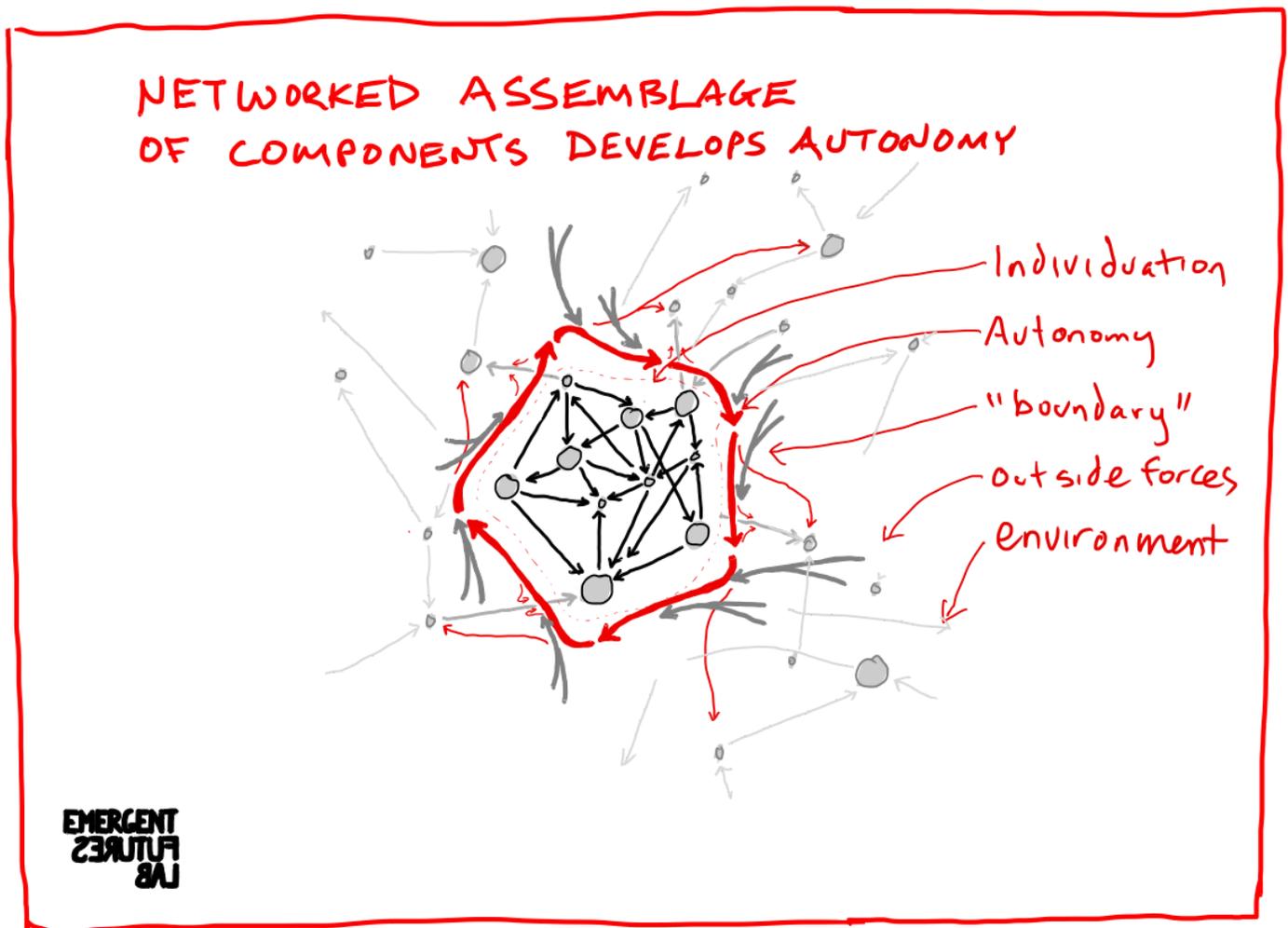


A couple of things to note:

- Relationships have their own identity — they are things in their own right. They are irreducible and distinct from what they relate (and in many cases define their terms).
- Components are not discreet things — but are themselves assemblages of processes. It is all patterns of processes.
- The boundary between inside and outside is not one of clear separation but organization.

Once a complex system develops and stabilizes it has a form of operational closure — identity or individuation. It has a form of autonomy in how it relates to the “outside” — this is

sensemaking. It actively defines and co-shapes an outside. The diagram below with the red arrows illustrates this dynamism.



What this means for creativity:

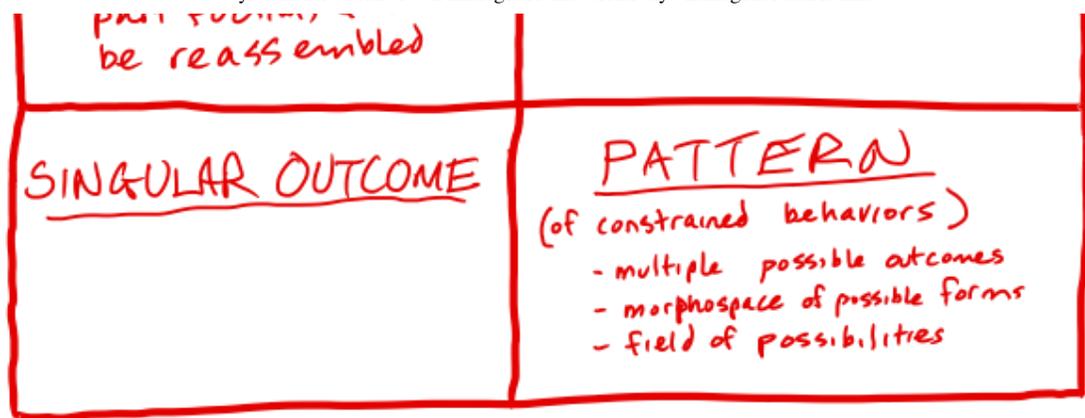
- Understand things as assemblages
- You're always embedded in an immediate assemblage: a taskscape
- You need to work across an assemblage
- It is about relations

Systems Shift from Linear to Non-Linear

As an assemblage individuates the form of causality and the system shifts from being linear to non-linear.

Linear causality is additive, proportional and aggregation. It is like building with lego. Non-linear causality is neither additive nor proportional. You cannot trace anything directly to anything. Outcomes are not proportional to inputs. The chart below summarizes the key differences:

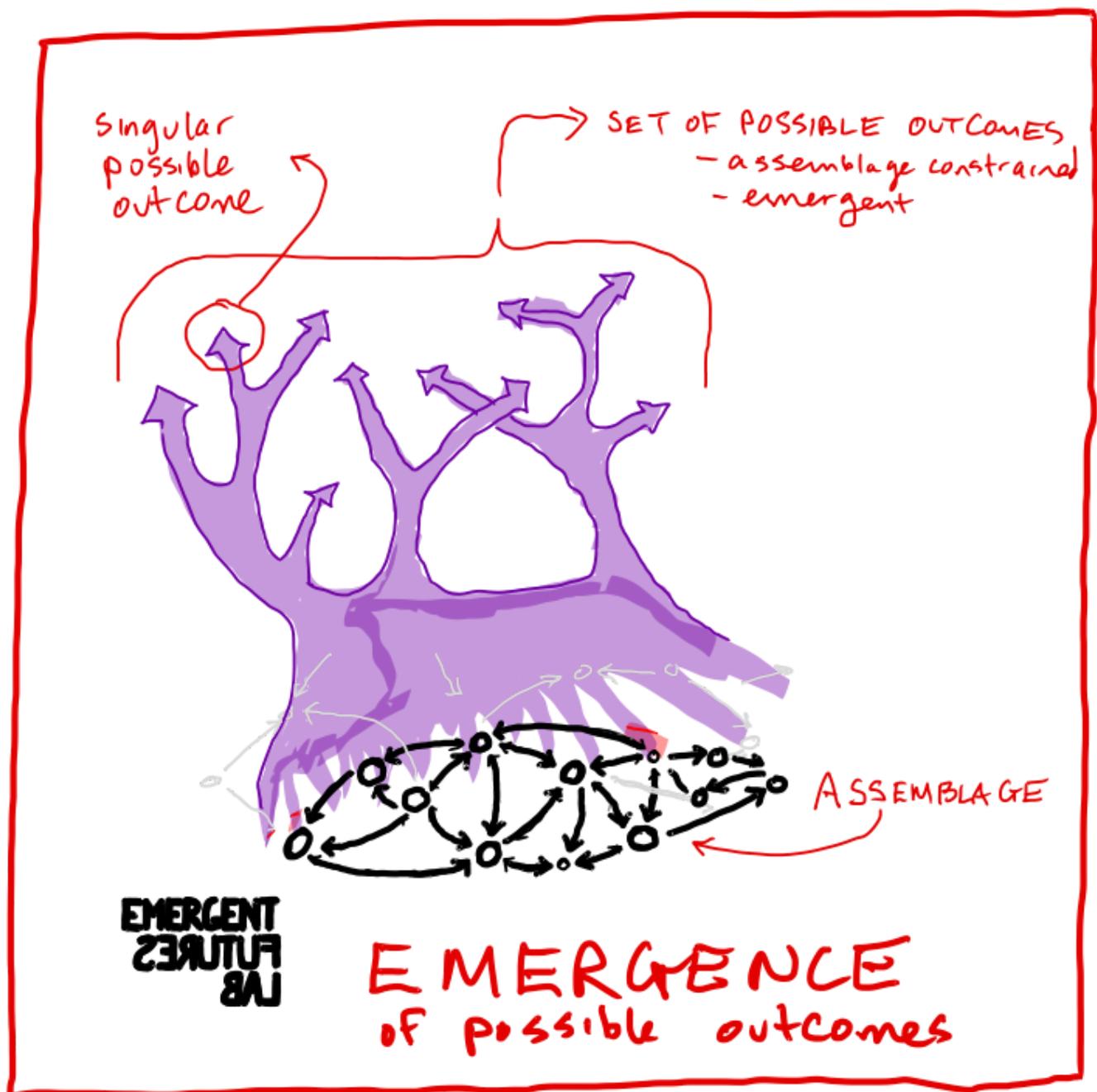
<u>LINEAR</u>	<u>NON-LINEAR</u>
<u>ADDITIVE</u> eg. $1 + 2 = 3$	<u>NON-ADDITIVE</u> eg. $1 + 2 = L$
<u>PROPORTIONAL</u> e.g. adding a small amount of salt to a dish	<u>NON-PROPORTIONAL</u> e.g. adding a small amount of LSD to the town's water system
<u>RESULTANT</u> - an "aggregative" outcome e.g. lego or a simple machine	<u>EMERGENT</u> an outcome that is hard to directly trace back to any one set of events
<u>LINEAR</u> direct step by step process	<u>FEEDBACK</u> - positive: - negative:
<u>DECOMPOSABLE</u> - the system can be taken apart & each part disassembled & can	<u>NON-DECOMPOSABLE</u> (or nearly non-decomposable) - e.g. living being



For creativity it is this last box that really matters: in assemblages — which is to say most of reality there are no solitary outcomes but a pattern of possibilities.

Outcomes Emerge From Constrained Possibilities

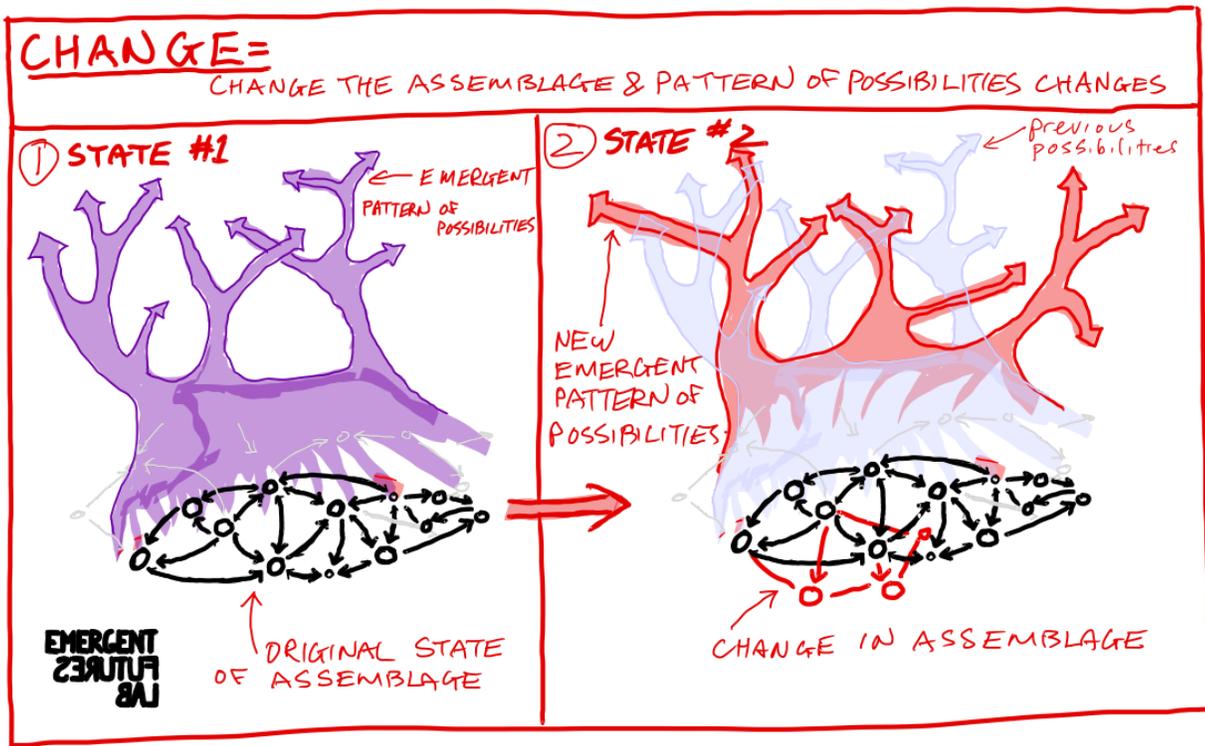
If we cannot trace an outcome back to a singular definable source it is the property of the whole of the assemblage or system. The next critical aspect of what emerges is that it is never a solitary discreet thing but a field of possibilities.. And these possibilities are constrained by the specific state of system:



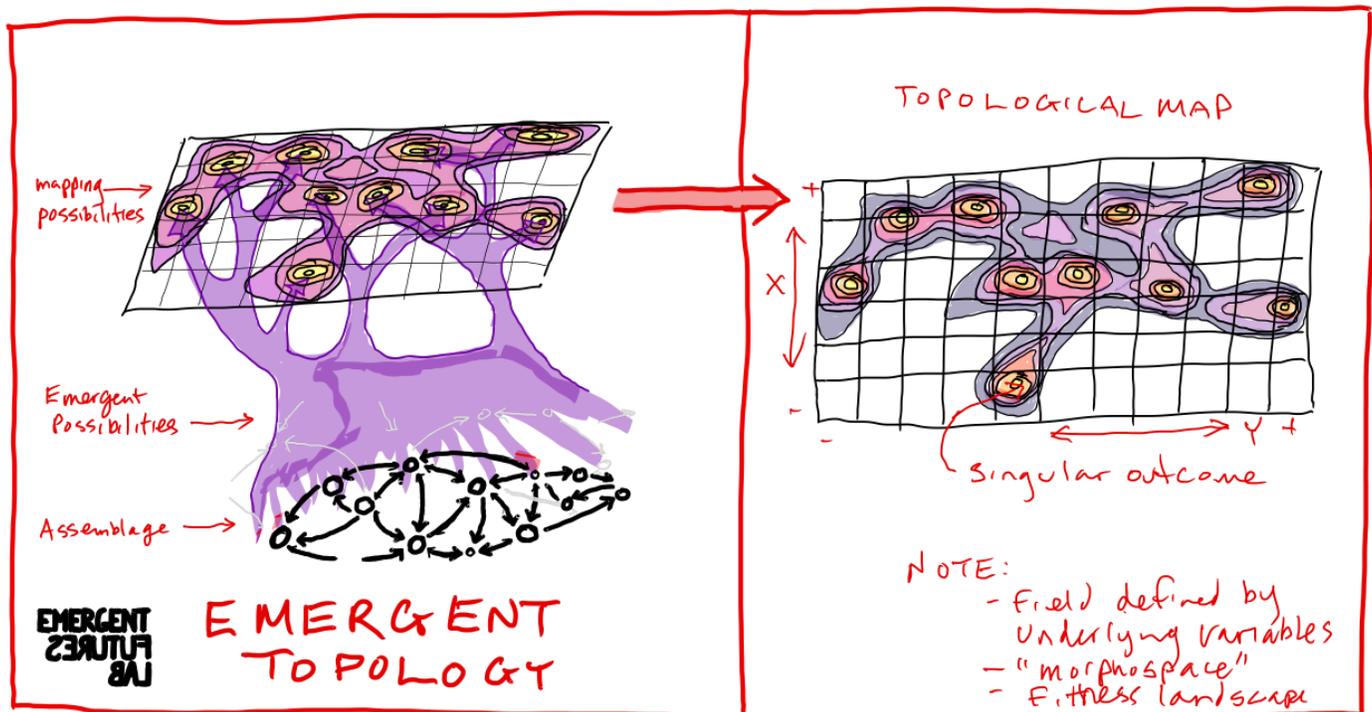
What This Means for Creativity

It really is the system that is innovating. And it innovates via emergent constrained alternatives (a field of emergent possibilities). When the system is in a certain state certain possibilities are probable and from these some are far more likely. If you change the assemblage the set of emergent possibilities will change.

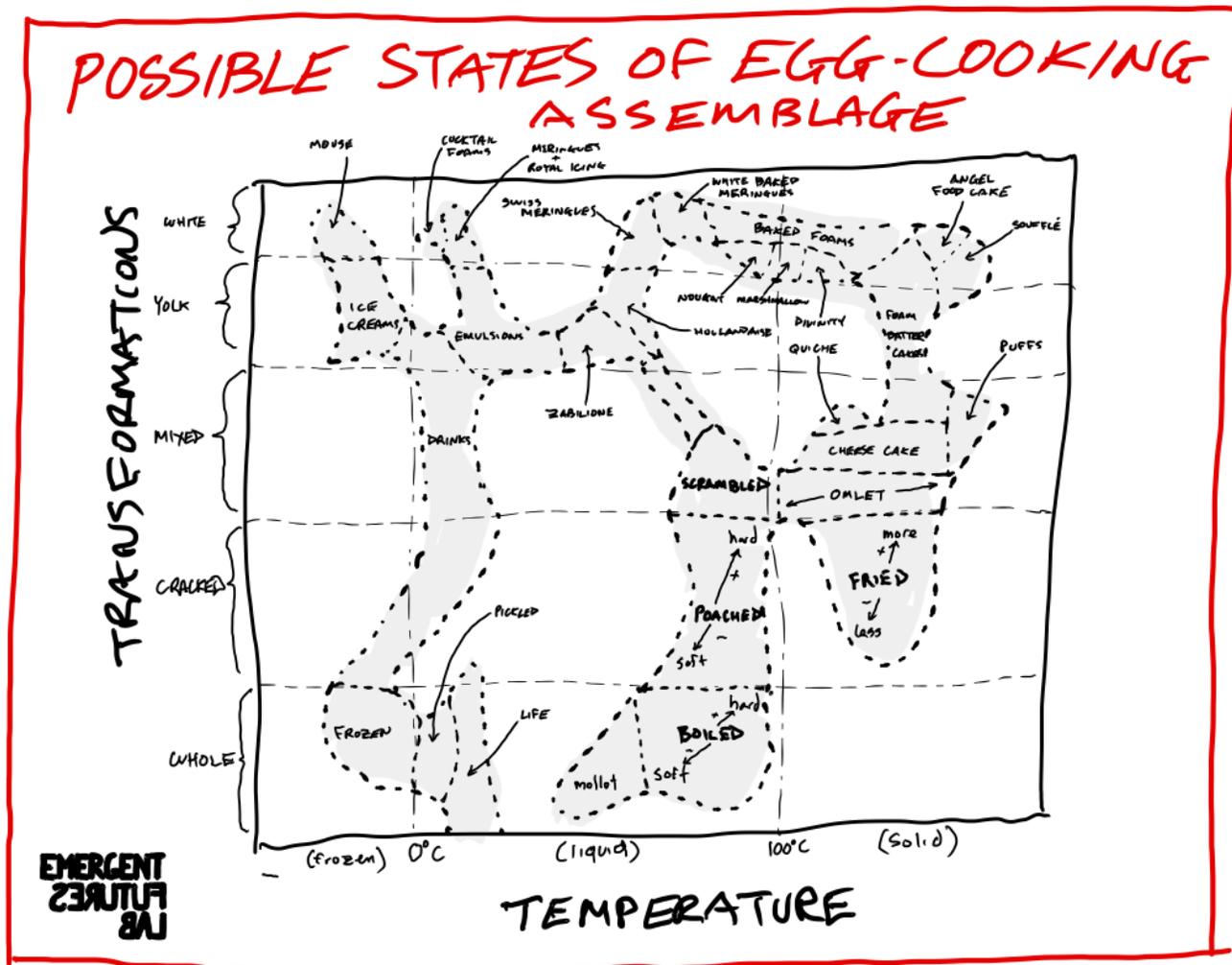
Thus a big part of creativity involves tweaking systems and exploring emergent fields for latent alternative possibilities:



A useful way to represent these alternative possibilities is as a type of topological map:



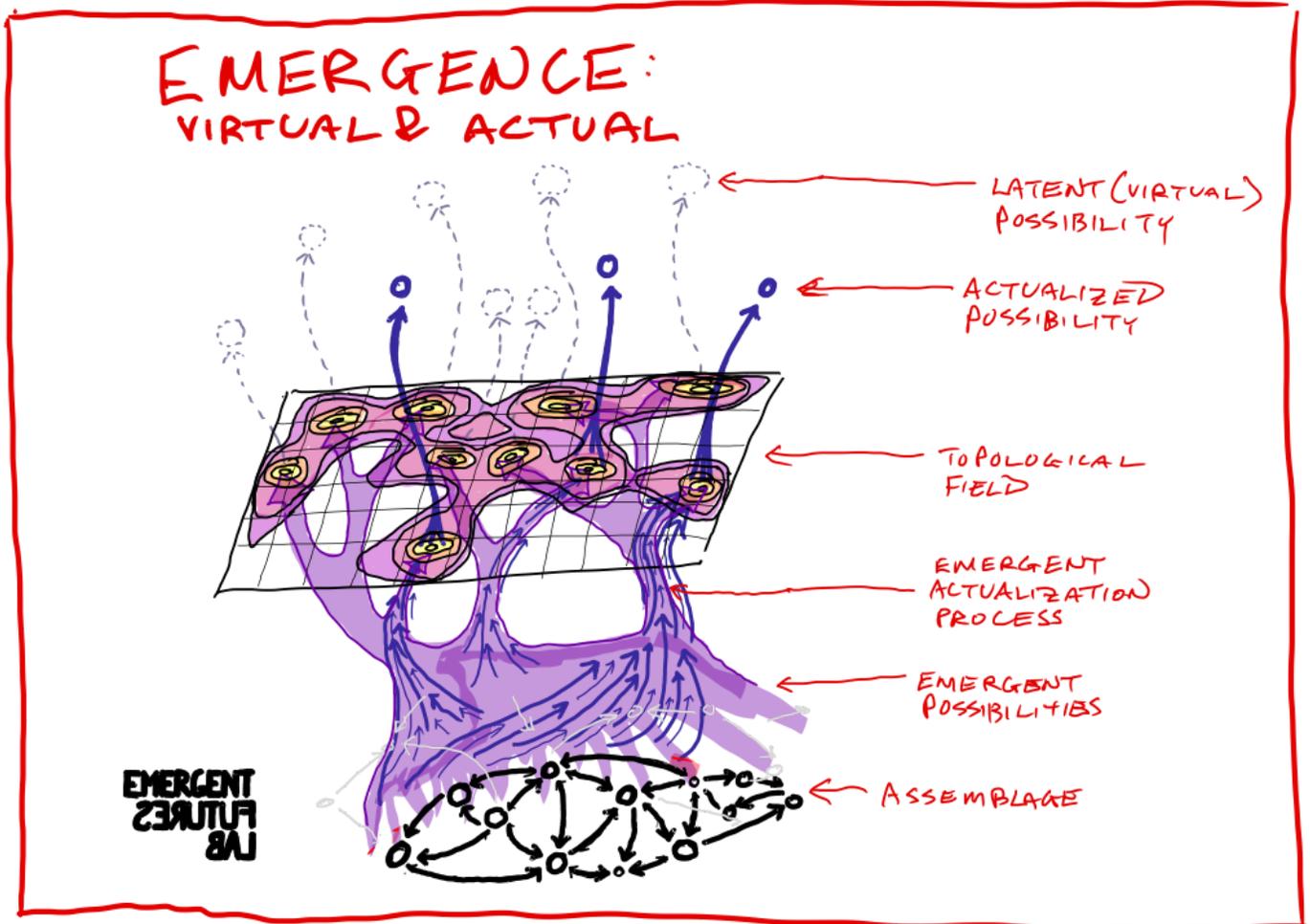
Such a diagram can seem abstract. Let's explore an example we have used before: cooking an egg. There is an assemblage — a taskscape of tools, techniques, agents, goals, histories and a specific environment (the kitchen configured in a certain manner). Here the goal is to cook an egg. This assemblage — even when only one very specific type of egg dish is being prepared opens up a large field of possibilities which can be visualized as a field:



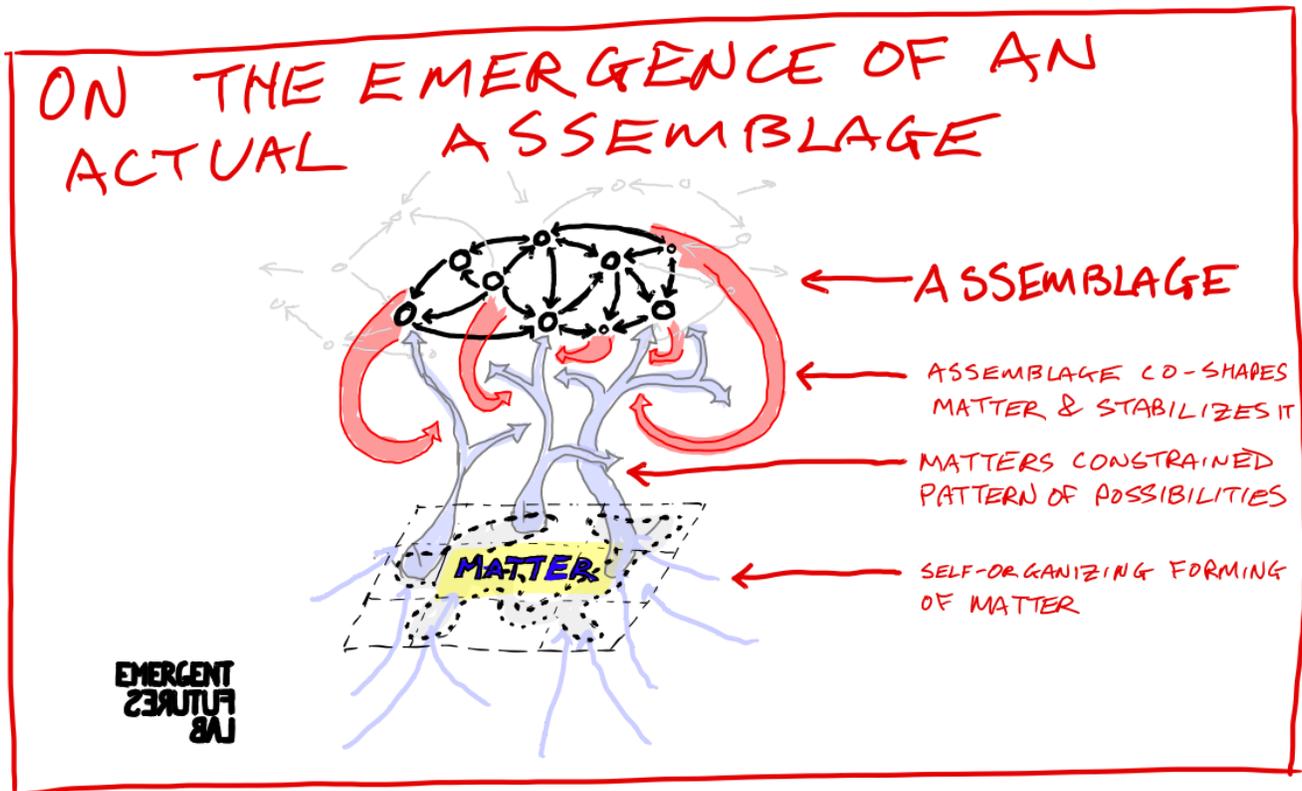
Here it is important to understand that emergent systems have far more latent or virtual possibilities than are realized at any one moment. You might only make a boiled egg but the assemblage is poised to go in many other virtual directions.

Every realized possibility is only one of many. What we call mistakes or errors are simply other virtual possibilities of the system.

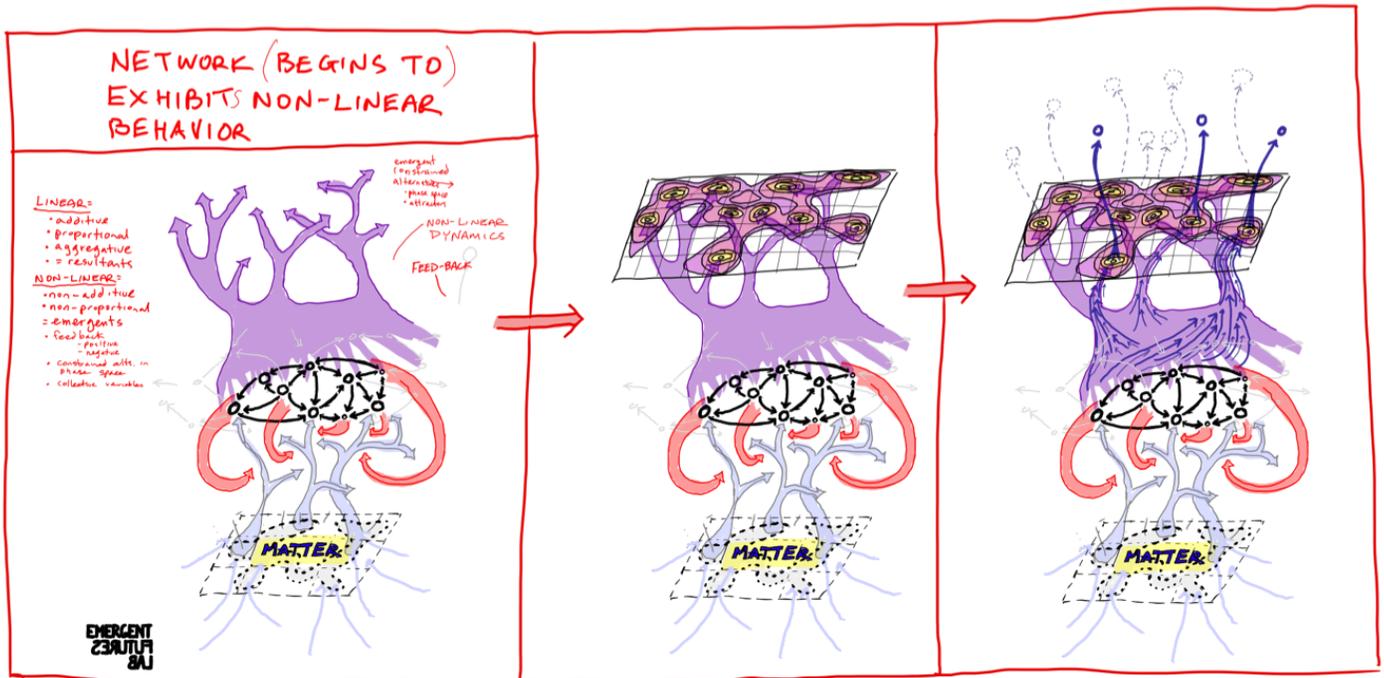
Critical to creativity is to always map the total field of possibility and to then systematically explore it. This involves working at multiple registrars: the “level” of the assemblage, the virtual field, and actual iain possibilities simultaneously.



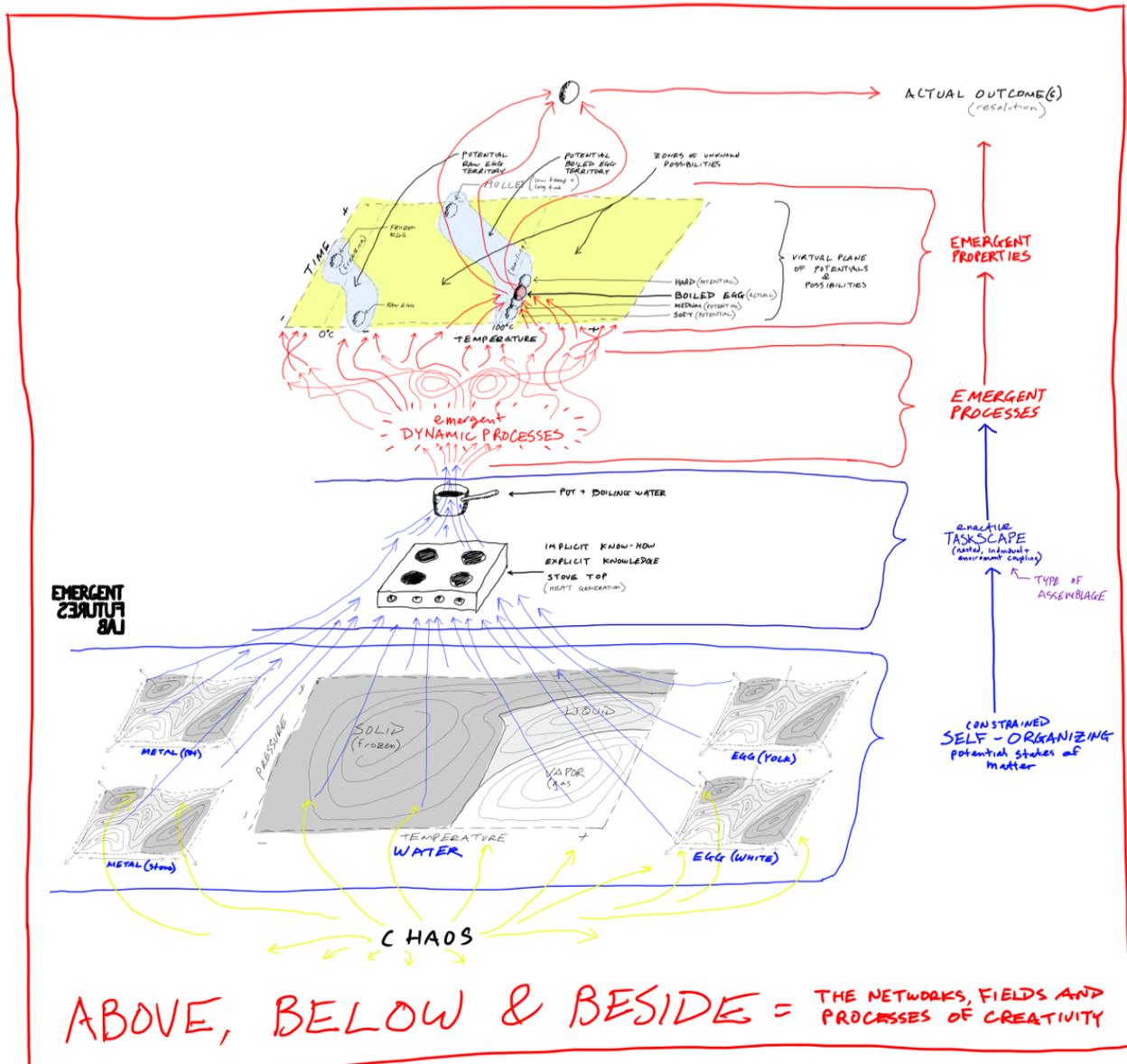
There is another critical level to work at — and that is to go back into how the components of the assemblage come into being. This is the level of how matter is self-organizing.



Being able to work across these four registrars (the actual, the virtual, the assemblage and the self-organizing of matter) is critical to emergent creativity:



If we return to our egg example we can see these levels and sense how we would act in distinct manners to inflect each of them simultaneously:



Emergent Processes of System Causation

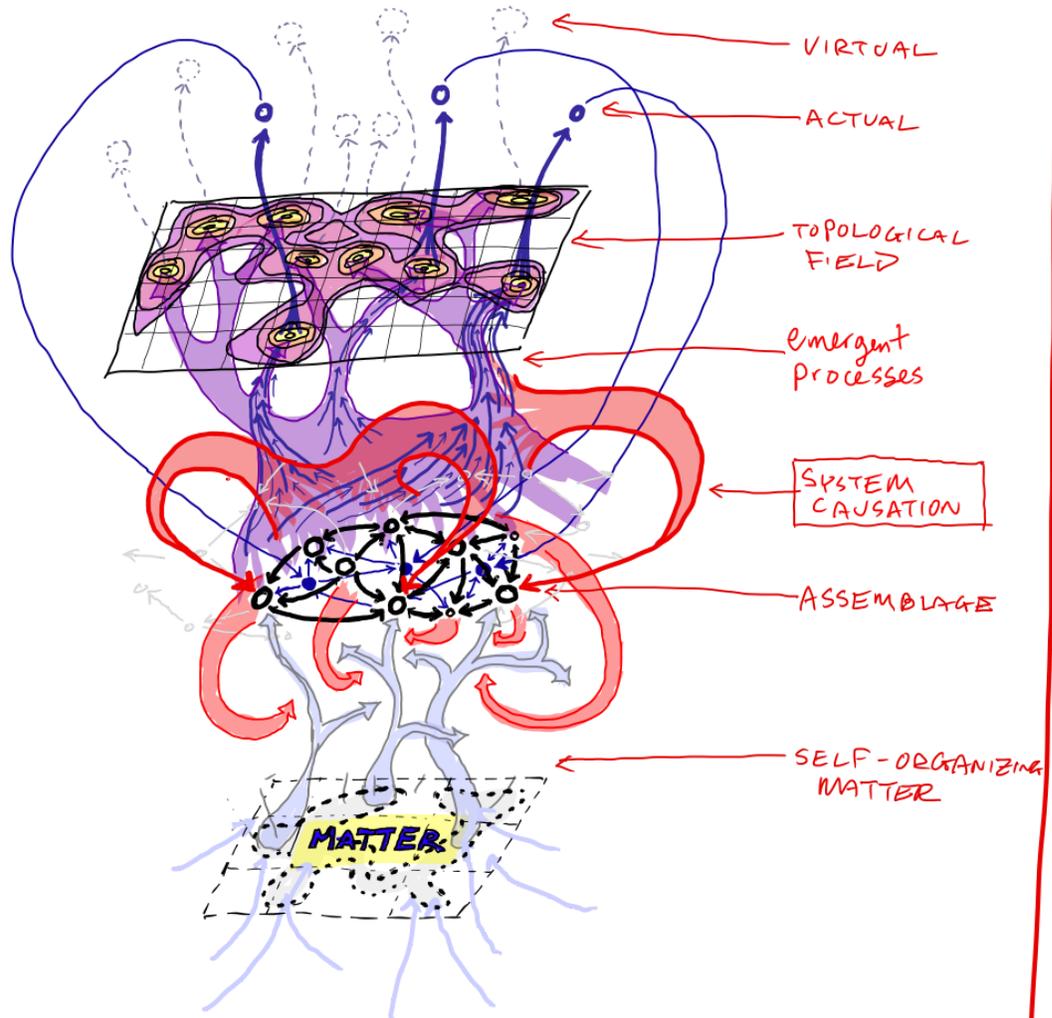
The third critical aspect of emergence is that the “whole” remakes the “parts”. This is often referred to as “downward causation” but is better understood as “system causation”

System causation can seem mysterious. But it is the critical piece of the puzzle. That the whole makes the parts effects all of us every day. Today in America the debate over policing is a critical example and it is one that pits essentialist explanations against emergent ones: is the killing of George Floyd and others a case of “bad apples” or is it something bigger?

System causation and emergence gives us a way to understand that it is not a case of bad apples acting out of their own essential troubled natures, but the system made all of the apples.

Creating and inventing a better justice system or a new work of art face the same question: who and how do things happen? And chasing after bad apples, silver bullets, or singular geniuses will not help us engage with creative processes in any meaningful manner.

EMERGENT PROCESSES & SYSTEM CAUSATION DEVELOP



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the emergent & relational "whole" is reaching "in" & shaping the parts (this becomes a continuous loop)

Some Conclusions on Emergence and Creativity

Someone will take credit for things or be held responsible for things. We can write histories to make Steve Jobs, Elon Musk or a poor soldier in Abu Ghraib responsible — but in every situation essentialism is just a fable that benefits someone or some part of the system — and more importantly it is a fable that keeps the [who and how of creativity obscure](#).

To realize that causality is not linear, and that it is not about tracing things back to imaginary sources frees us up to actually [engage in creative processes](#) free of disabling illusions. Emergence is who we are, what creativity is, and how we innovate.

Worlds Emerge

There is much more to be said about emergence, but that will have to wait for future Blog posts and newsletters in the coming weeks.

We can now say three critical things about the who and how of creativity and innovation:

1. Relational systems (assemblages) are authors of innovations
2. Self-organizing systems produce novel outcomes via indirect emergent processes.
3. The emergent “whole” in turn transforms its “parts”

What Do We Do When Worlds Create?

These answers can be frustrating — we know what to do in the [classical model of creativity](#) (even if it does not lead to change) — but now what do we do if the system is seemingly mysteriously doing all the real work?

In the classical model there are familiar tools and methods: ideation, empathy, prototyping etc.:

These are all methods for a universe of simple linear causality.

What complex systems require are wholly different techniques— techniques that work on the whole to co-shape the system from inside the system. This is done via experimentally nudging and dampening feed-back, while co-evolving with what emerges.

It requires new senses and sensitivity.

It requires a [new approach to creativity](#). A worldly creativity.

We are very much involved, we are active, experimenting and responding. But we are not imagining that we are the sole captains and authors, or that there is any one thing to find or do:

- We experimentally act and wait to sense how the system responds — we are partners in a complex dialog.
- We work simultaneously at multiple scales.
- We activate and foster collective capacities for response (capacity building)
- We are comfortable being blind to causality, and pragmatic in our skills for stabilizing novelty as it emerges.
- We develop collective systems and processes that recognize the role of humans but equally the critical authorial role of tools, environments, organizations, situated histories, environments and processes

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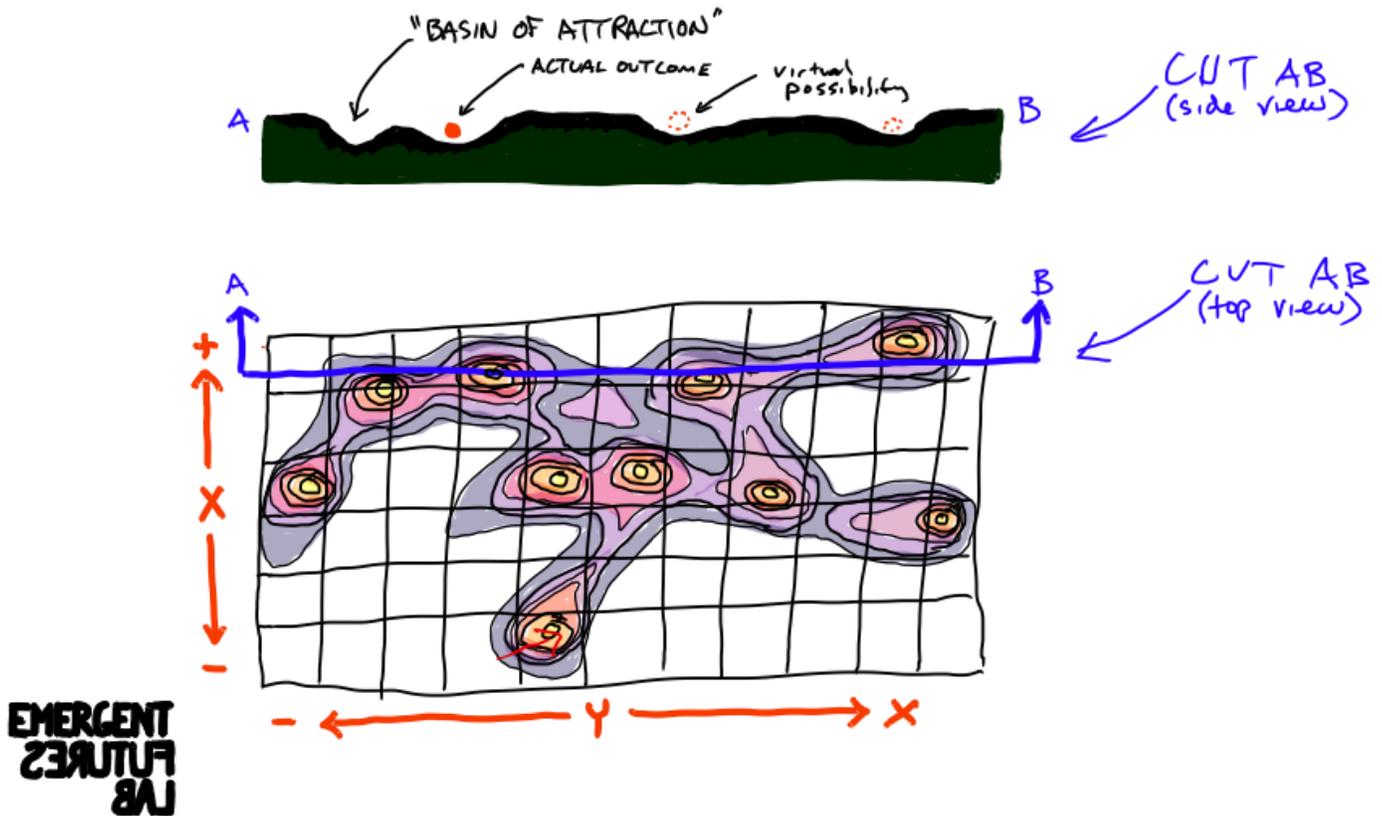
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How Do We Effectively Engage With Emergence

By Iain Kerr Jason Frasca

MAPPING THE TOPOLOGY OF THE POSSIBLE



The process of emergent novelty — how something new appears without being traceable directly to any set of component processes — is critical to all innovation.

In strong cases of emergence it's not only difficult to trace a feature back to a specific source, it is fundamentally impossible — the novel emergent feature is truly an emergent property of the whole.

From the component processes a whole **emerges**. This whole is a novel emergent process that gives rise to novel possible outcomes. And this "whole" becomes distinct from and irreducible to the components. And ultimately the "whole" starts to even shape the parts.

Think of the behavior of a crowd at a large outdoor concert. Each person is a unique component of the larger group. At first crowd is just a large group of people milling about, but as the evening progresses and they attune themselves to the music, each other and the occasion they cross a threshold into a new state of organized behavior with it's own propensities and disposition. Many unique events contribute to this new state and this state can easily be shifted by relatively speaking quite small events. Someone trips and cries out and suddenly the crowd is moving in a panic. Here we see the “whole” — the emergent logic of the crowd shaping the behavior of the components.

While crowds and crowd behavior are good examples of emergence, so too are all sorts of organizations. Such as:

- art practice
- a corporation,
- an individual
- a social movement
- a tool in use
- or a police force

These are all examples of complex systems that can be said “to have a mind of their own.” In each case (the individual who is alive or the art practice or the organization or the police force) there is a tight interdependent network that “individuates” or can be said to produce an operational separation from a related “outside” (that it also co-shapes).

We've outlined the basic logic of emergence and creativity in another article detailing what emergence is and how it works.

In this article we are going to focus on some basic principles of how to innovate with emergence. This article is meant to be an introduction, and in future newsletters and blog posts we will share more advanced tools and concepts.

Working with Emergence: Some General Concepts

Emergence challenges many of our standard ways of thinking and working. There can be a lot of misconceptions when you start to develop an innovation approach and take emergence

into account. Given this, let's start clarify some basic concepts and common misunderstandings:

- It's not about scale: when everything is about systems, fields and multiple possibilities it is easy to assume we are talking exclusively about large scale systems. But emergence happens at all scales and it is much easier to get a feel for how to work with it by beginning at a small scale. Making a meal or sharpening a pencil both engage emergent logics. We wrote a blog post about [tasksapes and cooking eggs](#) that is a good introduction to this.
- It's far more hands on: while the classical linear and ineffective innovation methods have a clear beginning (ideation), and a far more abstract logic, — working with emergence means lots of hands on engagement. You need to get a sense of the systems and this can only happen via active probing and sensing. Emergence is surprising and these surprises emerge only in response to some action. You need to do a lot (in a considered manner). There is little place for arm-chair speculation, grand visions, and removed discussions of possible futures — especially at the beginning. You need to develop an active and experimental approach where novel emergent outcomes lead; not predefined ideas. The fundamental question is always: “What can x do? [And what else can it do?](#)” We have written extensively on the concept of affordance in regards to [the unintended](#) and the exaptive process of design.
- It's not about singular outcomes but multiplicities: The classical way to imagine innovation is that some singular thing is being made — an airplane, a smart phone, a drug. But this is never the case. Any one action or outcome is but a single point in a field of potentials. A singular outcome arises because we actively and momentarily constrain a dynamic process to one outcome.

Any one outcome is because of an emergent process arising from an assemblage. These emergent processes always give rise to a field of mutually arising potentials. Even if we understand ourselves to be making a solitary object — it is “haunted” by a field of potentials. You might not know this, or you might not care to engage these other potentials but they are as real as the potential you are actualizing.

Emergent “wholes” have propensities, and dispositions — multiple distinct states they “gravitate” towards. There are never systems that have only one stable state.

For example: you are making the perfect sunny-side up egg — but you could flip it, or scramble it, or even burn it to carbon. These possibilities are there the moment the assemblage of egg + pan + oil + heat, cooking, etc. are in place — they are just not “actualized” and remain “virtual”. The assemblage affords all of these potentials — they are the constrained patterns of possibility into an emergent field of probabilities.

Everything is variation and contrast.

Accidents and mistakes are part of this field — simply as other emergent probabilities of the assemblage waiting to be realized. And it often takes great effort to constrain an assemblage from giving rise to accidents. The burnt egg haunts the inattentive cook.

- It's about playing with relationships more than things: think about our egg cooking example — none of the “things” are changing — the pan, oil, egg and heat stay the same — just their relations change. An over-easy egg is about developing a relation of both “sides” of the egg to the pan. Cracking the egg lets it have a new relationship with gravity (the flattening of the egg into its classical disk shape). Now we are in a work of events — affordances: congealing, burning, carmelizing, etc with thresholds and multiple distinct states — it is less about things and far more about processes and events.

Working this way also means working both more indirectly (say making new tools), and at multiple scales (rethinking the process i.e. the recipe).

Even the seemingly solid things — such as the pan or the eggs are better thought of as relational events with distinct possible states. We need to be asking: what can this afford us in this state? For example: what will separating the yoke from the white afford us in relation to a blisteringly hot pan?

- You know the negative much better than the positive: True emergent novelty (the goal of innovation in this case) cannot be known in advance — it will surprise you. This is why strong ideation is such a poor technique for innovation.

While you cannot know what novelty will emerge, you can know what you do not want to repeat (the old). Refusing — blocking while refusing to confine the future to what might want (ideation) is critical. You are attentive to what arises, open to actively following the novel and actively resisting the know. Blind to the future, and clear eyed about the past. This is very different from classical creativity which presumes to know the future and acts from a visionary (future seeing) perspective — god-like and free of curiosity... (enough said).

Eleven Key practices:

1. Work at multiple scales
2. Probe the system with semi-reversible interventions
3. Engage, create, and experiment far more than ideate
4. Experimentally play with variables while searching for thresholds
5. Follow what arises in experiments
6. Sense and articulate the logic of the “whole”
7. Experimentally block processes that give rise to key aspects of the whole
8. Co-evolve with your experiments

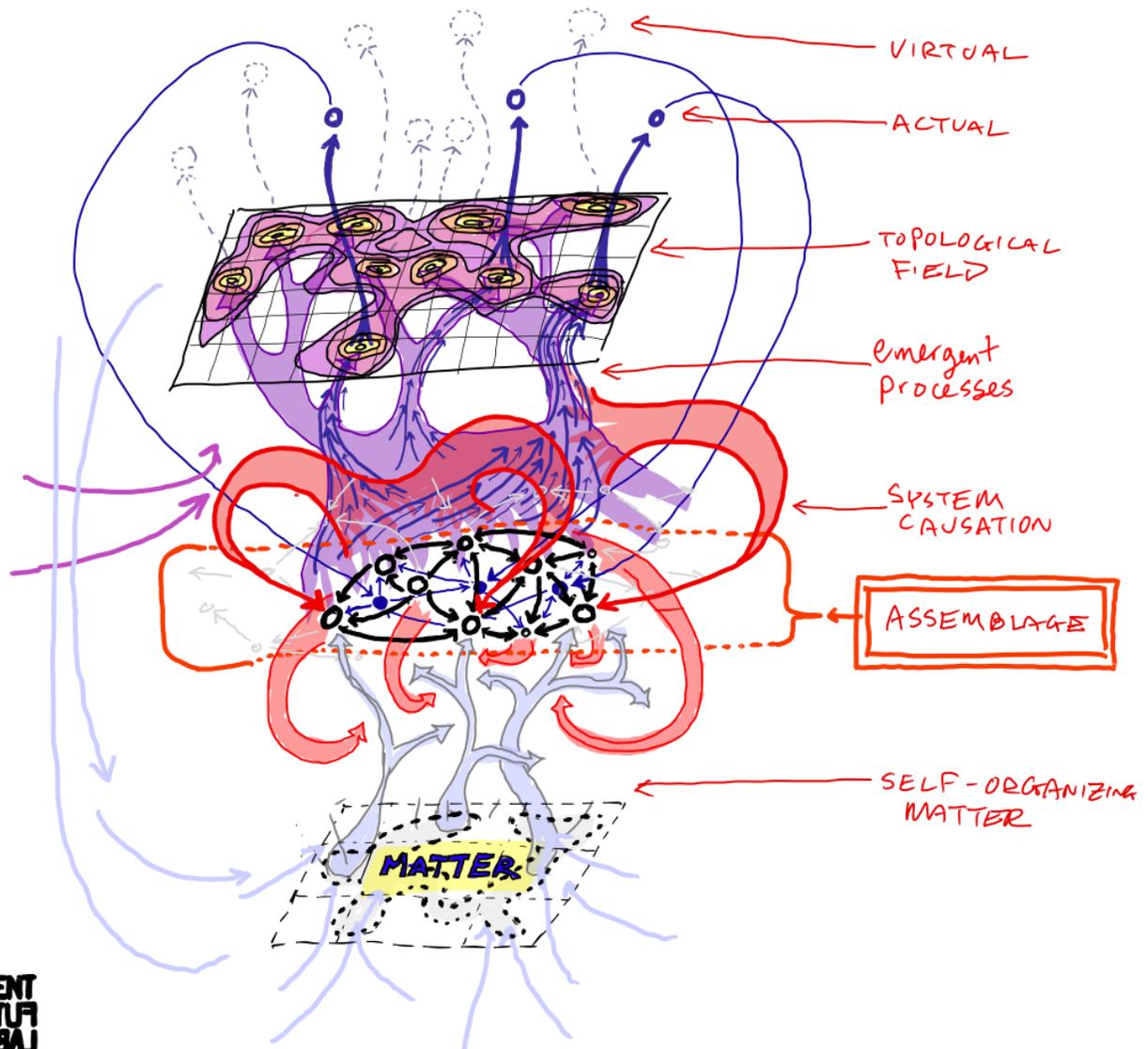
9. Consider the total field of potentials
10. Maintain an open approach of curiosity
11. Suppress the desire for latching onto single solutions

Understanding the Components of Emergent Systems

We have already introduced many of the key components (fields, assemblages, the virtual and the actual, etc.) in passing. Now let's really get to know them and how we work with them in more detail. Let's walk through emergence region by region, identifying the components, and noting some key practices:

Assemblages, Networks and Taskscapes

THE "COMPONENTS" OF EMERGENT SYSTEMS



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From the perspective of our everyday engagement with emergent systems [assemblages](#) are what we mainly encounter: a tight network of things, practices, concepts, habits and environments. We live in and of assemblages.

Think as you reach for your coffee - consider the organized web of interacting relations: Coffee beans, roasters, grinders, water, stovetops, filters, cups, drinking, bodies, habits,

histories, etc.

All of reality is connected and organized in networks of processes. Nothing is solitary— everything is configurations— an organized and stable pattern of process. These webs of process entangle everything. But reality is not simply one massive undefined web of relations. Networks of relations individuate, and have a distinct character. Some of these networks form in ways that cannot be easily separated— these semi-non-decomposable ones are “emergent”.

Our daily lives are full of these — in reality it is pretty much everything — we are always in a complex highly dynamic emergent situation. Some of these can be so strongly constrained that they act like simple systems — but they always sit close to the edge of tipping into disorder and new forms of order. It is best, from the perspective of innovation, to sense the highly dynamic possibilities of assemblages rather than taking their stability as a given.

We as individuals are also assemblages. Understanding, and shifting this logic at the level of ourselves is really fundamental to beginning to [engage emergent innovation](#).

Assemblages emerge from constrained self-organizing material processes and give rise to emergent processes.

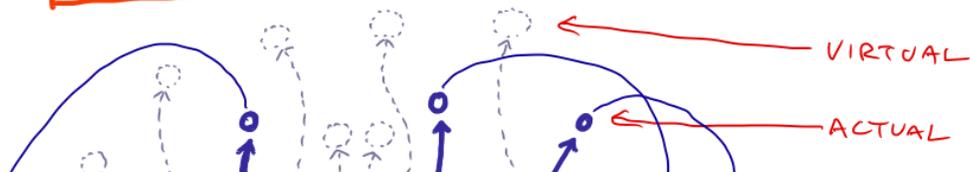
- “Below” are self-organizing material processes
- “Above” are emergent processes (a field of potential outcomes)
- “Beside” are constraining forces
- “Nowhere” are radical novel emergent possibilities

What this means for innovation:

- The key for innovation is to actively and experimentally sense, see and understand the assemblages that most directly impact your endeavour
- Probe the assemblage (good examples of this can be found in [interventionist art](#) [\(affiliate.\)](#))
- Diagram the assemblage
- Sense what happens when you change parts (substitution, intensity, etc.)
- Be experimental — this is the level you can have the most effect.
Identify probable component process to block and novel affordances (exaptations) to augment

Self-Organizing Matter

THE "COMPONENTS" OF EMERGENT SYSTEMS



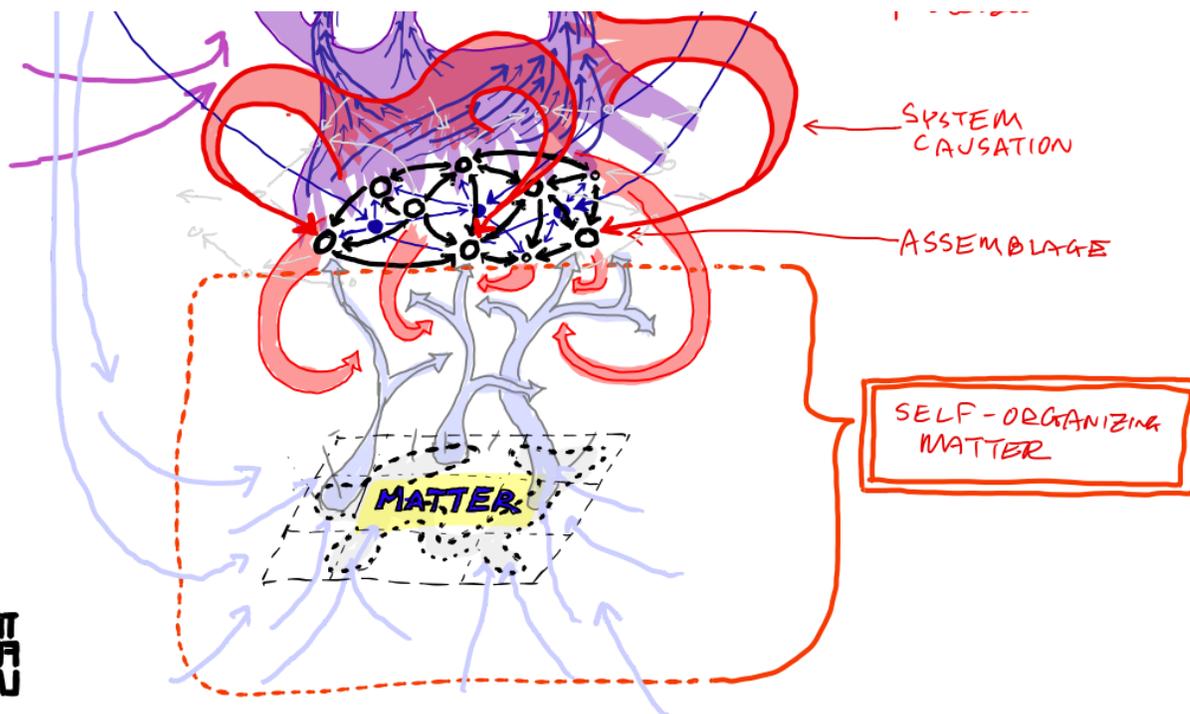
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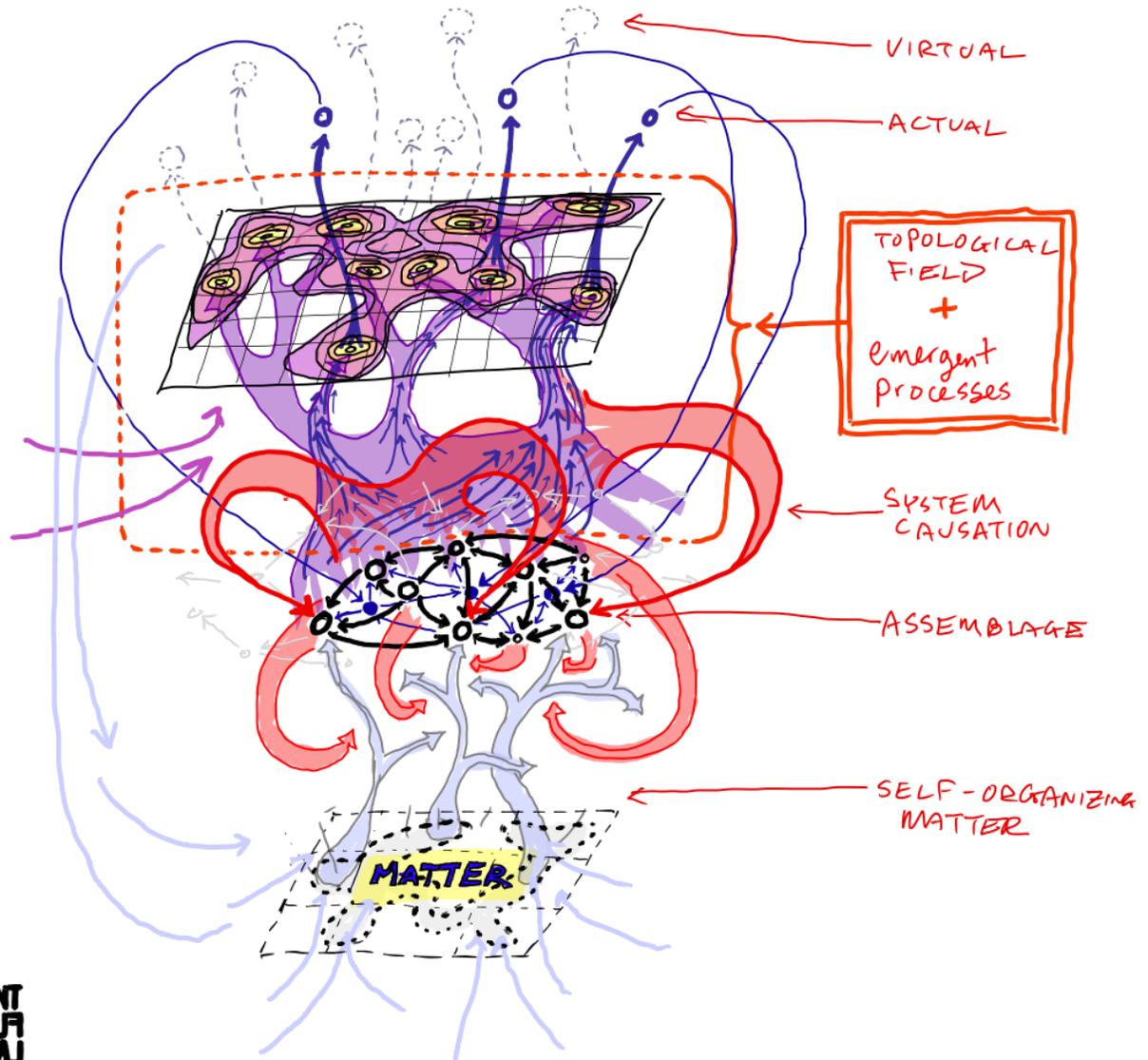
"Below" the assemblages of everyday life are the constrained self-organizing practices of matter that all these assemblages emerge from. Materials stabilize with phases, states, properties: liquid, solid, flexible, brittle, absorbent, etc. (We have written an [article](#) going further into this).

What this means for innovation:

- From the perspective of an assemblage — we work in two directions: “below” at the level of self-organizing matter and “above” at the level of emergent processes and their emergent outcomes
- To change assemblages is to work with how matter organizes itself to coax new states and properties
- Blocking how matter stabilizes into certain states will open up the exploration of other possible states
- Noticing an unintended quality or affordance arise from an assemblage can be traced back to the constrained states of matter (an exaptation).
- Exaptations (unintended novel states) can be activated and stabilized to give rise to new assemblages.

Emergent Processes & Fields

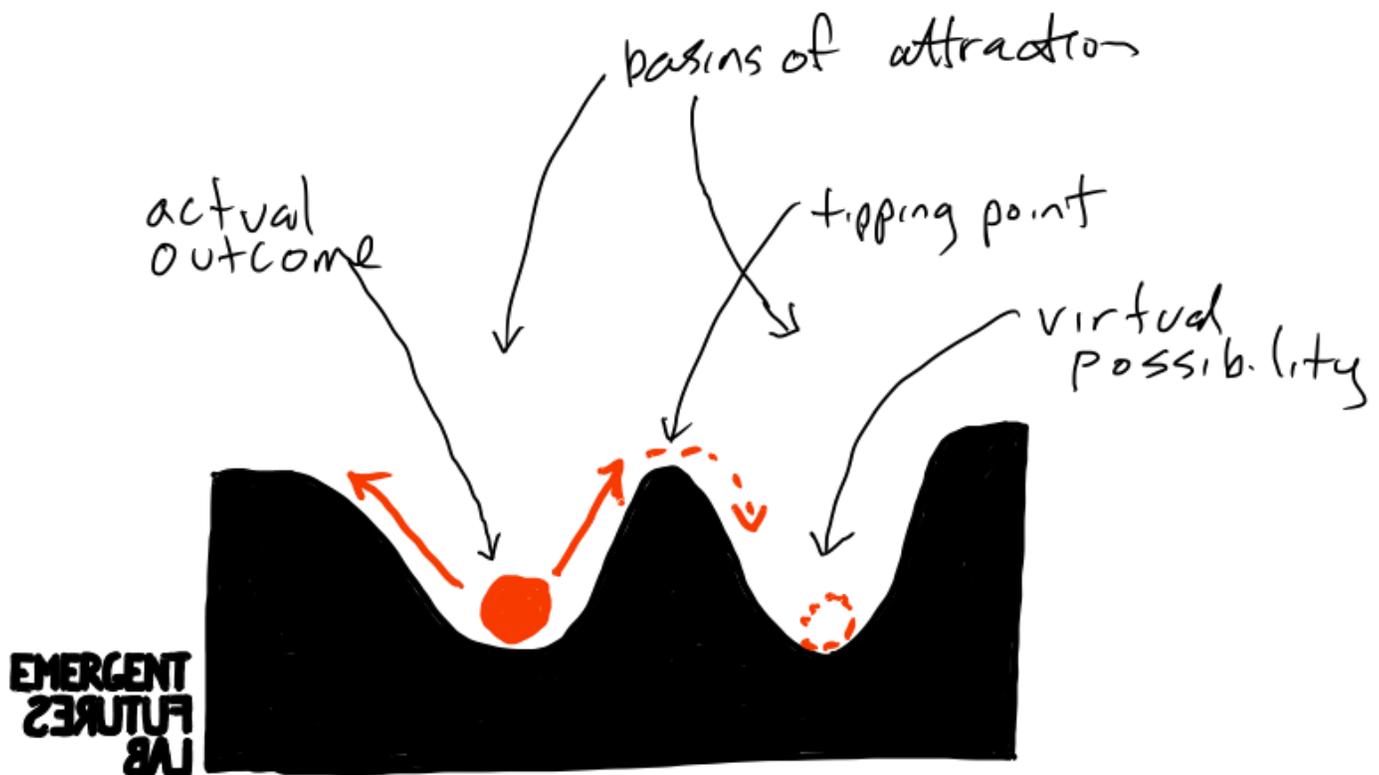
THE "COMPONENTS" OF EMERGENT SYSTEMS



Emerging out of the dynamic relations of an assemblage are constrained processes.

While we most often sense what is emerging from an assemblage as a singular and solitary “thing” — think back to the above egg example — these processes are giving rise to a field of related probabilities.

TOPOLOGY OF THE POSSIBLE



It is helpful to understand this “field of related probabilities” as a type of landscape formed of peaks and valleys. Valleys are stable states of the system (the most likely outcomes), and the peaks and ridges are the thresholds between differing states or possibilities of the system (where things “tip” from one state to another).

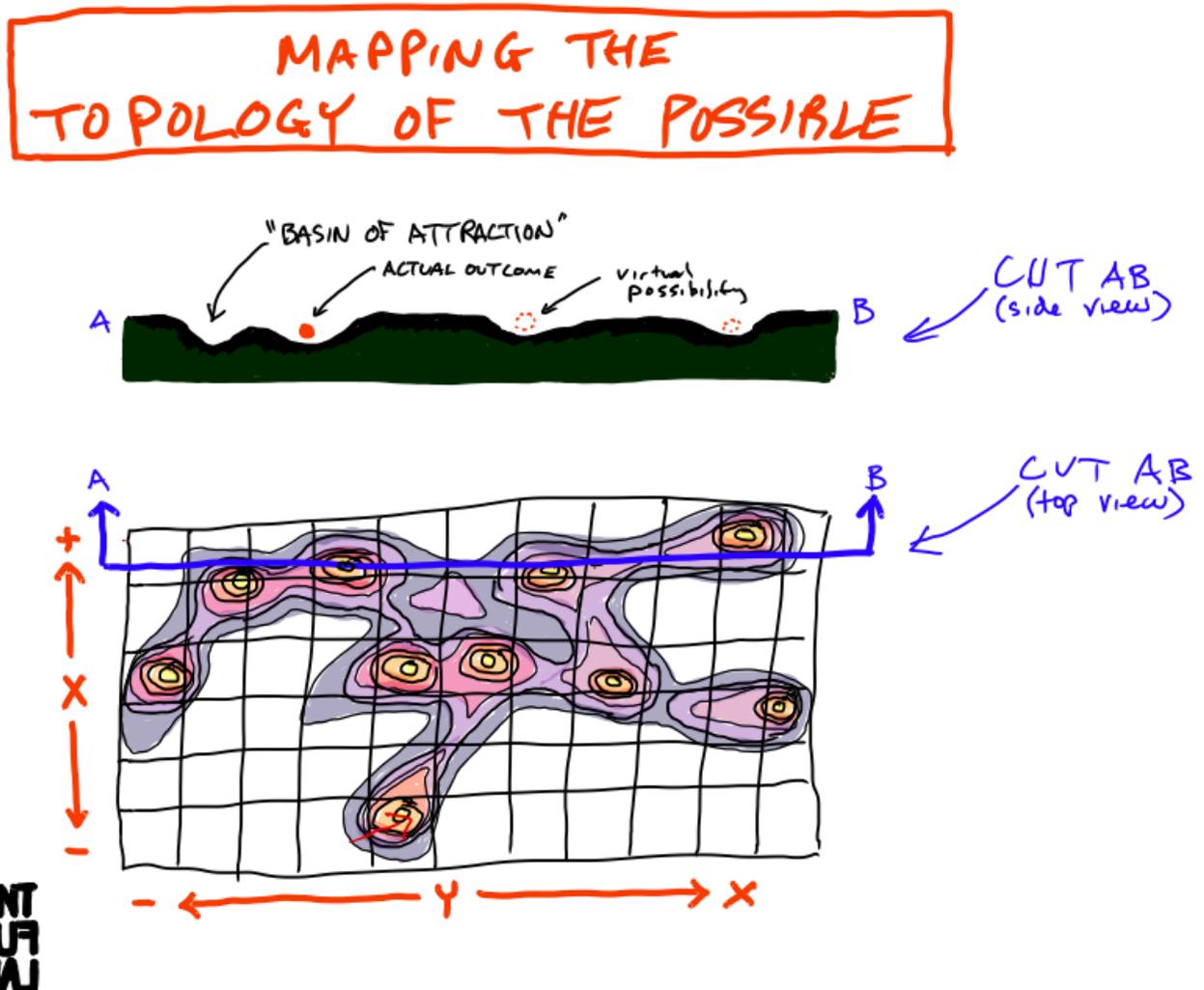
If an emergent outcome is the ball in the above diagram it will tend to roll into the deepest and most stable valley and stay there— hence statistically this field will most often give rise to this outcome.

Emergent systems are always in a state that will have stronger and weaker tendencies or propensities.

The danger with this landscape image is that we conceive of this “ground” as stable. In actuality the ground is dynamic and highly responsive to changes to the assemblage. For example: if you increase the heat in your pan the basin of attraction that equals “burnt” will dynamic expand and deepen...

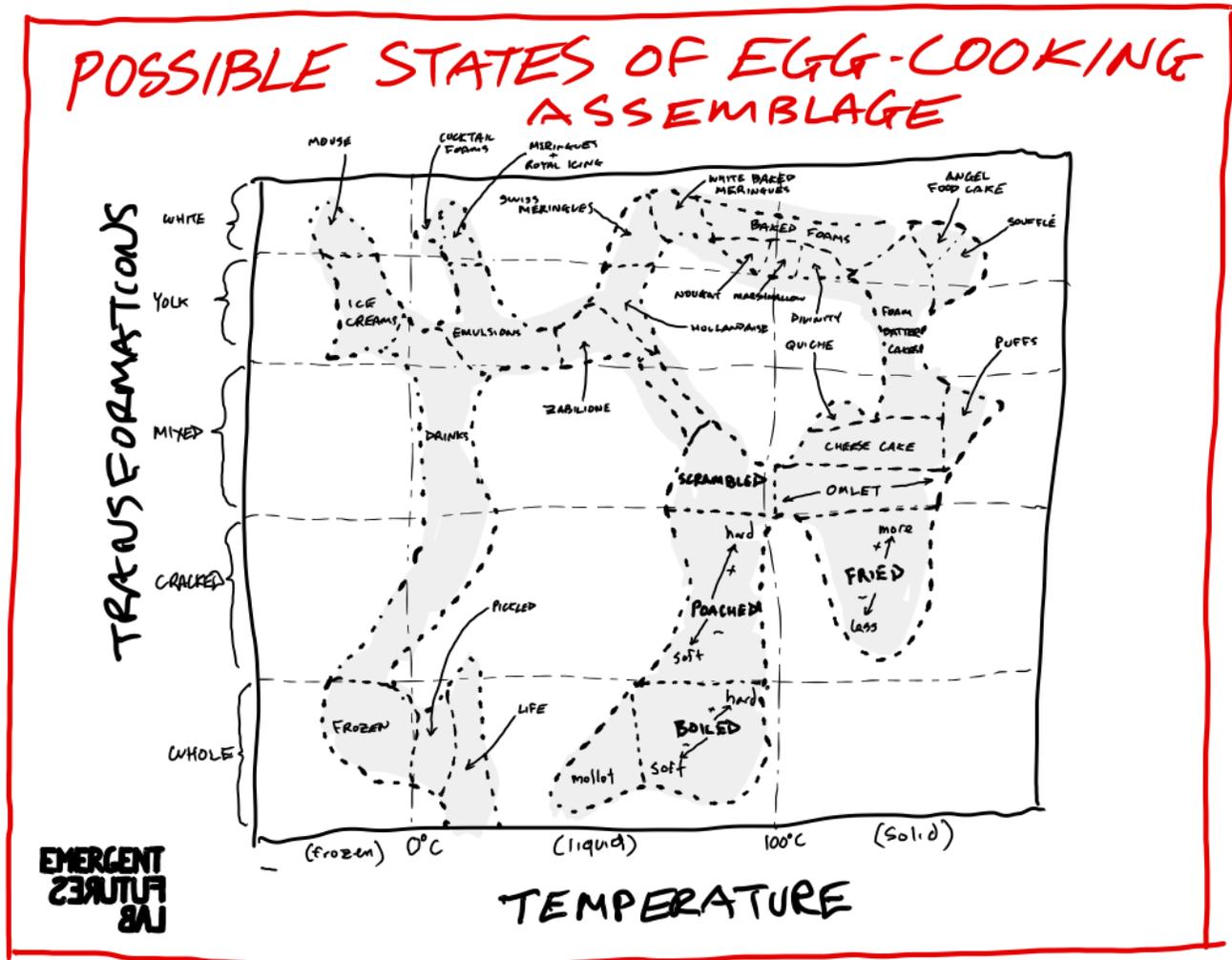
The “ground” is more like a highly stretchy sheet undulating in the wind.

The key is to sense your actions at the level of the assemblage and at the level of outcomes shaping a dynamic topology of multiple novel probabilities. Beside any singular novel outcome is a fast field of potentials that need to be realized/explored – stabilized and made as probable as your initial discovery/invention.



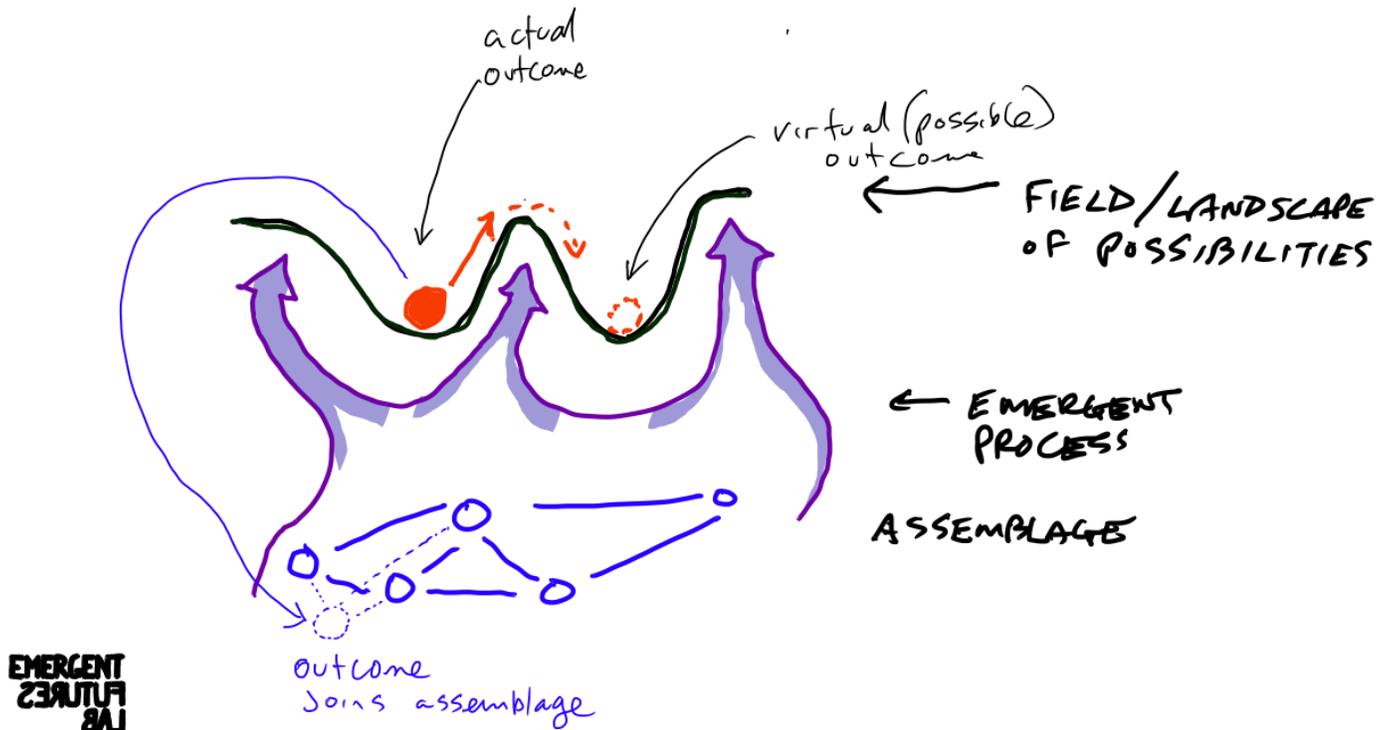
These multiple tendencies can be diagrammed as an open and dynamic topological field of possibilities. And this field will be enlarged or changed via experimentation (at any and all levels).

Going back to our egg example we could diagram the emergent state of the field of probabilities as this:



Here it is important to see the relation between the levels (see below):

THE EMERGENT PROCESS LOOPS BACK

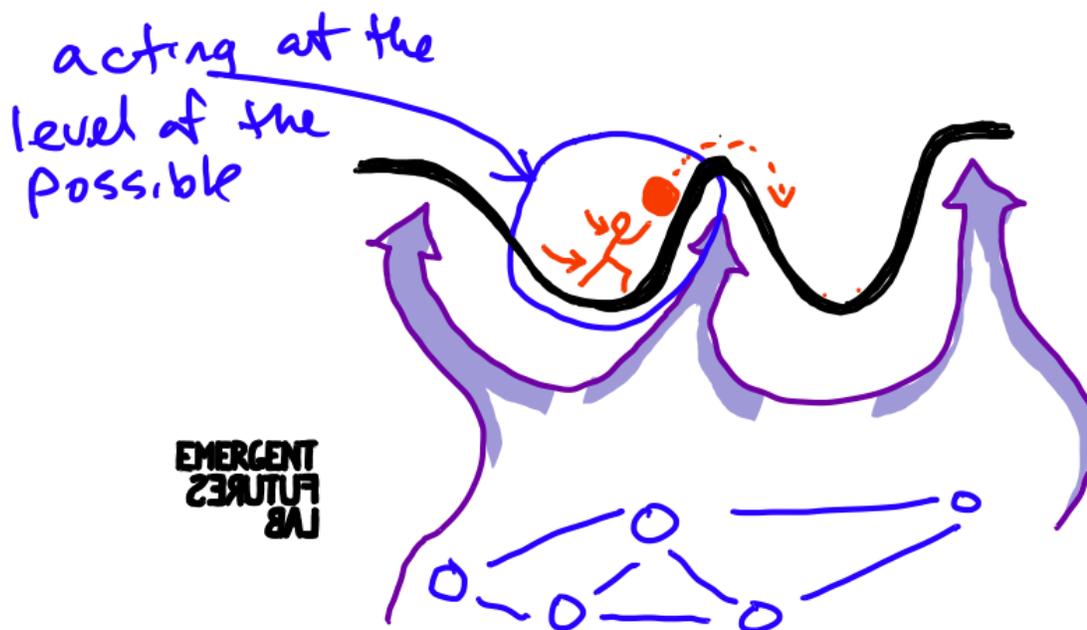


The assemblage gives rise to processes that constrains a field of possibilities that lead to an actual outcome that in turn becomes part of the assemblage (the thin blue arrow on the left). This is why it is inaccurate to speak of “above” and “below” — for all components are looping — what was above goes below — a looping of difference differing... with the field in continuous topological deformation.

What This Means for Innovation

- You can act at different levels with very different effectiveness

WORKING AT THE LEVEL OF DISCRETE THINGS



Act at the level of the actual and you are moving one thing towards a new basin (change in degree). This is like making an actual specific cup of coffee. The assemblage is all in place and you are carrying out the steps to actualize a specific possibility.

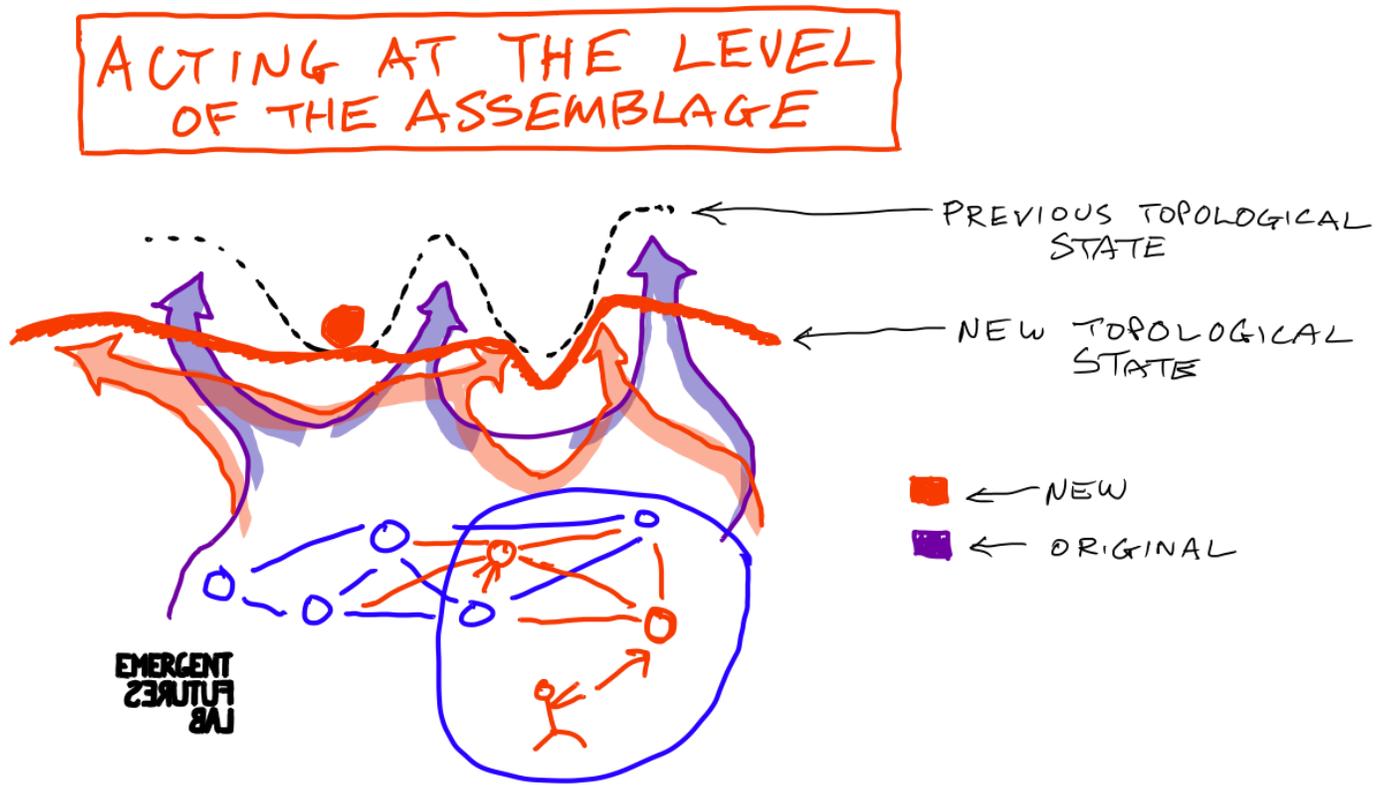
The advantage of this is it is immediate. The disadvantage is that it is not novel — you are going from one existing state of the system to another. The basin of attraction you are moving into might be new to you — but it is not actually new.

That said, this exploratory behavior is critical to exploring and discovering the possibilities of an emergent system. You have to experimentally “walk” the terrain: what are all the potentials of this configuration of the assemblage?

The language of exploration is correct but it can be also misleading if we imagine that the form of exploration is one of traversing an already existing landscape. With novel emergence

— to explore is to make the landscape as you go. Exploring can only happen via direct experimentation. You are enlarging and stabilizing the given field. Again this form of activity needs to be multi-scalar (above, below, and beside what is actual) and multi-modal (you are doing many distinct activities — inventing tools, processes, concepts and developing environments, etc.).

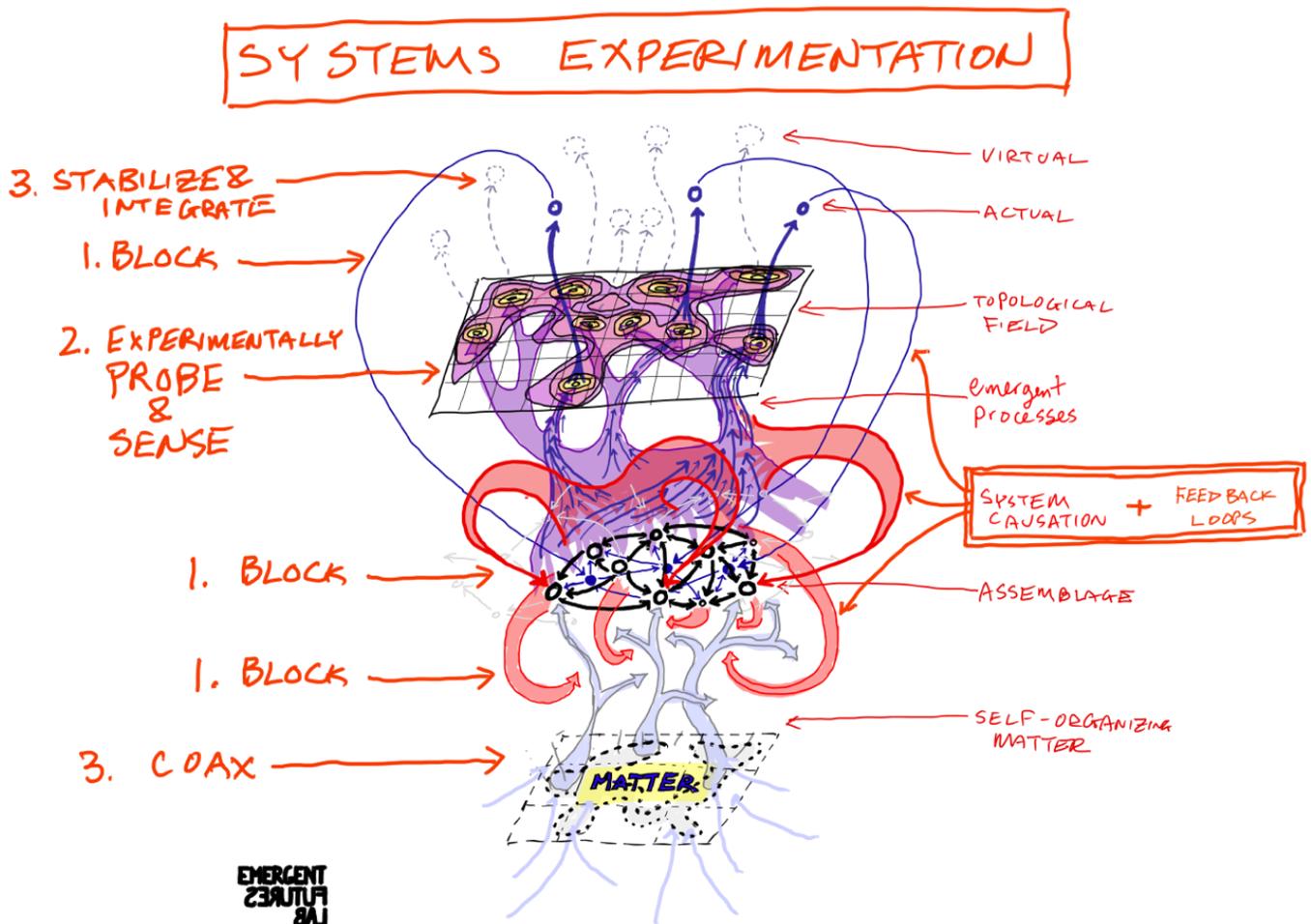
But — for genuine novelty — you have to first participate in the emergence of a new field:



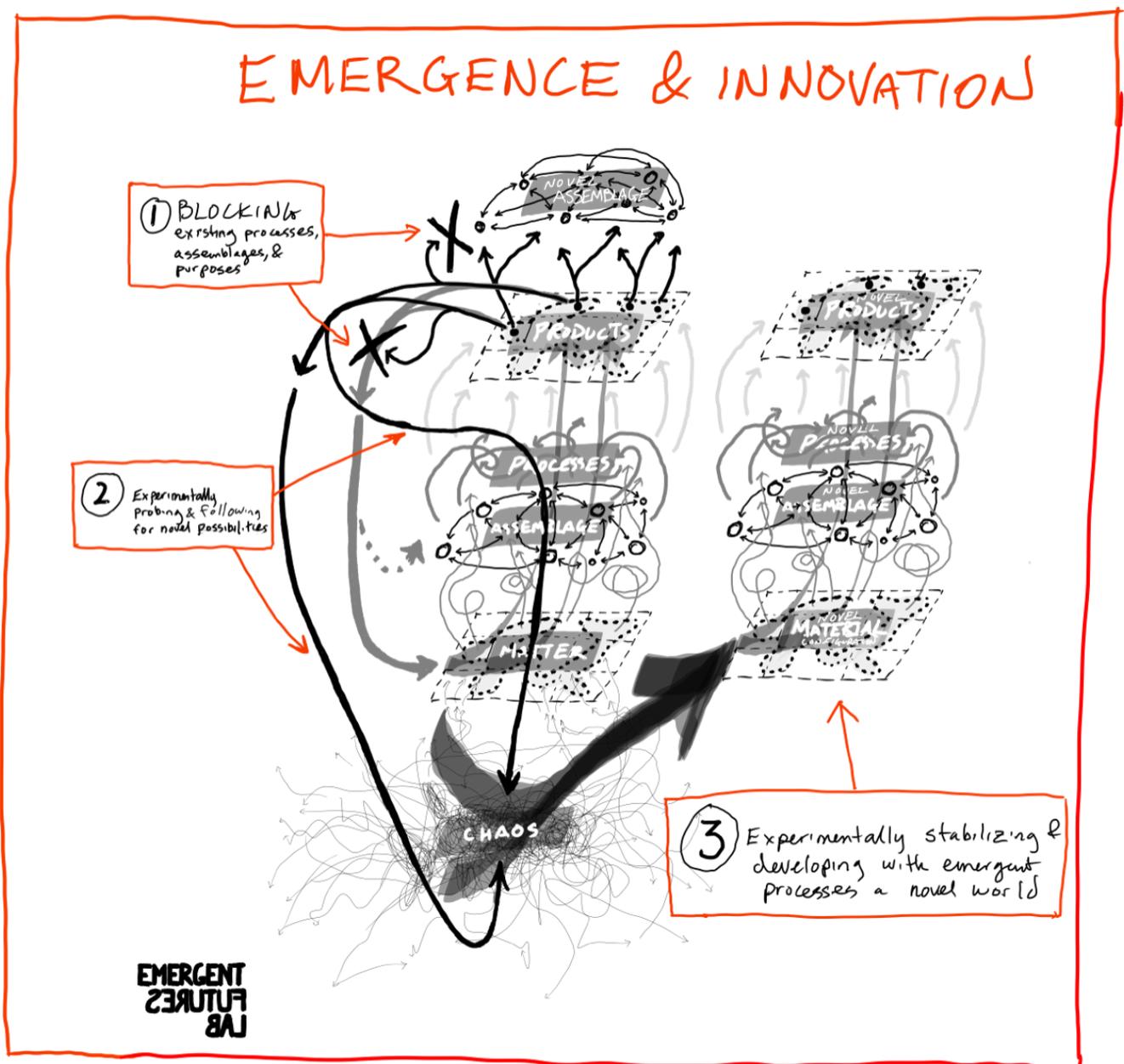
This happens at the level of the assemblage. Change the assemblage and you will change the field (change in kind). Here a dialog — really a dance emerges: tweak the assemblage, then experiment in actualizing within the field, then fold that back into the assemblage, etc. You are working in, across and between the levels. You are changing hats and methods rapidly. You are becoming an expert at the indirect and the direct — acting on the particular and seeing the emergent field.

System Causation

As you get good at this dance of multi-scaled, multi-modal, multi-skilled co-emergence for novelty you sense the agency of system level of emergence: the whole is “making” the “parts”. (We discussed this in detail in this article on [Emergence](#)).



What this Means for Innovation:



How to Innovate with Emergent Processes?

Hopefully this introduces how you can work with innovation and creativity as emergent processes — and helps you see that there are clear and effective ways to engage with emergence.

1. As you sense the emergent logic of a system (its dispositions and propensities) as a whole you can experimentally block assemblages that play critical roles in the resiliency and stability of the emergent system.

2. These experimental blockages will open up a space to sense, probe and experiment with novel possibilities latent but suppressed by the previous state of the system.
3. These in turn are coaxed, stabilized and integrated into novel assemblages.
4. How to Innovate with Emergent Processes?
5. Hopefully this introduces how you can work with innovation and creativity as emergent processes — and helps you see that there are clear and effective ways to engage with emergence.

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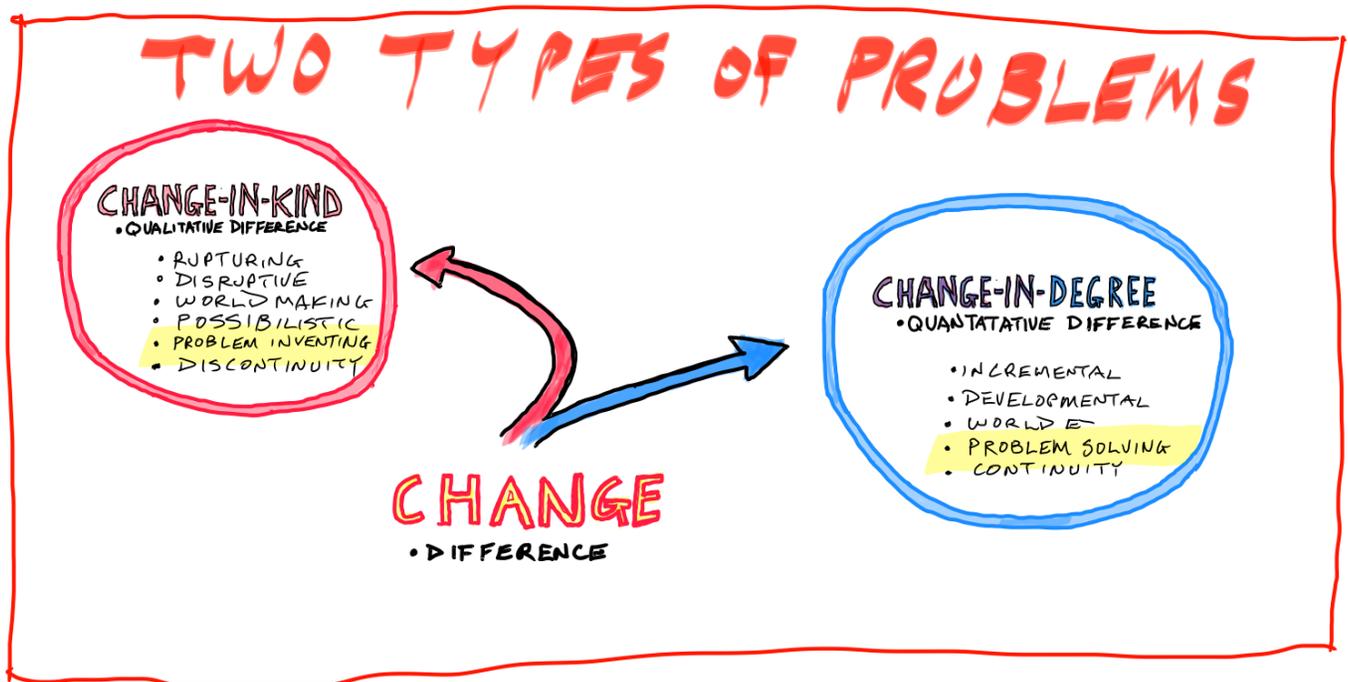
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Innovation — It's About Problems

By Iain Kerr Jason Frasca



What Does Innovation Do?

The most common answer we hear is that innovation is using creativity to “solve problems”.

We strongly believe in this answer.

Creativity and innovation are problem focused practices.

But, what does it mean to say it is “problem solving”?

Let's take it slowly and look at each of these concepts — a “problem” and a “solution”, in turn — what they are and how they work is quite surprising.

What is a Problem?

In a very simple sense, we could say that it “is the stating of a question that addresses an issue”.

“How do we do X under these circumstances?”

Or *“How do we solve X?”*

But if this was all — there would be little to say.

A problem contains far more than what is explicitly stated. The explicit components rest upon a vast sea of highly diverse implicit factors. This unstated side of things is not exclusively or even mainly conceptual. What is implicit in a question cannot be put into words because it is about things, environments, habits and practices — all things that exceed in action anything we might conceptualize about them in language.

Thus questions / problems come to us embedded in — and *are* — a network of unspoken assumptions, equipment, approaches and practices that frame and support the way the question / problem is posed.

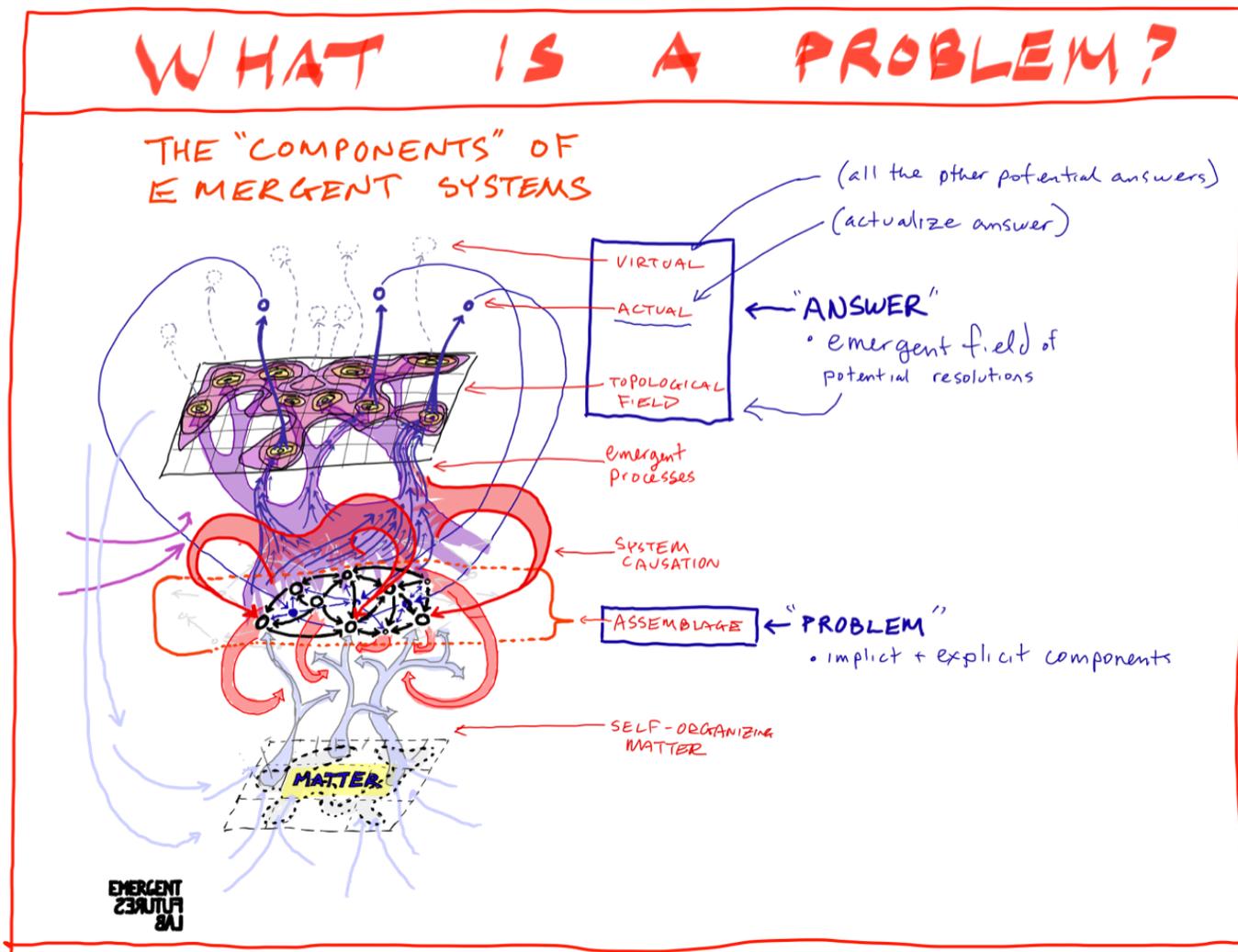
A problem is a statement embedded in a specific highly stable *assemblage* of physical things, environments, concepts, habits and practices that give rise to an emergent field of possible outcomes or solutions.

Problems are not free-floating statements or abstract challenges. They are issues arising as assemblages and fields.

As we bring into the light both the assemblage and the emergent field — we see *the actual contours of the problem*. We can consider this duality in its simplest form is what we see in the question statement and its potential answer.

All questions / problems have two “sides” - The Question and The Answer:

1. The Question = Assemblage
2. The Answer = Emergent Field of potential outcomes (See diagram below)



This diagram is the basic diagram of how emergent outcomes develop. It is worth pausing to read this article and look deeper into the [process of emergence](#) if you are not familiar with it.

By its actions an assemblage poses a question: *Given these circumstances what is possible?* And the emergent field directly offers the potential answers.

Questions Already Contain Their Answer

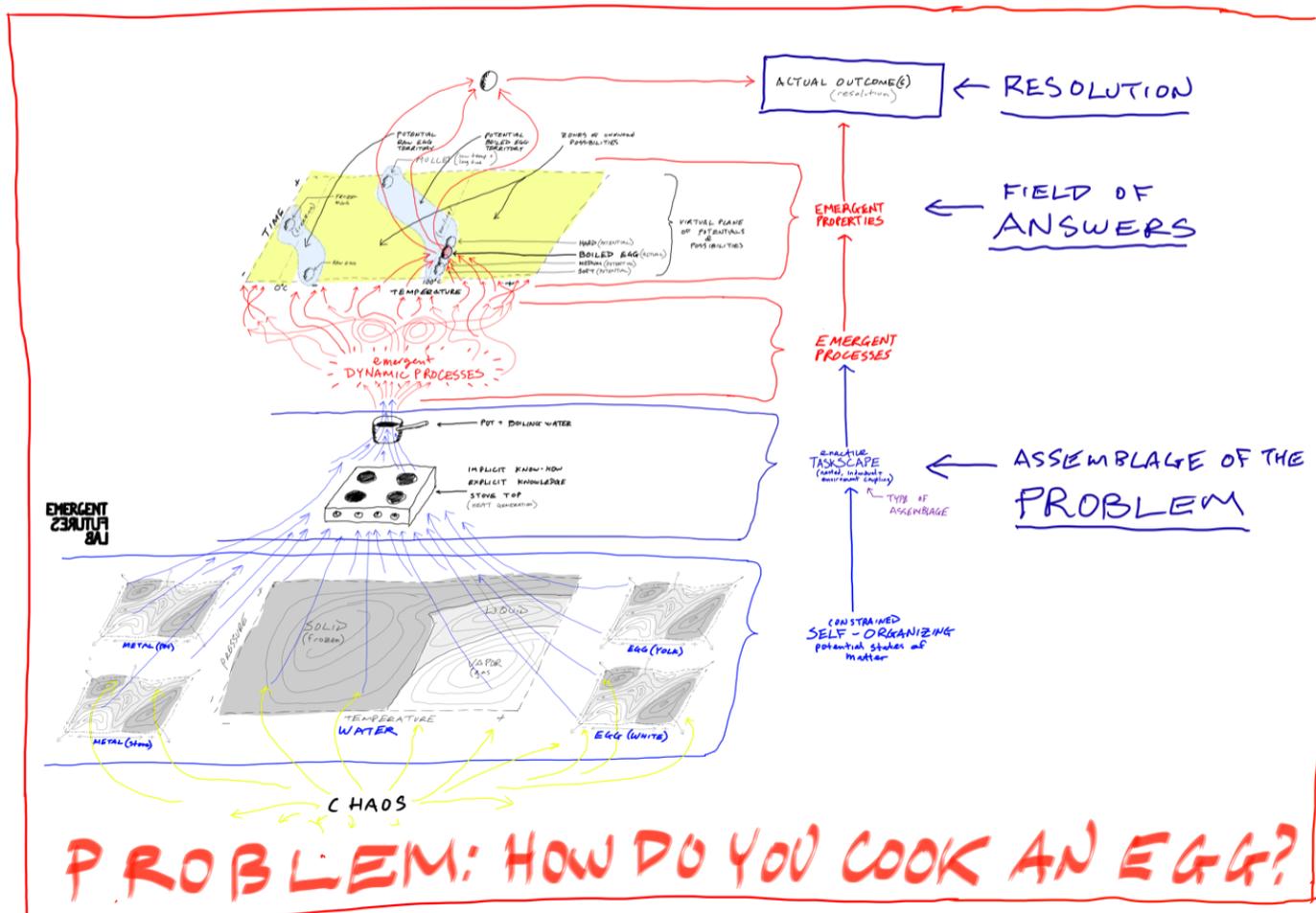
This might sound absurd, but once a problem's implicit components are daylighted and understood as an assemblage — *all problems already contain all their potential answers.*

The spontaneously forming emergent field that arises out of an assemblage (the problem) is a topology of potential answers. You might not know all these answers, and in some cases no one ultimately knows most of the potential answers — but they exist as a as yet-undiscovered field of organized virtual potentials.

The question / assemblage necessarily precedes the answer — if you cannot articulate the question (develop an assemblage) then no answer can be generated. Solutions are always connected to the question that generated them. Thus being able to create a problem is a generative act, and one that already encompasses the possibility of the answers that might eventually emerge.

How Can Problems Contain Their Answers?

Let's start with [an example that we often use](#). It is the simple problem “how do we cook an egg?” When we daylight what is left unspoken in this statement we will find ourselves within a specific assemblage of habits, techniques, values, bodies, tools, foods, and environments. And using this assemblage of eggs + pans + water/oil + habits etc. gives rise to a vast field of potential outcomes.



And as we attune ourselves to these potentials we move towards one outcome (or answer) — say a hard boiled egg or a soufflé. And in this answer, even if we did not know about it, was already there (immanent to the field of potential outcomes from the assemblage). In this way problems already contain their answers.

The early 20th century French philosopher of creativity, Henri Bergson, who developed this approach to problems put it this way, “a speculative problem is solved as soon as it is properly stated.” Let’s break this down:

- A “speculative problem” = A problem geared towards the discovery of novelty is itself a novel assemblage
- “Properly stated” = daylighting and properly composing an assemblage that entangles directly with an issue (area of interest) and gives rise to a novel emergent topological field of possibilities.

- Properly composed = organized to refuse (block) the emergence of the previous standard virtual field of potentials.

Creative Problems

This leaves one wondering — if the answers are already there — how can we be genuinely creative?

In the sentence that precedes the one quoted above, Bergson offers an important answer:“

For Creativity it is a question of finding the problem... even more than solving it. For a speculative problem is solved as soon as it is properly stated — and stating the problem is not simply uncovering, it is inventing”.

This is quite a radical statement — think of our K-12 education system with its focus on giving students questions to solve and solely focusing on the quality of their singular answers.

We don't mark students for the quality of the problems they invent (along with the experimental assemblages they would need to co-produce. Our education system is almost exclusively just about how well they answer the pre given highly abstract questions.

And in the existing paradigm creativity is also focused on novel answers — not on the novel assemblages that would give rise to qualitatively different problems.

Bergson flips this model on its head: what matters is the creative generation of a well stated problem and emergent field of novel potential “solutions”.

We would argue that our education system needs to focus on the making of problems by making powerful speculative assemblages. This is what needs to be judged — Imagine an exam that focused on working with assemblages to develop problems worth having?

What is a Solution?

If the problem generates its answers or solutions — what does this mean concretely?

What exactly is a “solution”? First, let's take a moment for this word. The term “solution” can be misleading:

With the concept of a “solution” it is important to be more precise: there is no such thing as a “solution”. Problems are never “solved” but “*resolved*” — solutions are never singular or fixed (“the solution”) but a field of emergent potential outcomes. Think of posing a question to an egg — “How can I cook you given this assemblage of frying pan + heat + oil/water, etc.?” There is no one perfect solitary answer — but a field of qualitatively distinct answers to explore and “resolve” into a singular dish.

In resolving the problem of cooking an egg, we could follow any number of qualitatively different ways to resolve the problem: boiled, poached, fried, scrambled, etc. Each of these would be a distinct approach to resolving the problem without ever being “the solution”. There is always a multiplicity of correct answers — the opposite of a correct answer is not a false answer but another correct one.

Innovation or creativity does not “solve” a problem but allows for a field of powerful novel resolutions to emerge as a space of potential.

This field of virtual potentials can be resolved —in our concrete actions into one outcome being actualized. (See above diagram). But this one outcome or resolution is simply one of many potential solutions that came into virtual existence the moment the problem(assemblage) was invented and stabilized.

The resolutions we might not like are not mistakes but are equal potential resolutions of the problem. Yes, problems already contain their errors...

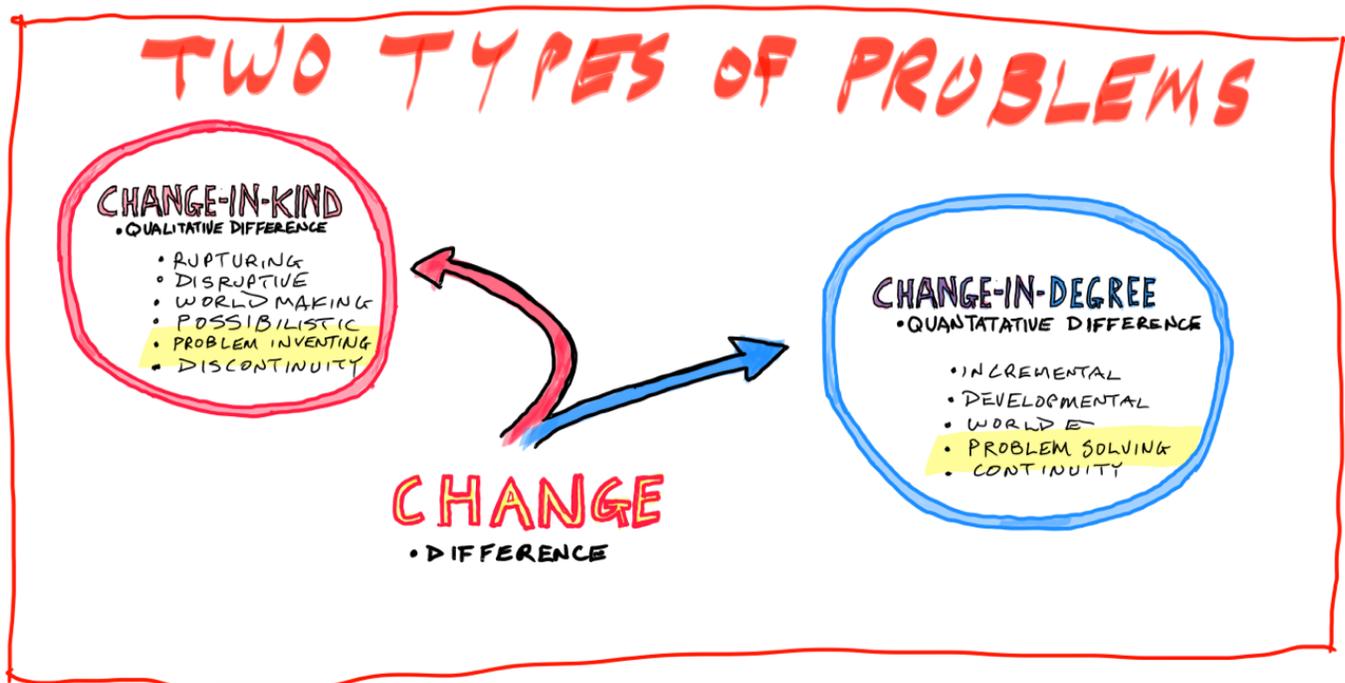
What we would call an invention, is not a solution or even a resolution but the totality of the assemblage + potential field + actual resolution.

Innovation: You Can't Solve a Problem Until You Invent It

But, innovation and creativity cannot be simply interested in elucidating and exploring the structure of existing problems — quite the opposite, the most important aspect of problems

is that they are not fixed.

Discovery, or uncovering has to do with what already exists (exploring the emergent field of a stable assemblage); any resolution / outcome was, therefore, something that was certain to happen sooner or later.



For radical innovation to happen problems must be made.

In inventing and radically reframing a problem (so that it no longer emerges) we move from the world of “it will happen sooner or later” to one of true novelty (change-in-kind).

In this way disruptive innovation does not solve a problem so much as it makes it lose its relevance. The invention of the car did not solve the problems of animal based transportation — but made them beside the point.

Inventing “Problems Worth Having”

Disruptive innovation involves pausing from accepting an existing problem and the normal process of immediately moving into solutions. Disruptive innovation involves stepping out of the assemblage of an existing problem+solution field and *inventing problems worth having, for worlds worth making*.

It is a radical mistake to believe that problems are fixed universal challenges that we must face. We talk about “the problem of hunger” for example — as if it were a fixed universal and a historical thing. This error is one of not understanding [what it is to be-of-a-world](#).

We live in a world of situated stable problems (that only appear to be universal — Maslow’s hierarchy of Needs is another great example of a false universal). This leads us to misrecognize what problems are, how they operate, and how they relate to the conditions for the production of novelty.

The first thing to understand about problems is that they are not universal, ahistorical or non-contextual. Modes of being-of-a-world exist across an assemblage and give rise to fields of patterned probability. These patterns of probability are “problems” that are resolved by actions that make one potential outcome actual. Problems are immanent to an assemblage.

Defining a Problematic Creativity

Rather than defining creativity as a “freedom from” (the freedom from all limits) or the outcome of a perfect idea (the liberty + brilliance model of creativity) we define creativity “problematically” —by focusing on the *generative process of transformation*, which is driven by [constraints](#) embedded in a concrete assemblage — and *the emergent questions or “problems” (fields of potential resolutions) that these constraints generate*. Innovation is the collective invention of problems worth having for worlds worth making.

On Being Innovative With Problems

Here are nine things to wrestle with for a problem centered innovation practice:

1. Novelty — creativity is the outcome of a set of practices that lead us to invent and pose new and profound [world making problems](#).
2. Perhaps the biggest mistake in innovation is that far too often we assume problems as they are stated. *All radical innovation involves inventing the problem — either through a*

radical reframing, or through the development of a totally new question.

3. Problems are created materially and conceptually — problems are built piece by piece into an assemblage. With a virtual field of potential resolutions emerging from the state of the assemblage.
4. Creativity is problematic: We are inventing new problems to develop new worlds that can lead to novel outcomes. (If it were only that easy!)
5. This is not the end of the story, “the truly great problems are set forth only when they are resolved.” They are resolved as a field of potentials. Resolutions feed back into the assemblage (really feedforward).
6. We cannot ignore the previous key arguments about [embodied and emergent creativity](#), and simply replace brainstorming answers with the brainstorming for good questions! Problems are not statements! When we are trying to be radically inventive, we can know what we do not want, but since the new does not yet exist *it resists all formalization* — even into a problem statement. We need to work at the level of an assemblage and its emergent field (far beyond ideation).
7. Thus when pursuing a disruptive path of innovation [we might know what not to do](#) (or what to block), but we need to experimentally allow the problem to co-emerge with our experiments in assemblages and fields.
8. The initial goal then of blocking and experimenting is not to produce a resolution, or even an alternative world — that only comes much, much later — first we need to generate a portal, an opening, an experimental path — and this is where the blocking of old assumptions (critical assemblage components) and the generating of novel quasi-questions (micro novel assemblages) that will help us in deviating. Later we will come to understand what our actual novel question/assemblage/world is...
9. How do we invent a problem? *By co-shaping an assemblage differently to allow a novel field to emerge...*

Want to dig deeper into how to innovate? Have a look at our [book for innovation: *Innovating Emergent Futures*](#). Here we go much deeper into what innovation is and how you can innovate.

Innovation is Hard

**You know you need to
innovate,
but no one shows you *how-*
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