

Systems Based Gamification: Play, Complex Science and Strategy

Part Two: Complex Science

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In this section I'll argue some key points:

- Complex Adaptive Systems theory should be adopted into gamification
- Emergence should be part of our gamification design process
- Playing and designing games are rewiring our brains in order to better manage complexity in the real-world
- Gamification will better enable us to cope with managing complex systems in enterprise

A lot of my ideas here are inspired mainly by the founder of Cognitive Edge Dave Snowden. There's a lot of positive insights we can gain from understanding games, but gamifications needs to also deeply understand the real-world. As for game-based learning I believe that as designers we need to understand complex systems in order to develop

games that create tacit knowledge and better enable us to cope with the real-world.

Ann Pendleton-Jullian has an amazing Ted talk where she describes this process. Playing games, and becoming game designers changed the brains of her students which made them better performers in their careers. This is a tacit skill, and a very necessary one for our volatile world.

So please keep in mind that this is a very brief introduction where I try to stress the value of understanding these scientific concepts for gamification and game designers alike. If you like them be sure to contact and research the authors I mention.

Sub-sections:

1. Systems Thinking
2. Emergence
3. The Re-wiring of Our Brains
4. Management of Complexity

Systems Thinking

Both games and the real-world are based on systems. We live in political and economic systems. Our family, group of friends, work environment, etc are systems. If we're going to be merging game systems into the real-world systems we should then understand how systems work.

There's two basic types of systems, these types are:

Closed systems: These are linear and predictable. A real-world example is the factory conveyer belts processes. Efficiency is key. Managerial approaches like Six Sigma are used. In video games the plot, levels and player challenges are already designed. It's a causal system, meaning that if you do the same thing once, it will have the same results if you do it again.

Open systems: These are nonlinear and unpredictable. Most human systems fall in this category. Effectiveness at expense of efficiency is key. Managerial approaches like The Lean Startup are used. In video games the plot is not predetermined. Open Ended games and sandboxes fall in this category. It's noncausal, if you did one thing it may or may not work a second time.

The business world has already began to divide management styles to accommodate these two basic types of systems

within organizations There's at least two Harvard articles on this. One is titled: *The Ambidextrous Organization*, the other one by Dave Snowden is *A Leader's Framework for Decision Making*.

As Snowden points out, complexity is a well established management tool, not some outliner theory. You discover what type of system you're in (open or closed) and apply different management processes to accomodate.

I argue that gamification should also do the same by establishing separate principles for the closed and open systems. This is especially necessary in enterprise since we should try to enhance the existing system we are working with. Applying linear game design principles on a non-linear open system in business can be disastrous and viceversa.

2

Jobs at close systems tend to be boring and repetitive. In order to manage them you need to have defined goals, defined processes and lots of quantified metrics. Extrinsic motivators work in close systems because there's usually no intrinsic motivation to do the job.

Close systems are what a lot of the enterprise gamification literature is referring too when they want to make work fun.

They rely heavily on points, badges and leaderboards (PBL) in attempts to create extrinsic motivators. These work excellent in closed systems as many case studies show, but based on my experience with management these techniques mostly work in closed systems.

Applying them to open systems can have negative effects. The reason is that it constrains behavior too much in a system that requires improvisation. With PBL you're usually rewarding predetermined behaviors. It may also destroy the intrinsic love for a job as Snowden points out was the case in health care with the pay-for-performance program.

3

Jobs at open systems are filled with novelty. They're about exploration and learning. The most extreme example is working at a startup, you can't predict what's going to happen next. You're running safe-to-fail experiments and applying Eric Ries Lean Startup method. There's probably already strong intrinsic motivation to do these jobs and they may be stressful but they're fun!

Wall Street traders use a phrase that says “F-your money!” An answer referring to how much money a trader would take to quit his job and retire. The point being that they love their job so much that no amount of money would pull

them out of it. Now that's engagement!

In his book *Enterprise Games* Michael Hugos bases his game mechanics on those of Massively Multiplayer Online games (MMO's). His ideas are aimed at using information technology in a way that imitates the dashboards inside these nonlinear online games:

Video game heads-up displays (HUDs) provide players with rich contextual displays to enable rapid orientation and comprehension of streaming real-time data

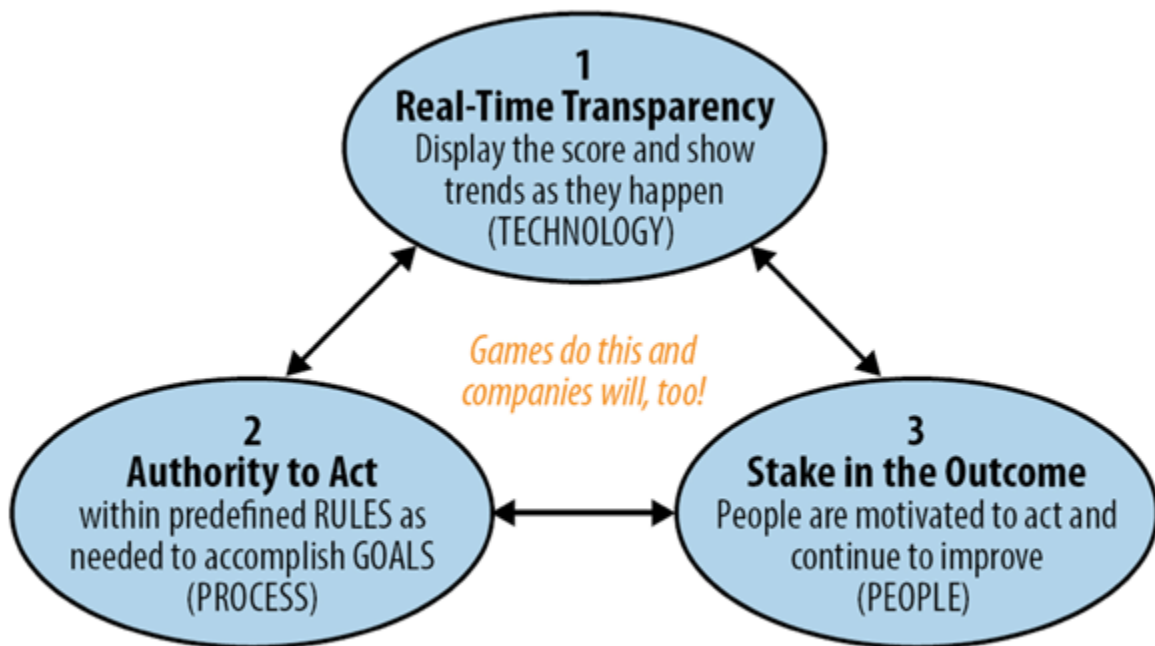


HUD capabilities enhanced by real-time player to player and player to group communications using text and audio



Image used with Michael Hugos Permission

It's not necessarily about making the job fun, but through these systems the corporation becomes agile. Michael's process is a bit different than the traditional "gamification" material:



Engaging feedback systems emerge when these three conditions are present.

Image used with Michael Hugos permission

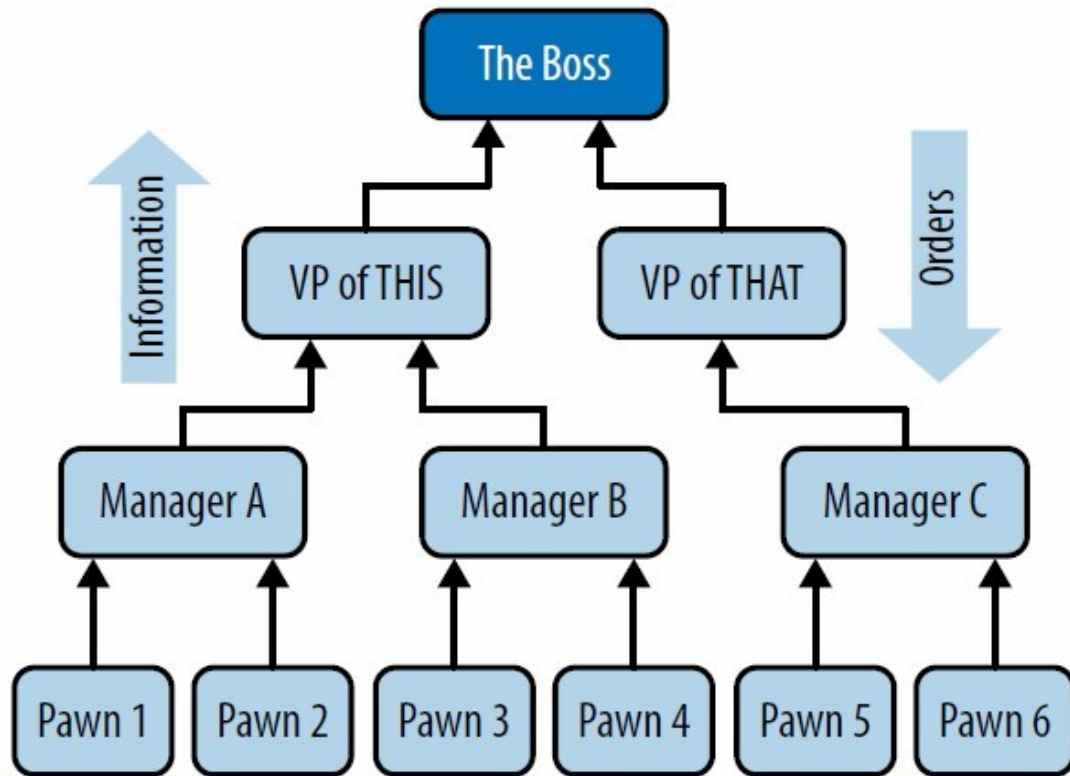
This process was developed through supply chain management operations. What's significant here is that Michaels method is *emergent* but the rules bounds that emergence into business specific goals. You can quickly adapt and move your business forward or pivot when new opportunities arise.

4.

There's an article in the Huffington Post that I highly suggest reading by one of my favorite authors Robert Greene titled: *Google and the Napoleonic Model: Business in Revolutionary Times*. In the article Robert writes that having technology is useful but you should also work on finding

innovative ways in using it. The way our business models are organized will affect our agility and strategic maneuvers. There's a need to be decentralized, adapt quickly, get feedback, etc. These claims aren't new but Robert gives it a fresh perspective, but like many articles it stresses a need but doesn't give specific practical advice. It's very thought provoking but it's not a "how-to" manual.

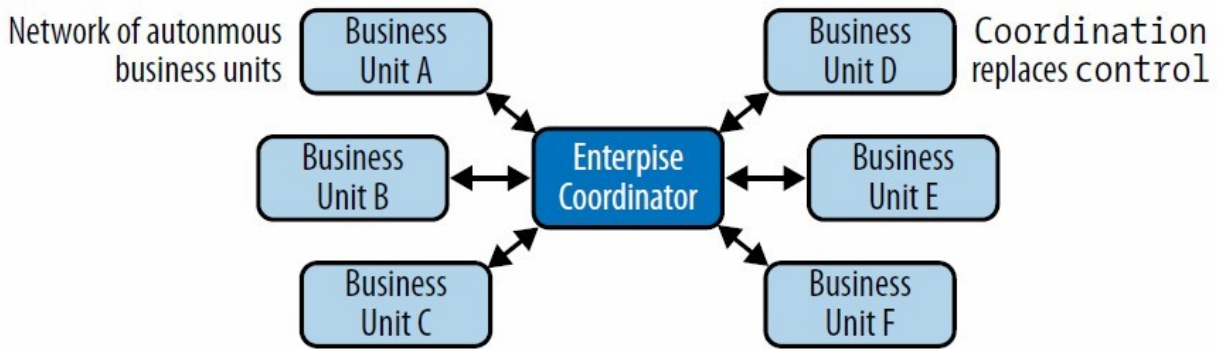
Michael Hugos books *Enterprise Games* seems to me a more detailed account on how to organize a company into this "Napoleonic business model" Robert Greene coins. Traditionally the corporation was hierarchical and the boss had to bark orders in a centralized fashion. Robert Greene compares this model to Microsoft and IBM:



What worked well enough **ONCE** is way too slow **NOW**

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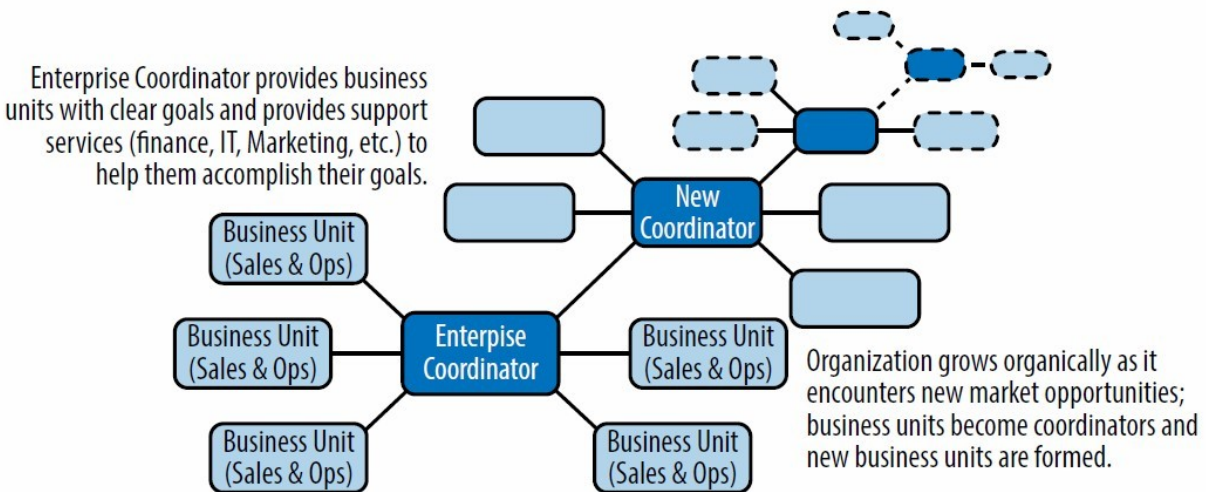
The volatility of our world requires that we abandon this model and take a more decentralised one, but yet there are still rules that guide this decentralization . This is what Robert Green calls the “Napoleonic Model” used by Google. Michael Hugos explains how this can be achieved by gamifying IT as an open system:



Enterprise Coordinator says **WHAT**
Business Units are free to choose **HOW**

Image used with Michael Hugos permission

This system becomes ideal in the network age as connections between different departments begin to emerge organically:



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But never forget that there is still leadership in these organizations. There are some “experts” who claim that we are seeing a new egalitarian age with the rise of networks, they're deluding themselves. There will always be informal power structures, and spontaneous organization isn't going to

work. The role of the leader as the visionary and strategist still applies, read a history of Apple. The French Revolution would have been doomed without Napoleon. There is some truth to “the great man” theory of history.

But the leader isn't all. There also must be rules in which the group of people organizes itself, game design can better help us achieve this in corporations.

Leaders must not only tell organizations what to do, but more importantly they must “design” the rules the organization operates by, which is no different than designing a nonlinear game. Just like Napoleon Bonaparte designed his military for adaptability 200 years ago (read Roberts article for more details) we need to begin adapting our corporations for agility. This is necessary for developing a “Complex Adaptive System” (CAS) which I'll explain below.

If we are to manage open systems, a new game-based managerial approach can have much to offer, but we must remember it's not about fun. This style of “gamification” is similar to the branch of behavioral economics that was developed by American think tanks to fight the Soviets during the cold war called “Game Theory.” The strategists were inspired by different games to come up with their strategic models. But they did make some mistakes:

- 1) That people behave rationally (an economist's view point)
- 2) The world can be predictable since they believed it was mechanical (great movie and novel *A Clockwork Orange* makes a philosophical argumet against this)

This new “Game Theory” or “gamification” bases itself strongly in the foundations of Complex Science that are being developed by Cognitive Edge and others. I’ve also added interdisciplinary approaches of my own such as tricks from diplomacy and game design. But the foundation is not to create fun or happiness, is to better navigate the world and solve problems in competitive settings. “Fun” latter come running after us when we’re dominating our field/market. If we’re not making an impact, we’re not going to have fun.

The 2005 movie *Revolver* is a good metaphor for this different “gamification” approach. In the movie a master con artist and a grandmaster chess player combine their expertise and develop a new theory on how to succeed in the real-world.

We must realize that when you apply extrinsic motivators

into jobs inside open systems you'll kill the intrinsic motivation the employees had.

Snowden mentions a new process that appeared in healthcare called Pay-per-performance that does a great job in illustrating the effects PBLs can have in business. Just like many of the enterprise gamification processes out there it based itself on quantified metrics of success (even though this was not a gamification design). The goals were clearly defined. When they achieved these goals they had the extrinsic reward of a cash prize.

The literature on the results is mixed, but most agree that it destroyed the intrinsic motivation of the staff to help people and instead they were only focused on making points. This could be one of the risks in applying points, badges and leaderboards into open systems.

Another danger (explained by Snowden) is that open systems are highly contextual. You can't predict all the little subtleties needed to be done. A points system in open systems can be dangerous because it may restrain adaptation to different contexts. A big point of emergence is serendipity, making positive discoveries you didn't plan for. Too many rules and you'll destroy this ability.

We all have experience this in our social life. You have to

have subtle changes depending on who you talk to. Who you are with your mother is not the same person you are with your close friends. The type of text message you send to your spouse is not the same as your clients. You can't apply a fix set of rules to interact and measure success in these different social contexts.

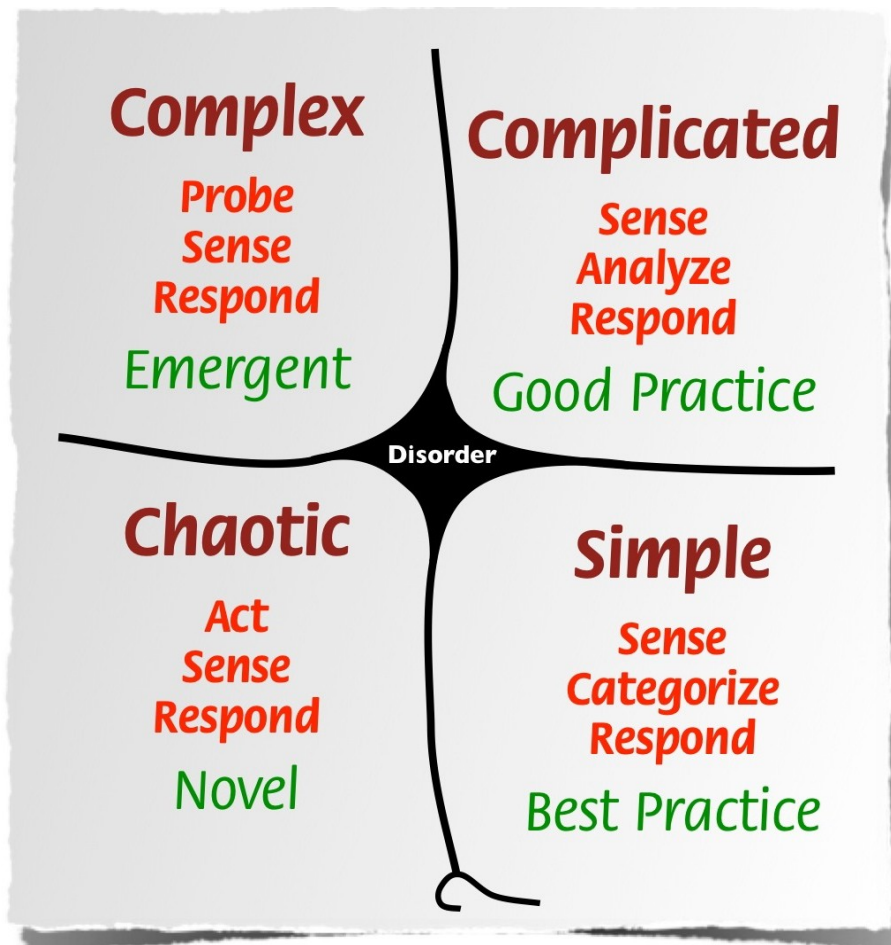
But points, badges and leaderboards work wonders in monotonous boring jobs. It's the only novelty the employees get! And quantified metrics are great since engineering a closed system is possible. This means that in a close system we CAN repeat successful practices again and again so we CAN find the one best way of doing things. Best practice works here so our feedback systems should reflect this.

But this doesn't mean that points systems don't work in open systems. Michael Hugos Red Cup Game depended on points. You have to pay attention on how its affecting the system as a whole.

Emergence

1

Dave snowden invented something called the Cynefin framework:



This model is brilliant and should be mandatory for every gamification designer to understand. I'm not going to fully explain it so if you're interested Google it yourself. But here are the basics:

The simple and Complicated boxes are linear and therefore casual (you can do the same thing twice and have the same result). This is where engineering principles work. The simple model can be understood by anyone, think about a water pump. In here universal principles can apply, thus it's

“best practice.” The complicated model is also linear, but requires deep analysis or experts to understand it. Think about the engineering problem of building a bridge.

The complex model is nonlinear. If you're familiar with Eric Ries method this is a similar but richer approach. Probes would be Eric Ries's minimum-viable-products. These are the tests you perform to measure the reaction of your potential market in order to see if your first ideas are going anywhere. If it works you scale, if it doesn't you pivot. But it's also used for exploration, discovering the “unknown-unknowns.” **If you discover these, you might become the black swan Nassim Nicholas Taleb warned your competition about!**

This last method in the complex box is crucial because it's an *emergent* property. Most of the world is a complex system and we can't predict the future.

Designing your whole gamified/business process from beginning to end without interacting with the real-world can be disastrous. Eric Ries developed an engagement process with a game-as-a-service, there's a lot these types of games can teach other industries.

But not only are the product design methods for these types of video games useful in other industries, but also their

community management practices. These have already successfully been applied with great success. Look up the Youtube video “Community and Communication in Games-As-Services” by the speaker Robin Walker, his talk is BRILLIANT. I think his techniques have the potential to become mainstream the same way the LeanStartup was. Check him out.

Robin Walkers engagement with customers in the games community creates a “metagame” which means it’s “a game on top of a game.” This is what the metagame does:

- Drives engagement and loyalty to the game
- Creates free marketing in the “mouth-to-mouth” sense
- Provides valuable feedback that allows the game company to constantly tweak and offer products they didn’t initially thought about but that the users love

So it creates a scalable long-term adaptive process that engages customers and it's feedback changes the business services. It’s a co-evolutionary approach. The community of users activities and insights in the metagame are constantly impacting the game companies content and vice-versa. This should also be mandatory in gamification.

As Snowden points out you have to figure out where you are in terms of resources but also the culture and structure of

the organization, then you see where you can evolve from what you have. You don't imagine a future state and try to reach it as gamification is mainly advocating.

2

If you're the designer of any product or service you come to the table with your hypothesis on what the users want. Sometimes you're designing a product or service you yourself would want to use. This approach could be really powerful and effective since you're literally able to understand the customers needs since you're one of them. Or it could be a disaster, since your interests aren't shared by a large enough market and no one cares for what you have to offer.

As a designer you will begin to gain a feel for what works and what doesn't. Steve Jobs followed Henry Fords maxim of "If I had asked people what they wanted, they would have said faster horses." Just asking people what they want doesn't work, you have to analyze them in a scientific approach. This is the basis of Eric Ries's book *The Lean Startup*.

There's sound theory on this. Dave Snowden explains that most human systems are complex, and by the nature of this system you can *never know* in advance what will work and what doesn't by "researching the market." You have to

interact with the complex system by running safe-to-fail experiments. This is pretty much the summary of Eric Ries book (also mandatory reading in gamification).

What's interesting about Eric Ries's book is that he came up with his method of design by building the social video game *IMVU*. So far the game has been really successful. So a lot of the principle from *The Lean Startup* directly correlates to any gamification design since Eric was working to create a game-as-a-service that was fun.

Any hypothesis for a gamified program can be based on our personal tastes or patterns we've seen with other people. In gamification its necessary that you understand the theory behind what makes something fun, so it's useful to get acquainted with the works of experts in the field like Raph Koster, Gabe Zichermann, Jesse Schell, etc. There has to be a sound basis for these hypotheses also! Knowing the theory will save you precious time and resources. But also be aware that the hypothesis may be entirely wrong and having it may screw you up, you u should also be ready to look at the world with fresh eyes.

But as Dave Snowden says: If you don't understand why something works (theory), you can't scale a design process for your specific context.

Case studies only work to a point, know the science behind your field.

3

A great example of emergent game-based learning is that of Constance Steinkuehler. I highly recommend you study her research in detail. It shows how you can't entirely plan a fun process before interacting with the students, but you need to constantly adapt to the engagement patterns your users are experiencing. Constances experience is almost identical to Snowdens ["Childrens Party"](#) metaphor where he explains how complex adaptive systems work. so my conclusion is this: **You can't design an engaging process without understanding complex systems theory.** There's many examples that show this. Snowden is mandatory reading.

Constance ran an after school program where the plan was to use the video game *World of Warcraft* to teach literacy skills to teenagers. Parents heard about this program and began sending their kids to her before she officially announced it, they were all boys.

Her initial objective was to turn this program into a "third place that bridged school and games." This makes sense! (P.S. Eric Ries says that when something makes sense like this, its probably going to fail. Don't be seduced by a logical

plan). The idea was that the kids would play the games and do all sorts of intellectual activities around the games like building their own website, reading and writing game-based texts, using multimedia, etc.

After a month she concluded that this approach wasn't going to work, the kids were just not engaged. So she used another strategy: Instead they just let the kids play the game while the staff played along with them. When they found something the kids got interested in while playing, they worked to encourage it. For example: Some of the kids got interested in *World of Warcraft* comic books, so the staff brought a big stack of these comics into the class and the kids started reading.

They discovered though, that reading a textbook and reading a game based text from the online game communities had no difference in comprehension from the students (these kids were falling behind their reading grade level). So a “fun theme” doesn't work. It wasn't until they offered game based text that reflected a specific problem that the kids were trying to solve in the game that they began to engage in reading the how-to content from the forums. From this something fascinating happened: These same teenage kids with a reading level determined to be 4 years behind were reading college level texts with perfect understanding.

Constance explains that therefore it wasn't that these kids were falling behind due to a cognitive problem, they were clearly smart, but it was an engagement problem. What happened was very obvious, but seems to be forgotten in schools. If the kids were interested in the text they would auto-correct themselves twice as much compared to a text they didn't care about. So if they read a sentence and it wasn't perfectly clear to them, they would read it again until they got it's meaning. They're now engaged in the text!

Constance called this “Interest-Driven Learning” where you discover what the kids are interested in and serve as a guide to find more resources on those interests. So if you think about it this is a sort of emergent style of gamifying in an educational program. This emergent approach is fundamental for engagement since the theme of the text wasn't the cause of the kids engaging in it. **Fun mechanics only worked if the context they were presented reflected an interest of the student.**

Constance had started the program by giving the students texts she thought they would like which were directly from the game communities. The reading levels were exactly the same as the schools texts. It wasn't until she discovered the particular problems trying to be solved in that game by the students that she was able to get very specific texts for those problems which caused the kids to engage in reading.

Also important to note that she looked for the hardest texts in the community (above their grades reading level), which I already mentioned the students understood perfectly.

So again: You need the sound gamification theory on what makes something fun, which is explained by experts in the community, but you will also need to engage in your particular problem and find out the context. Remember we are dealing with complex social systems and we can't understand it without engaging in it. Buy a copy of The Lean Startup and check out Dave Snowdens material on design. Learn to design through emergence and stay open for new insights, aka serendipity.

4

I've read some gamification designs that go like this:

“We've divided our corporate training courses into 30 seminars. Each seminar is like a game level. You have to take your basic courses in order to level up. And it's social because you have to take these courses as a group. Isn't that fun! ? ”

Bah! No. First of all this is assuming that explicit knowledge is the only type of knowledge (or the one worth learning). Second of all sitting down to watch a seminar isn't play. It's

still a dull lecture! Just adding points to it won't make it fun, in fact seems like an insult to your employees intelligence, it's really condescending (which is a problem in gamification). This “gamified lectures” are still a passive activity, and just because it's a group shared experience you won't change that. In fact they'll probably be bored out of their minds and look for ways to distract each other.

I'm not saying that seminars are wrong just that it's unlikely that you can directly gamify them. You should instead create some kind of platform for play on the side where they can immediately apply their knowledge.

For example: If you have a talk on how to deal with angry clients, have them act it out after the seminar as a group. No complicated points and leaderboards, keep it simple. That way the explicit knowledge from the seminar sticks into their memory better and they develop a tacit understanding from participating and watching others participate in the reenactment.

Games tend to be non-linear. Think about this: Can you truly predict all the moves in a chess game from beginning to end? No. It's emergent. There's basic rules but those rules always develop new patterns between the players moves.

Games are like an ecological system, not a linear engineering system. Works like this:

Whites make their first move and the entire board game (ecology) is altered. Now blacks have to make a smart move based on the opening of whites. They move. Now whites has to work with his initial move and that of blacks. Whites actions affects the boardgame (ecology) but the positions of the pieces in the boardgame also affect the way whites act. The emergent properties between the white and black pieces are co-evolutionary. They emerged based on their own past moves, their opponents past moves and how this has changed the boardgame.

In complexity science this is what's called “evolutionary potential.” Once the chess game has started there's patterns that have been established. These patterns can't be taken back. If one of the players made a stupid move he or she can't just take it back, the player must manage the evolutionary potential from whatever present conditions he finds himself in. It's an emergent property based on the boundaries of the game! This is how complex systems work.

Gamification designers have to manage the evolutionary potential of the conditions they're working with.

Think of yourself as a tinkerer. You have to find innovative

solutions to drive up engagement based on the resources at hand. The movie *Apollo 13* has an excellent scene where engineers have to come up with a way to block a carbon dioxide leaking and make a “square peg fit in a round hole” with random materials found in the shuttle.

6

Emergent systems allows for a greater use of the brain. First of all tacit knowledge can't be passed down from one person to another, it has to be experienced by the individual. You have to start thinking in new terms. If you have a game where you want your students to learn skills (an actual game like minecraft, not a seminar with points) you have to view it has a petri dish. John Seely Brown explains this concept in his book *A New Culture of Learning* (also mandatory reading!).

Second, what they learn at a tacit level will be very hard if not impossible to measure. This means that if the patterns developed in the brain aren't transferable into the real-world then it's a waste of time. It's hard to tell if it's been a success or not. Virtual simulations may be a waste of time since they don't reflect the complex subtleties of the real world, but casual games like Dual-N-Back may boost performance in complex tasks. It's just very hard to tell for sure, I won't go into more details on the complexities of

this.

Third, there's a new theory in cognitive science that separates the brain not in “left vs right” (emotional and creative vs rational and organized) but in “top and bottom” (strategic AND analytical). I'll explain this theory in more detail below. But the point I want to make across is this: with real play, not a passive seminar, you're actually engaging in whole-brain learning.

Fourth, The seminar example is an activity with points systems. **This isn't play.** Specially if there's no emergent properties.

It's the emergent properties that make something fun! A big part of the dopamine release from games comes from surprise. If you go to a seminar there rarely is a surprise (and if there's no interest in the subject adding points won't drive engagement), this seminar is a linear process and they'll win by just showing up.

If you dump a bucket of legos into a kids feet he'll be amazed at all the different objects he can build which he didn't plan for, but emerged through his tinkering with the plastic blocks. That is play. It's both psychologically stimulating and good for business.

Read the book by Stephen Kosslyn and G. Wayne Miller *Top Brain, Bottom Brain*. The notion of people being left brain or right brain oriented is actually not founded on any sound science. If you hear any gamification “guru” claiming to understand human motivations based on the left vs right brain dichotomy, ignore him and move on to someone else. Instead your brain works like this:

The bottom part of the brain is where implicit knowledge is located. It's also used to analyse and understand the world through your long-term memory and immediate feedback from the senses. The top part focuses on organizing some of this knowledge and planning out strategies you'll act out.

When you gamify education in a linear system you're only focusing in the bottom part (passive experience, like a gamified seminar). You need play (taking action in an open system) to engage whole-brain learning. This way you practice on analyzing the environment (bottom brain) and strategize to act on it (top brain). And in fact it's this whole-brain disposition that is needed to manage a complex system.

Some people tend to be top brain oriented (strategic but not capable of analysing the world effectively) so are always

making plans but are so detached from the real-world that they rarely work. You see this in “wanna-be” entrepreneurs all the time.

Others are bottom brain oriented which means they can understand (or think they do) the world properly, but aren't able to make any strategies to navigate in the real-world. These people may be good at lectures or writing books but don't take their advice on how to act.

Other's don't have neither brains working properly. These people tend to be really fun to be around with actually, they can be spontaneous and carefree. Others are complete idiots, best to leave them alone in their bubble of delusions.

Finally you have individuals who have both brains working properly. These are usually successful leaders. They understand the world deeply and accurately, and know how to make and act out complex strategies based on this information. They can be Machiavellian though (Kevin Spacey in the TV series *House of Cards* comes to mind)

A whole-brain individual is the only one that can understand the complexities of the world because they're also action oriented as well as analytical. Has Dave Snowden points out we can't understand a complex system unless we interact with it. No amount of analysis or observation will give you

the necessary insights into understanding a complex system. In some cases it's about the relationships between different components that must be understood at a tacit level.

If your employees are to be trained to understand and manage a complex system in business, a seminar won't work. But authentic play does. Look at the work of the CEO of IDEO Tim Brown for more details on this.

8

This doesn't mean that all training should be turned into a game. The apprenticeship model should be reinstated and interaction in the real-world is key, but some simulations and games can be beneficial in the right context.

A distinction should be made while using simulations between a complex and complicated system. Since a complex system is always changing and has too many variables that can't be programmed for, we can't replicate an actual complex system from the real-world into the virtual-world. What virtual worlds can do though is teach us how to better navigate a complex system. To learn how to learn. But we have to remember a virtual simulation is limited!

“the map is not the territory” Alfred Korzybski

But a complicated system (linear) is excellent for virtual simulations. The military has been using the to train pilots in flight simulators for example. There's a linear cause and effect in operating a plane in the real-world that can be recreated in a simulator (pulling a handle, pressing a button, etc). Skills in this area are directly transferable to the real-world, plus they're excellent for building up myelin.

Training with complex systems can be like learning comedy: It's very context dependent just like a complex system, you can rarely have canned material that can work all the time. If the same people hear your joke you'll fail to produce the same effect and different people have different styles of humor so there's no universal joke. But watching and reading comical material makes a person funnier. If a person is funny (which is a tacit skill) he will be able to adapt to contexts quickly and keep people in his group laughing, or quickly adapt to strangers sense of humor and make them laugh.

Therefore learning complexity in virtual environments can transfer to the real-world, but its exaptive in nature, not adaptive (see the next section for an explanation of these terms). Read the IBM study done on their managers who play World of Warcraft *Virtual Worlds, Real Leaders*. But remember virtual worlds are limited. Spending too much time in them will cognitively cripple you since you're always

learning the subtle complexities of the world implicitly. If you don't interact in the real world, you'll have a false "mental map" and fail.

Re-wiring our Brains

1

We have to realize that there's two types of knowledge transfer from games that occur either through adaptation or exaptation:

In biology if a animal evolves a trait for a specific purpose its called adaptation. If it evolved a trait for a specific purpose but uses that trait for something else in a novel way then its called exaptation. Dave Snowden explains that the evolution of technology and knowledge works in the same way. I've adopted this view for games:

I call a knowledge transfer adaptive when the game is specially designed to transfer a particular set of skills. This is the example of the flight simulators in the military. The game was designed to teach the soldier how to fly and only how to fly and that's what it does.

Exaptation is a skill gained in one area and then used in something else. Playing the game Monkeyball in Nintendo's

Gamecube is proven to increase surgeons hand-eye coordination in the operating table. So the skill of navigating a virtual monkey in a video game transfers into a surgeons operating skill. The game isn't designed to help surgeons, but the skills of navigating its 3D environment with a game controller improved their performance in the operating table.

In order to understand complex systems in the real-world this exaptive properties of games seem to be extremely beneficial. Playing games that seem to have nothing to do with the real-world changes our brains in ways that enhances our ability to interact in it.

I'll give a detail example below, but think about how doctors are recommending that the elderly play games in order to prevent them from going senile. Playing simple casual games will change their brains in ways that will enhance their interaction with the real-world in every possible way imaginable.

2

Ann Pendleton-Jullian has mixed game designed thinking with complexity science. She explains that games are:

- Rule based.

- These rules are static.
- Yet gameplay is dynamic, improvisational and it offers infinite possible alternatives in the moves you can make. Every move in the game is a choice. Your choices affects the ecology of the game, changing the system as the game develops. Games are ecosystems.

Another interesting thing about games Ann says is that they're logical and mathematical, but they operate around a system of narrative. The real-world operates the same way. This is putting on top the mechanical and technical aspects of an organization the cultural ones. By culture I mean the relationships, hierarchies and identities and the stories people tell each other, this way we can understand these social relationships within groups and better design for engagement and emergence.

Note: I believe gamification should be subdivided between engagement and emergence. It's one thing to make people do something they would usually not want to (traditional gamification). Another design business practices as mentioned above with Michael Hugos that allows better organic structures that quickly adapt to a volatile world based on game-like feedbacks and practices.

Ann's description of a game are the characteristics of open systems. Games are emergent and the relationships between

agents and narratives affecting the players is very similar to Dave Snowden's description of complex systems in enterprise. We can better understand these real-world complex systems through games, books and lectures can't really ground us in it. This is why game-based learning done properly is so indispensable. It's not necessarily about fun, but to develop tacit skills for navigating complex systems...

3

Ann Pendleton-Jullian was teaching an architectural class at the Knowlton School when she began using game mechanics in her class. She set out at the beginning of the semester to start playing games, then designing games and then moving into complex architectural projects.

When asked to define an architectural studio she said: *“An architectural studio is both a space but also a community of practice.”* A community of practice seems to be an accurate description of most professions, and that's why I believe that the community management techniques described by Raph Koster from games-as-a-service are so valuable in the gamification arsenal.

“Is it a game?”

It's a SERVICE. Not a game. It's a WORLD. Not a game. It's a COMMUNITY. Not a game. Anyone who says, "it's just a

game" is missing the point.” The Laws of Online World Design, at <http://www.raphkoster.com/gaming/laws.shtml>

In the class students began playing a game called Quoridor. The complexity of this game is theoretically higher than chess. At first there was no correlation between the game and the architectural projects they were also working on in the studio, but after a few weeks Ann discovered that some students began to exhibit new tacit skills she had never seen before. Students were beginning to deal with the complexities of the architectural problems in very innovative and interesting ways.

In the second phase students had to design their own games. At first this was carried out individually. The games were usually awful when designed in isolation. There were too many rules, the narrative sucked, etc. But then they were put to work as groups to design a game. This completely changed the dynamics from the games being designed, students began to share ideas, perspectives, test the games as a group, etc.

The result from all this was the creation of amazing games. They don't explicitly understand how it's created, it emerges through a tacit understanding. Similarly to The Lean Startup methodology, they're getting immediate feedback on their designs and adjusting it based on the positive or negative

feedback.

Design for gamification should therefore be social, dynamic and emergent, not linear like an engineering method. Remember the example of Constance Steinkuehler. When designing a game there's an element of playfulness when discussing ideas, but the execution part can be very hard and frustrating. Designing fun isn't always a fun process, but it's very satisfying when you're finished. Remember that as a game/gamification designer.

Ann Pendleton-Jullian explains that by playing and designing games students had their brains re-wired to understand and manage complexity. All this happening at a tacit level. If this is true then the importance of gamification is seriously amplified, and its main value isn't about fun, but of developing tacit skills that transfer directly to the individuals careers.

Game design thinking changed the way students designed their architectural projects, making them more effective. Therefore we have to pay close attention on the tacit element of games. So if we want students and employees to improve their performance in complex systems we need to have them not only play in games, but become game designers also. **Therefore we can say that game design becomes a necessary “game mechanic” in game-based**

learning.

You don't need programming skills to develop simple video games. For children I recommend a free MIT program and community called Scratch. Also a lot of AAA games have level design options in them as in GTA V and Tony Hawk. The online game Counter Strike takes this a step further where you can have more flexibility with the rules in your level. But more specialized games like SimCityEDU are entering the classroom. My favorite is Unreal Engine 4 which charges \$19 a month which is the one I personally use.

For adults I believe that simulations closer to reality could begin building domain specific long-term memory patterns that can be used in the real-world. An example I've used before is SCM Globe, students have to design their own supply chains, and many times plug in real-world data themselves (costs per unit, factory production, transportation costs, etc) this requires the students to do online research on real businesses and apply them to the game.

An interesting thing about gamers is that they usually play games related to their careers. Those in sports play sports games, those in the military play military games, race car drivers play racing games, etc. I've been told before (by possible investors for one of my current startups) that developing games for people in a particular career won't

attract them because people want to play games to forget their jobs. This is the exact opposite, people tend to play career related games.

Eve Online is a very complex MMO that can take up to 3 month before you start “getting it.” Gamers in the community joke that the game doesn't have a learning curve, but that it's a learning wall. But many of the players tend to go into areas of the games economy that reflects their own real-world careers. For example those who decide to become manufacturers in Eve Online tend to work on that industry in the real-world. They have told me that they do believe the game improves their skills in their career.

4

Gamification is not some soft luxury where we design for fun just out of a love for pleasure, its a survival skill for the 21st century!

Lets this sink in your head:

The world is becoming more and more complex every day. And it's not just because there's more people in the planet. The internet has added this new abstract dimension where we operate through these fluid networks. Everything is interconnected with everything at a global scale. In order to

understand the world we have to understand the relationships between the different agents in our ecology.

But academia has been preparing us to do exactly the opposite. In its attempt to make the world scientific and measurable it has removed narrative and implicit learning from teaching. This movement began during the 60's when the social sciences were trying to gain credibility as a “real science.” The cultural movement demonizing Western literature also had a lot to do with it.

Academia has also done another thing: Different university departments rarely talk to each other. You study to become a specialist and rarely talk about the interrelationships between other fields of study. This initially made sense since to specialize in one department can take decades, but in order to navigate the world you need to be a generalist making connections, not a specialist isolated in one field.

Charles Hills devised a course at Yale called Grand Strategies precisely to address this problem. He began to teach would-be diplomats who would need to focus on international affairs by introducing them to the humanities. It's the reading of literature he says, that will prepare them to understand the complexities of the world.

I explained that stories are a form of play that creates

patterns in the subconscious through implicit learning. This is what literature does: Its narratives explain how politics, economics, warfare, culture, leaders personality, etc all influence each other. Literature and games are crucial for our cognitive development. They're also valuable for developing our theory of mind which is basic for our social skills and strategic ability.

And finally, good literature brainwashes you into thinking in higher mental states. It's not that superficial everyday conversations, but it adds depth to your perspective. Stories are beginning to again be introduced in schools as a teaching tool, gamified education can also benefit from it. It might not be that we directly tell a story, but games are math with a narrative on top. Chess isn't just moving some pieces and doing math, you're moving pawns, bishops, knights, etc in order to capture the opponent's king. But the introduction of literature and history as general reading in schools would be something I would welcome. They must be connected to the students lives in order to drive engagement.

6

The fun elements of games are necessary for the learning of complexity, as I mentioned before complexity requires implicit learning, and dopamine enhances this type of learning. But this should not be taken as an excuse to justify laziness. Play is just one element for learning a complex

task, there will still be grunt work (which will never be fun unlike some gamification “gurus” claims). The learning benefits of fun should not be an excuse to quit when things get hard, since deliberate practice is still necessary for mastery (don’t confuse deliberate practice with the game concept of flow. This is a present mistake in gamification I’ll write about in the future).

I’ll end this section with a quote from one of Ann Pendleton-Jullians Ted talks. In it I hope to clarify the exaptive nature of games and game design can have in improving our tacit knowledge in dealing with complexity in the world. Her talk was a big catalyst for an educational gamified process I call “Intrinsic Based Gamification.” The idea is that games are temporary training tool to develop specific problem-solving skills that will be used in the real-world. Once this happens a persons career becomes the 2.0 version of the game they love. It’s “gamification without gamification” since an employee will enjoy their job without the need of a gamification designer to “turn it into a game and make it fun.”Enjoy :

“What is interesting about this is that while I started it not quite understanding what I was going to get, what I got was a lot. Had I told the students starting out that I was going to get them designing complex, dynamic, emergent systems they would have said “forget it, I’m not taking the studio,

I'm going somewhere else this is way too difficult.” The issue is that by doing it through game play in a way that is actually fun they were able to develop a tacit skill to do this thing that then fed back into the design project. Like I said I never said “take the design, work from the game and then translate it into the architectural project” I merely gave them an architectural project and because their brains have been re-wired [from the games and game design at the start of the semester] they began operating in a very different way.” -Ann Pendleton-Jullian

Managing Complexity

1

When designing a game we learn how to create a system that has a layer of narrative on top. Business management has begun to embrace complexity theory as a valid alternative. The argument goes that if we live in a world that operates on complex systems, our organizations should be structured in such a way that thrives in these systems (read harvard article *Embracing Complexity* or *A Leader's Framework for Decision Making* for an quick reference).

Steve Jobs was quoted in the his biography by Walter Isaacson as saying “*I discovered that the best innovation is sometimes the company, the way you organize the*

company” Let that quote sink in your head.

Proponents of applying complexity science in the organization claim that since the world is a complex system, business organizations should be structured as complex adaptive systems (CAS). CAS lay in the middle between really structured systems (order) and complete unstructured systems (chaos). Dave Snowden is my favorite author on the subject and I can't stress it enough: read his works!

CAS in human systems have sets of rules and narratives that control their behaviour and allow them to evolve in particular directions (“evolutionary potential”). They interact and change the ecosystem they're a part of while being flexible enough to also adapt to changes in that ecosystem.

2

A little logical argument for adopting complexity in gamification:

- If business is in fact a complex system then we can assume that a complex adaptive system is the best model to organize companies
- If the understanding, navigation and management of a complex system depends on tacit knowledge like Ann Pendleton-Jullian said, and games are miniature complex

adaptive systems, then developing skills in game systems will help us understand, navigate and design complex systems in the real-world

- And if playing and designing games are essential for these skills, then gamification's role in enterprise and education arise from a need to manage complexity in our volatile world

This would mean that game design thinking in the gamification community should also be focused on managing the systems of the real-world, not just try to induce dopamine. But the dopamine triggers must be understood, since dopamine enhances implicit learning which helps us understand complexity.

Michael Hugos book *Enterprise Games* focuses on the need to manage systems. His background is in IT and gives a very unique perspective on applying game mechanics to information systems. See my article at Gco titled *How Gamification Improved Supply Chain Efficiency*.

Michael predicts that the only way to manage the volatility that will come in the near future with big data and the adoption of sensors everywhere is to adapt business dashboards and business practices to look like those inside MMO's.

Following this logic my assumption is that the future of the “gamification expert” should be linked to knowledge management. Gamification shouldn't only be about fun for pleasure's sake, but fun as a tool for creating tacit knowledge. Our modern problems are complex, gamification designers could be managing this complexity has a bridge between game mechanics and real-world systems.

If we know for a fact that play supercharges pattern creation in our brains with the intention of understanding complexity, could it be that if IT and big data is gamified like its described by Michael Hugos that this will supercharge the creation of real-world business-specific patterns in our subconscious? Think about it: Game mechanics inside the business operations could be the best way to create tacit knowledge in an organization.

“When it comes to serial processing, computers win every competition between man and machine. They are quicker and less prone to error. But for complex tasks that resist resolution through an extensive series of rule applications, the human brain still takes the prize.” Leslie Paul Thiele

Maybe the value of big data is to organise it like a game in the aims that our subconscious brain will make sense of it? In order to understand the above quote we need to put it into context:

“The conscious mind is like a serial processor that addresses tasks

sequentially. It is inhibited from taking on more than one job at a time.

The unconscious mind works more like a parallel-distributed processor.

It addresses numerous complex tasks simultaneously by funneling multi-

ple independent sources of information through multiple information-

processing units. To the extent that we engage in

“multi-tasking,” the

unconscious mind has to take over. As much of our lives are characterized by multiple demands on our attention and multiple

sources of

information, it is unsurprising that implicit cognition plays a very large

role in our ability to function effectively.” Leslie Paul Thiele

So far a lot of our education and business training has

focused on the conscious mind, but this is an educational design flaw. Gabe Zichermann and Steven Johnson has pointed out that research shows that humans have began having a compound increase in fluid intelligence. The reason for this is believed to be our entertainment, both video games and complex TV series (not sitcoms but shows like Game of Thrones). Our entertainment IS currently making us smarter.

The objective should be to tap into how those mechanisms work and affect our brains, and use it to amplify human intelligence. **Computers aren't going to replace human beings any time soon because they can't effectively deal with novelty and context.** Gamified systems could be a way to enhance human intelligence with technology, not an attempt to replace it (something Snowden stresses a lot, but he doesn't link it to gamification. I have no idea what he would think about such a notion). Computers are great in closed predictable systems, not in open systems.

Using your subconscious doesn't mean you're in a sedated dumb down state of mind. We've all seen people that seem to lack any conscious thought and operate automatically through habit, this is not the same as diminishing consciousness to allow subconscious areas to make decisions

as Thiele suggested in the above quotes. Remember you have to be using your top brain and bottom brain! The fact that a chessmaster is using most of his brain in a subconscious state during a game (as opposed to conscious state in novices) doesn't mean he's sedated! I think a great metaphor is the movie *Rain Man*:

If you haven't seen it it's about two brothers who find each other as adults. One is played by Tom Cruise who is this player guy with lots of social skills. His brother is played by Dustin Hoffman who is an autistic savant with no social skills what-so-ever. Think of Tom Cruise has your conscious brain and Dustin Hoffman like your subconscious brain.

In the movie Hoffman is able to see all these different patterns that Cruise is obviously unaware of so Cruise takes his autistic brother to Vegas. Hoffmann is able to tell Cruise the results of these patterns while counting cards in the casino, which then are used by Cruise who can actually navigate the real-world and make decisions in order to make money in Vegas. We need to start designing whole-brain educational programs to develop whole-brain individuals that can solve the world's complex problems.

Fingerspitzengefühl is a German word that translates into

“fingertip feel.” I first came across it in the book *The 33 Strategies of War* by Robert Greene which defines it as the ultimate state of a strategist. It's a sort of intuition you get in your field of practice after years in it. This intuition is not available to our consciousness, ideas just flow into your head, decisions are made on gut feelings, you just seem to have a sixth sense.

If we can discover how to use game mechanics to supercharge pattern building in our employees subconscious brain while they work we'll start developing massive fingertip feel as a company. This notion might be taken with society as a whole. We will become a culture of strategists able to navigate the world's complexities.

“Similar cases regarding the learning of complex skills with little or no awareness of their mechanisms are well-documented. These capacities, though learned, remain unavailable to introspection.” Leslie Paul Thiele

