LIMBIC

FROM GAMIFICATION TO NEUROBEHAVIORAL DESIGN

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TABLE OF CONTENTS

How We Got Here2
WE ARE IRRATIONAL
Evolutionary Neuropsychology of "Irrationality"
FROM GAMIFICATION TO NEUROBEHAVIORAL ENGINEERING
How Gamification Works and the Psychological Levers Involved
WHERE WE ARE NOW
GAMIFICATION IN EDUCATION
GAMIFICATION IN EMPLOYEE ENGAGEMENT
GAMIFICATION IN HEALTH & WELLNESS
THE FUTURE OF GAMIFICATION

HOW WE GOT HERE

Consumers are facing more choice than ever before, employees are fighting more distractions than ever before, and children are exposed to more engaging entertainment than ever before. It has been shown that in the world where the labor is mostly creative in nature, monetary rewards are unlikely to instill motivation or loyalty (Pink, 2009). This places the question of engagement on the top of the agenda of corporations and educational institutions.

Gamification is the trend that represents the use of game design elements in non-game contexts to drive engagement and design behavior. Gamification applies to a broad set of domains:

- Employee engagement
- Crowdsourced innovation and problem solving
- Consumer engagement
- Education
- Personal development
- Wellness: health, fitness, and nutrition

Gartner, a technology research firm, estimates the penetration of gamification at 1-5% of the target audience (Gartner, 2012), which represents a huge opportunity. The firm also projected that 50% of corporate innovation will be "gamified" by 2015. The trend however, is at the peak of the inflated expectations, meaning that gamification has challenges to overcome before widespread adoption. Indeed, it has been proven quite hard to create an experience that would be "just right" to maintain the desired level of engagement. It holds true both for "entertainment games" and "serious games".

We believe that gamification is a part of a larger emerging discipline that can be called **neurobehavioral design**. Neurobehavioral design will use the understanding of how human brain works to **create desired behavior in individuals through their interaction with media**. This understanding has been developing through cutting-edge research in neuropsychology and emerging technologies such as emotion recognition, natural user interface, natural language processing, and machine learning. Some rules of neurobehavioral design (for example, in games, propaganda, or marketing) have been around for a long time. However, only now we have the necessary tools to combine the insights into a field of knowledge that can transform the way we engage with the world, each other, and ourselves.

It's not about games; it's about tapping into the motivational resources of our limbic brain. We are irrational.

WE ARE IRRATIONAL

As much as we would like to think about ourselves as rational beings, we are very far from it. Humans are not only irrational, they are "predictably irrational", a term coined by Dan Ariely, a behavioral psychologist. Everyone has heard about our cognitive biases such as **loss aversion**, **sunk-cost**, or **extremely high internal discount rate** that makes today's gains disproportionally more important than those that occur in a year. Research has confirmed what the darkest moments of the 20th century demonstrated: we are more **obedient to authority** than we ever imagined ourselves to be, making a normal person like you and me capable of horrible things when authority is involved. We have seen how **herd behavior and crowd psychology** create mass hysterias like tulip mania and are used to an advantage of a regime or a brand. We use little tricks like putting the most important points first or last when we present because we now know that our **memory** works this way. Women have known for ages that to win a potential partner they have to play "hard to get", or create artificial **scarcity.** We know that mirroring the posture of our conversation partner makes them **predisposed** towards us.

These insights into how our motivation and behavior deviates from rationality have revolutionized economics, business, and marketing; however, they are only the tip of the iceberg. With the technology such as FMRI and complex blood testing, over the last 15 years we have started to understand much more about the neuropsychological and chemical foundations of the biases that we observe.

EVOLUTIONARY NEUROPSYCHOLOGY OF "IRRATIONALITY"

Our brain can be best modeled as an interaction of two systems: one is logical, conscious, effortful, slow, and another – emotional, automatic, subconscious, fast. This idea, a summary of the recent research on how we think, is behind what Daniel Kahneman calls "fast" and "slow" thinking. In fact, "slow" thinking is rooted in the brain structure known as neocortex, the most recent development of the brain evolution that is considerably bigger in humans than it is in other mammals. Nevertheless, the capacity of the "slow" brain is still very limited. It has been estimated that it cannot process more than 5 to 9 variables at the same time, which is considerably less data than we receive from the world around us. On the other hand, "fast" thinking is a product of the limbic brain that has not evolved much since cats. It relies on instincts and unconscious learning through complex networks of dopamine neurons and releases the results in the form of emotions and "gut feelings" (read – chemicals).

Since our "slow" thinking is the only one we are fully conscious of, we tend to overestimate the degree to which it controls our behavior. In fact, it is the limbic brain that dictates the majority of our actions. This is the reason why real humans are far from rational economic agents. It is also the reason why diets fail, monetary rewards do not produce desired behavior, and children are much more engaged in video games than in classes at school.

Hundreds of thousands years ago, in a different world, these "biases" were selected by evolution and hard-wired into our limbic brains precisely because they made complete sense then. They are not at all

irrational. In fact, valuing something that you can have now more than something you can have in a year is a solid survival strategy when your chances of surviving this year are rather slim. We could not survive on our own and therefore needed to be a part of the pack – thus herd behavior and obedience to the leader of the pack as survival mechanisms. Scarcity and competition were good heuristics that could show us if the resource is valuable – and were right more often than not, making our genes (and cognitive biases) more likely to survive the natural selection.

On the neurochemical level, complex dopamine networks of our "fast", limbic brain generate chemical responses (that feel like pleasure or pain) to generate behavior that proved itself useful either with evolution (instincts) or with experience. Not even necessarily useful for the individual itself. For example, the evolution "needed" to incentivize mammals to care for our fragile youth – something a reptile would consider an unthinkable waste of energy. So the "parenting" behavior appeared as a set of chemical reactions that link caring for the offspring with our own pleasure and our child's suffering with our own pain.

In short, the evolution found a way to incentivize behavior that goes beyond what makes sense for the individual right here, right now. We have been "gamified" by the evolution itself long ago.

FROM GAMIFICATION TO NEUROBEHAVIORAL ENGINEERING

Our limbic brain is the most powerful motivation system we have, and we have little conscious control over it.

There is no doubt that with advances in neuroscience we will understand much more about our limbic brains than we do now, which will enable us to design employee, consumer, or student behavior more effectively. However, humanity has been discovering the underlying principles of behavior design through trial and error for centuries.

Game design is just one of the areas that actively studied and used these principles. It is not that games per se somehow provide the answer to the question of motivation and engagement. It is just game designers (along with politicians, propagators, and advertisers) figured out ways to engage our powerful limbic brains earlier than neuropsychologists became able to.

Therefore, the trend of "gamification" is in fact broader than just using the so-called "game design principles". It is about using what we know about how we think (and feel) to tap into the abundant motivational resources inside our brains that have been largely uninvolved in our work, our health, and our learning.

HOW GAMIFICATION WORKS AND THE PSYCHOLOGICAL LEVERS INVOLVED

So far, gamified activities have leveraged our limbic brains through generating social engagement, personal expression, and more importantly simple (but powerful and even addictive) dopamine-powered instant reward and punishment-based learning. The trick is to stimulate our brain to release certain chemicals in response to the "gamified" experience that would keep us engaged without "effort" or "discipline" on our side (all neocortical activities).

Rewards:

- **Instant gratification**. A player's action receives instant feedback, positive or negative. It is the best environment for our dopamine networks to learn to associate an action with an achievement (and pleasure that results from the achievement).
- **Random rewards.** Unexpected rewards such as bonuses have been shown to lead to faster learning than regular ones.
- **Flow-type experiences**. They are the so-called "optimal" experiences that occur when the task difficulty matches one's abilities level. Humans engage in them just for the sake of the experience.

Social:

- **Belonging.** Games are often played in teams, satisfying the hard-wired need for belonging (since it was barely possible for us to survive without a pack, it was a good idea from the natural selection standpoint).
- **Competition.** Competition for resources is a powerful motivator for mammals. It also creates the illusion of scarcity, which makes the prize more desirable.
- **Altruism.** In certain conditions, people derive pleasure from altruistic acts such as gifting since it reinforces social bonds (and the likelihood of survival as the consequence).

Personal:

- **Identity.** Games provide players with identity through achievement, status, and reputation. Sometimes games provide identities itself (reputation, status, achievement; taking on new identities as a character in a game)
- **Self-expression.** Certain games allow players to be creative which satisfies the need for self-expression.

The levers described above translate into game mechanics principles. These principles were originally developed for video games, but are as applicable to "serious" games (cite enterprise gamification).

Performance:

- Real time feedback for your actions
- Transparency in terms of where you stand among other players
- Intermediate goal-setting to make sure your next goal is in sight

Achievement:

- Public status and reputation

- Leveling up constant progression to keep the right balance of challenge and ability
- Mastery and on-boarding

Social Interaction:

- Competition
- Teams
- Virality (i.e. be incentivized to involve others)

Game mechanics elements:

The absolute majority of available gamification solutions are using quite a limited set of game mechanics elements.

- **Points.** Players get rewarded for certain actions (and sometimes punished for others). There can be several types of points in one game.
- **Levels.** Certain number of points lets you progress to the next level that unlocks more functionality.
- Badges. Badges are forms public identity derived from certain achievements in the game.
- **Bonuses**. Unexpected rewards that keep the connection with pleasure
- Leaderboards. A publicly visible ranking of players.

GAMIFICATION IN EDUCATION

Motivation and engagement are named among the major challenges of education systems (Lee, 2011). As education competes with more engaging entertainment than ever, the default environment of schools promotes disengagement, learned helplessness, and boredom. 1.8M students fail to graduate from high school each year in the US only. However, the same students have no problem staying engaged while collecting crops in Farmville (done on a daily basis by 28M people) or playing the World of Warcraft (over 5M people spend 40+ hours a week playing the game).

Engagement is not the only positive effect on gamification on learning. Gamified learning is also experiential learning. It not only delivers "useful knowledge" -knowledge becomes obsolete too quickly in the modern world). It teaches to think and learn independently. It embraces failure as a part of learning experience and "tinkering" as the new learning paradigm, which translates into a mindset of an entrepreneur and a creator as opposed to that of a clerk (M. Honey, 2013).

There are multiple ways to incorporate game dynamics and games into education (adapted from MIT Education Arcade, 2009):

- **Games as Content**. A game can be used to deliver subject knowledge in a certain area. Players acquire knowledge and skills by learning how to play as a necessary part of the game progression. SimCity, Civilization, or Making History are examples of games that provide knowledge in urban planning and development, history, and geopolitics.
- Games as Simulations. Games test the player's knowledge and skills by simulating a real life situation.
- **Games as Context.** Games can be used to create an experiential context for understanding of a topic. For example, Dungeons and Dragons can be used to understand probability, and Pictionary can be used as a way to introduce ideas about forms of communication.
- Games as Authoring Platforms. Platforms such as Scratch or Gamestar mechanics allow players to express themselves (and learn how to code or design computer games) through working on their own projects.
- Games as Assessment systems. It has been shown that students Allowing students to arrive at their best. Not a single shot.
- Games as Cognitive Training. Companies such as Luminosity and brain age use games and game dynamics such as points, levels, and competition) to train memory, problem-solving, and flexibility

GAMIFICATION IN EMPLOYEE ENGAGEMENT

The Problem

It's no secret that one of the underlying pillars of success for the enterprise is an engaged, productive workforce. If this is widespread knowledge, then why, according to a 2011 Gallup Study, are 71% of American workers "not engaged" or actively disengaged? Even if that number seems high, a recent AON Hewitt study which found that 40% of worldwide employees are "not engaged" isn't much more promising.

The answer to this paradox is actually quite simple – either employers aren't aware of the extent to which their employees are engaged (lack of data), or the solutions employed to increase employee engagement thus far have largely been ineffective.

Current Trends

The "Consumerization of the Enterprise" – one of the many over-hyped phrases spouted in the blogosphere, and used to describe something that's been happening for some time now – has generally been associated with the infiltration of consumer hardware and services into the enterprise. What many enterprises are realizing is that some of these things employees are bringing into the enterprise are directly competitive with employee engagement. Facebook, texts, tweets, personal email – we all now live in a world of constant distraction which plays right into the hands of our innate desire for instant gratification. What's worse is that these very deterrents to employee engagement – social games, apps and the like – are **far ahead of the curve** when it comes to applying gamification (e.g. pulling the right psychological levers) to engage you, the user.

Again, to varying degrees of detail, enterprises recognize this – so do entrepreneurs, and with new startup software companies coming out of the woodwork with just slightly less velocity than random mobile apps, enterprises have quickly turned to software as the white knight for their employee engagement conundrums. As Kris Duggan, CEO of Badgeville astutely points out, *Gartner claims that enterprises will spend nearly \$300 billion on enterprise software, yet a survey by The IT Adoption Alliance says that usage of this software is at a dismal 50%.* Said differently: \$150 billion is being wasted on software investments (or the equivalent of the entire GDP of Greece, yikes!). In addition to throwing software at the problem, other enterprises similarly avoid tackling the root of the problem by using Band-Aid approaches by blocking access to certain services, or using the stick to deter employees. But why not use the carrot instead?

Why is Gamification Needed?

Enterprises are slowly becoming aware of the need for gamification as an effective tool to drive employee engagement. In a November 2011 press release, Gartner states that more than 70% of Global 2000 organizations will have at least one "gamified" application. Gamification solves many needs, and does so cost-effectively. It's well known that employees, and people in general, value

recognition and feedback in general. Tapping into this basic human instinct in enterprise gamification programs will go a long way in incentivizing behavior. What's lesser known is the extent to which employees value recognition and awards, and how enterprises can use this not just to drive engagement, but also profitability. Cindy Ventrice, employee engagement researcher and author of Make Their Day asked employees to estimate the dollar value of workplace recognition, and found that *57 percent reported that the most meaningful recognition cost the organization nothing*.

How can Gamification be Used?

Kris Duggan, CEO of Badgeville and serial entrepreneur, identifies 10 areas within the Enterprise where gamification can be used: Training & Learning, Support & Services, Sales, Collaboration, Marketing & Social Advocacy, Order Management & Warehousing, Human Capital Management, Product Development, Ideation / Innovation and Corporate Culture. While we agree that these are all potential beneficiaries of gamification, we highlight three areas that we found particularly interesting:

- Compliance This is a broad term, and intentionally so. Software companies have made a
 killing using the "compliance" pitch (SAP purchased SuccessFactors, a maker of compliance
 and 360 review software, for nearly \$3.5 billion). Per our previous point, usage of this software
 is low and infrequent (the latter often by design as reviews only occur periodically). Enterprises
 can apply gamification to this definition of compliance by recognizing rock star employees (vs. a
 go-through-the-motion end of year review where feedback is strictly between the manager and
 employee), or rewarding those who complete corporate training and compliance training (firm
 policy, laws/regulation, etc.) in a timely manner. Yet another use case is recognizing those who
 go out of their way to provide productive feedback off-cycle. The possibilities extend far and
 wide, and the end result, among other things, is transparency and engagement.
- Sales I recently spoke with a handful of sales reps and managers in various industries. The takeaways from those conversations were 1) sales reps are competitive, mercenary divas and 2) sales reps will *always* try to game the sales system and compensation structure. In that regard, the sales organization is a perfect petri dish for testing gamification programs, if for no other reason that if the program has holes or is flawed in any way, the sales reps will expose that weakness quickly and without any thought to how it could negatively impact the organization. Again, tapping into the right psychological levers is imperative to a successful "game". With your typical employee, that might be recognition. With sales reps, that lever is winning. Contests for pushing a new product, customer satisfaction, increasing collaboration between sales and marketing, or pushing other corporate initiatives are all areas where applying a contest and announcing winners (to oversimplify a "game") can help promote those historically difficult issues.

Innovation – Companies like Kaggle and InnoCentive have established contests where teams compete for prizes to solve various corporate challenges. We think applying these types of "games" internally

(e.g. R&D departments) can help spur innovation, or even solve particularly challenging issues that arise. If the games are established properly (which is key), positive side-effects from friendly "games"/competitions may include increased collaboration and better corporate culture. Applications may include finding the optimal operational process for particular tasks, bug fixing contest among internal engineering teams or a marketing challenge to come up with the best campaign.

GAMIFICATION IN HEALTH & WELLNESS

The Problem

28.5% of the U.S. population is obese.¹ According to the CDC, 19% of all U.S. adults are smokers.² Obesity costs the U.S. \$190 billion every year in obesity-related problems, or 21% of total healthcare costs, while cigarette smoking costs the U.S. more than \$193 billion (\$97 billion in lost productivity plus \$96 billion in health care expenditures).³ Undoubtedly, health and wellness issues are at the forefront of concern for just about everybody – the individuals who suffer from these ailments, the government and corporations who pay for them and the friends and family who are affected by them. So why do these staggering trends continue, and even rise, *even though we know the root causes for why health and wellness issues like these exist?* The issue is that these ailments aren't just physical ones, but emotional and psychological ones as well. The problem today is that most "solutions" target the physical aspect of the issue (nicotine gum, gastric banding, weight loss pills, etc.), or target the wrong psychological/emotional levers.

Current Trends

Ironically, this section would be better titled "static trends" as the underlying problems, and awareness of these problems, have been around for quite some time, with little change (outside of the steady rise in obesity rates and healthcare costs). The government and corporations have been a large proponent of change, largely due to the fact that they're footing a significant portion of the bill. Obesity in the U.S., and health and wellness issues in general, largely due to factors such as childhood obesity reaching an embarrassing rate. However, the solutions and reactions to the increased focus on these issues still largely fail to address the root cause of these problems. A brief list of some of the current types of solutions includes:

- Emotional marketing (e.g. commercials around anti-smoking, childhood obesity awareness, anti-drug use, etc.)
- Product marketing (i.e. addressing the physical aspect gastric bypass, weight loss pills, nicotine gum, etc.)
- Government programs (e.g. revamp of cafeteria food to fight childhood obesity, smoking tax, etc.)

¹ <u>http://www.pbs.org/newshour/rundown/2013/04/how-us-obesity-compares-with-other-countries.html</u>

² http://www.cdc.gov/tobacco/data statistics/fact sheets/fast facts/

³ <u>http://www.phitamerica.org/News_Archive/10_Flaggergasting_Costs.htm</u> http://www.cdc.gov/tobacco/data_statistics/fact_sheets/fast_facts/

- Corporate programs (e.g. health incentives)
- Dedicated companies focused on health and wellness offerings (Jenny Craig, Principal Wellness, MediFit, etc.)
- Social solutions (e.g. exercise groups, quitting smoking with friends, etc.)

However, gamification has increasingly emerged as a tool to address health and wellness challenges, particularly at the corporate level where executives are incentivized to lower healthcare related costs and maximize profits. According to Buck Consultants, 62% of employers consider gamification the most effective strategy in encouraging employees to improve their health and at least 31% will adopt at least one new health-related gamification strategy in the coming year. Furthermore, a recent survey of 800 mid-to-large sized employers conducted by Aon Hewitt found that 83% of employers currently offer some form of employee incentives through wellness programs.

Why is Gamification Needed?

In short, *gamification is needed because everything else has largely failed*. Some of the most difficult health and wellness issues such as fighting obesity and cigarette smoking require pulling the *right* psychological levers to effect change. However, most of the "solutions" to key health and wellness issues are simple "Band-Aid" approaches used to treat symptoms instead of root causes. Gamification has been a very hot topic of late, which has led to the emergence of the application of gamification as a powerful tool for health and wellness.

How can Gamification be Used?

Gamification is ideal for some of the toughest health and wellness issues, such as the obesity and cigarette smoking examples highlighted in this section. Below are the highlights of an idea for a health and wellness gamification start-up that we discussed:

- Platform for using psychological/neurological levers to incentivize human behavior in a way that's much more powerful than the methods used today
- Build a community/network around this technology, with the technology itself supporting the creation of "open" (community) and "closed" (personal network) games/contests
- The games/contests created will be carefully crafted to touch the very levers that most effectively drive human behavior
- Users will input basic information (goal of contest and basic demographic info, unless they log in w/Facebook)
- These games will be sponsored by relevant advertisers based on the type of contest (running, strength training, quitting smoking, weight loss)
- Supported by social network (people who can create profiles with workout goals, typical workouts, location, available workout times, preferred gym, etc.) where people can meet to work out (targeting one city at a time)

• Users can give something akin to "likes" for sharing helpful information, being a good workout partner during a meet-up, posting interesting information to their profile, etc., which creates an environment where people strive for status by being positive, active contributors in the community

Though obesity and cigarette smoking were the two examples discussed, the number of health and wellness applications is limitless, given that each individual has different priorities, desires and needs in this area. Entrepreneurs are taking note as well, and there have been a significant number of recent gamification start-ups focusing on tackling the health and wellness challenge. One area where we've seen quite a bit of focus is on solutions that target corporate health and wellness programs, given corporations are one of the primary parties footing the bill (the other being government), generally have deep pockets and are highly incentivized to curtail spiraling healthcare costs for the sake of profits and shareholders. Some of the health and wellness gamification companies we've seen include:

- Audax Health combines social networking and gamification features into the employee Health Risk Assessment (HRA) process to increase employee engagement
- *EveryMove* allows users to choose rewards that they earn through staying active
- *Healthper* uses gamification to build solutions for individuals, employers, health plans and professionals
- *Mango Health* helps employees properly manage medications, awards points for following medication schedule accurately which can be used to redeem prizes
- Zamzee gamifies health and wellness for children

THE FUTURE OF GAMIFICATION

Despite the richness of its theoretical application opportunities, it is still unclear even to industry experts whether gamification as a trend is going to stick. According to a recent survey by Pew Research Center (Pew Research Center, 2012), 53% of respondents believed that by 2020 gamification would penetrate multiple areas of our lives, whereas 42% predicted that gamification would not evolve into a larger trend.

Gartner placed Gamification at the "peak of inflated expectations", meaning that the trend has to overcome certain challenges in order to become widespread. The critics usually consider the difficulty of creating an effective game and high costs the main barriers that could prevent gamification from taking off. We could also add ethical concerns (if we figure out a recipe for engagement, it could be easily used to manipulate people) as a major cloud on the blue sky of gamification. Another concern might be the risk of micromanaging and incentivizing players to "game the system" using "scripted games".

Having analyzed the influence of these and other factors, we remain convinced that neurobehavioral engineering in a broad sense (tapping into motivational resources of our unconscious brain) has great potential to transform the way we engage in a workplace or in a classroom, with the products we buy or with the goals that we set for ourselves.

We believe that gamification will benefit from the following trends:

Technological:

- 1. Advancements in neuropsychological research through new diagnostical methods such as fMRI. Insight into how our brains work on the neural and chemical level will help to identify new levers for engagement.
- 2. Advancements in artificial intelligence, data mining and machine learning will allow for personalization and adaptability of gamified systems to increase their effectiveness. These technologies will also enable creation of "emergent games", where the goal is defined but the rules and actions are not. This type of games will solve the risk of fragilizing systems through micromanaging by using "scripted" games.
- 3. **Maturation of emerging technologies** such as natural language processing, adaptive learning, augmented reality, brain-computer interfaces, and affective computing will enable highly interactive gamified experiences tailored to the inner and outer context of a player.
- 4. **Abundance of cheap data** with effortless collection technologies (such as smartphone location and usage data) and trends such as quantified self will provide the basis for instant feedback crucial to gamified solutions.

Societal:

- 5. **Demand for more engaging experiences** will come from the so-called "Generation Y", digitally native generation which is used to highly engaging experiences and instant gratification (tablets, video consoles, internet) from the day they were born. To unlock their full potential, we will have to come up with better ways to engage them in learning and working than we use now.
- 6. Increasingly creative nature of work will need new ways to engage and motivate workers (and, as the result, students). Automation and artificial intelligence will eliminate the basic jobs while more workers are going to be involved in innovation, design, or problem solving. It has been shown that monetary rewards have limited impact when it comes to creativity. Therefore, the need for new frameworks for engagement and motivation will become more pronounced.
- 7. **Telecommuting and MOOCs** will contribute to a decrease in face-to-face interaction and therefore to the need for other ways to keep the students and workers engaged.

Higher transparency and a new legal framework will be required to address the ethical side of the gamified "interventions" into our neurochemical motivation systems.

We see the biggest venture opportunities in the following areas:

- 1. **Consumer-level platforms** for creation of gamified experiences in different areas. We found there is no easy way for consumers (e.g. teachers, fitness enthusiasts, non-profits) to create games to support engagement.
- 2. **Gamified analytics solutions** to enable personalization and adaptability of gamified experiences.
- 3. Gamification in public sphere and incentivizing socially responsible behavior
- 4. Consumer engagement platforms that would leverage virtual currencies
- 5. Protection side technology: "antiviruses" that would protect our brains from being manipulated