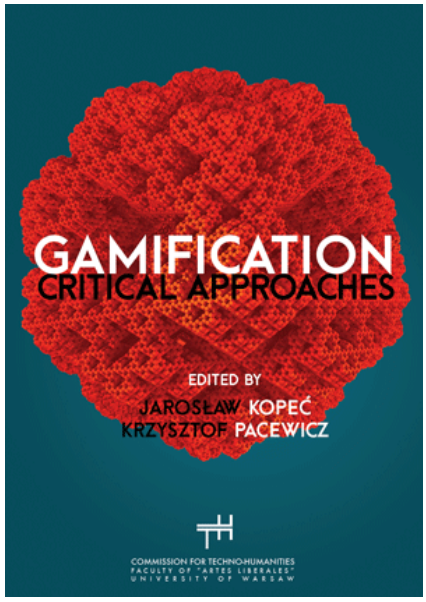


Title:
GAMIFICATION: PLAYING WITH NEUROSCIENCE

Author:
Aleksandra Przegalińska

In:
Gamification. Critical Approaches. Edited by: Jarosław Kopeć, Krzysztof Pacewicz, pp. 99-112.

Published by:
The Faculty of “Artes Liberales”, University of Warsaw. Warsaw, 2015.

ISBN:
978-83-63636-44-9.

Bio:
Aleksandra Przegalińska is an Assistant Professor at the Center for Research on Organiza - tions and Workplaces at Kozminski University. Aleksandra completed her post-doctoral re- search at Brown University (New York). She defended her PhD on the philosophy of arti'cial intelligence at the University of Warsaw. She also majored in sociology at the New School for Social Research in New York. Currently Aleksandra is investigating relations between sci- enti'c management and self-tracking practices.

GAMIFICATION: PLAYING WITH NEUROSCIENCE

Aleksandra Przegalińska

This chapter addresses the relation between neuroscientific self-quantification devices and quantification/gamification procedures. It is mainly based on the example of Melon – a headband and an app to measure focus on a daily basis. My aim is to show the dual nature of links between gamification/quantification regimes and neuroscience (in particular neuroimaging) with its ability to present our neural activity as transparent. Both gamification and quantification – in my understanding – aim at general behavioural change, resulting in outcomes perceived as positive. In this chapter I will try to show how these regimes interfere with neuroscience in order to become even more persuasive and, essentially, successful.
The chapter starts with a general introduction to gamification/quantification as well as quantified self-tracking, and then presents types of quantified self-tracking tools that introduce aspects of gamification. This section is followed by close examination of Melon, a set comprising a headband and mobile app that analyses the activity of its users' brains in order to provide tips on how to stay more focused. The last section of the chapter takes a closer look at the newly established relation between gamification and quantification regimes and neuroscience and how neuroscience is used and transformed to serve them.

Introduction

Gamification and quantification regimes aim at general behavioural change, resulting in outcomes perceived as positive (such as weight loss, workplace productivity, educational advancement, or consumer loyalty). Gamification is the use of both game thinking and game mechanics in non-game contexts to engage users in solving problems. It combines the playful design and feedback mechanisms from games with users' social profiles in non-game applica-

tions. It offers the pleasures of play, and nurtures the desire to level up and, ultimately, win. Quantification, on the other hand, provides real-time feedback about users' actions by amassing large quantities of data and then simplifying it into various fairly understandable modes (progress bars, graphs, charts, etc.). Quantification of the self relies on collecting, collating and analysing minute data and providing feedback on how to better care for one's self. The term "care of the self" refers here, quite obviously, to the later work of Michel Foucault (1988), who closely examines Socratic dictates to care for oneself and know oneself. Foucault argues that through this self-reflection and -care, individuals come to see themselves as responsible for constituting themselves, including as moral subjects. This care for oneself is achieved in knowing how to live through abstinence, regularly subjecting oneself to a thorough examination of one's conscience, and achieving a general state of being in mastery. For Foucault, there is a certain pleasure associated with this control. This is exactly the point when quantification and gamification mechanisms step in. Currently, we could say that the Socratic dictates identified by Foucault and transformed into gamification and quantification regimes are an explicit part of the neoliberal project (Morozov, 2014, p. 269-301). Appealing design, immediate feedback, social contacts and a "fun" dimension are applied in order to attract participants. 200 million hours are spent each day playing computer and video games in the U.S. By age 21, the average American has spent more than 100 hours a month playing (von Ahn & Dabbish 2008). This kind of play is not to be mistaken for play understood as a non-serious pursuit that provides downtime from the responsibilities of daily lives. Here however, it is worth noting that as early as 1961 Erving Goffman has argued – along with many other prominent sociologists, historians, and anthropologists (Caillois 1961; Huizinga 1955) – that play was indeed a serious form of social interaction that required a more nuanced definition. Currently, for many complex reasons, play as we knew it has been replaced or supplemented by gamification. And gamification has become combined with quantification to a degree never known before.

An important aspect of current gamification is that it is applied to non-play spaces. Game developers and designers define gamification in terms of utilising game mechanics, technology, and development techniques from games in non-game spaces, while those from outside the industry generally equate gamification with adding points, leaderboards and badges to non-game activities. Epitomised by online technologies such as Nike+, Mint, and Foursquare that pledge to make everyday tasks such as exercising, financial planning and socialising more enjoyable, gamification proponents promise to make real life more like a game. The applications of gamification are diverse and wide-ranging, including, to name a few, car dashboards that use mini-games and graphic visual feedback to reward reduced fuel consumption; software that allows users to set, track, and achieve financial management goals; websites that reward

users who post interesting comments with reputation points and recognition; programs that promote healthy eating habits using points; and a raft of fitness and weight loss coaches for game consoles.

Gamification practices, operating under the umbrella of play, foster a quantification of the self, collecting, collating and analysing minute data and providing feedback on how to better care for one's self. This quantification of the self feeds into neoliberal governance projects that promise to make daily practices more fulfilling and fun.

Now, quantification and gamification of the self rely on procedures of various self-governance projects that promise to make daily practices more fulfilling. Enabled by increased levels of surveillance (for instance, by self-monitoring) these projects use incentives and pleasure rather than risk and fear to shape desired behaviors. Metering technologies provide users with both instantaneous and long-term feedback on the outcomes of past practice, thus influencing future behaviour.

Data collection in gamification and quantification is followed by visualisation of this data and cross-referencing, in order to discover correlations, and provide feedback to modify behaviour. As Pantzar and Shove note, "once equipped with a heart rate meter, an individual becomes a knowable, calculable and administrable object" (2005, p. 4). All measurements of this kind feed into circuits of reproduction, making performances visible and thus reproducible. This monitoring becomes a connective tissue essential for the reproduction of everyday practices, linking micro-level performance to the macro-level scale, while simultaneously spanning past, present, and future and presenting it in a rich but understandable manner.

More importantly, methods of metering construct the practices they sustain (cf. Pantzar and Shove 2005, p. 2). Data flowing from metering become institutionalised forms of memory implicated in larger patterns of continuity and change. The results are made evident through long-term record keeping.

When we subject ourselves to this quantification, we get more reassuring feedback concerning our progress towards knowing and mastering the self. Our daily achievements sum up to large scale trends that both confirm and shape transformations we have striven for. The next move to enhance both gamification and quantification procedures is to introduce "hard science" to prove their effectiveness. Actually, it is not a new tendency to use neuroscientific techniques to make that transformation "happen". The practice of using neuroscience to design gamification patterns has long been known. It is a new phenomenon, however, to use neuroscience to make that transformation visible. The techniques used by neuroscience have expanded enormously, from cellular and molecular studies of individual cells to imaging of sensorimotor tasks in the brain. Cognitive neuroscience has provided studies of mechanisms underlying cognition with a focus on the neural substrates of mental processes. Computa-

tional neuroscience of brain function has added knowledge concerning the information processing properties of the structures that make up the nervous system. By means of all these techniques, neuroscience claims to make our brain activities transparent. This is why it became an object of interest for organisations and industries that implement gamification/quantification procedures in the first place.

Neuroscience played an important role for gamification/quantification regimes as it allowed the implementation of those mechanisms that under neuroscientific scrutiny seemed to work best. Afterwards, it allowed researchers to check the results of the mechanisms implemented and reinforce those behaviours of users which were most desired. Currently, however, it is no longer a question of what to research in order to construct state of the art gamification/quantification procedures. It is all about the use of neuroscience within gamification/quantification regimes, as part of the measurement and play.

Types of quantified self-tracking tools

We can define quantified self-tracking as a regular collection of any data about the self that can be measured, such as biological, physical, behavioural or environmental information. Additional aspects may include the graphical display of the data and a feedback loop of introspection and self-experimentation. Quantified self-tracking is currently being applied to a variety of life areas including time management, travel and social communications as well as in the context of health. In the past, the cost and expertise needed for working with large-scale datasets and visualisations limited access to such work to professionals. However, these costs have decreased significantly. Furthermore, improvements in tools have made data collection and manipulation more available to the individual.

As already mentioned, quantified self-tracking first occupied the health sector and then became visible in wellness and recreational sport activities. With biomarker testing, health metric tracking was traditionally an expensive one-off process ordered by physicians for patients in response to specific medical risks. Two of the biggest applications in doctor-driven health metric tracking are cardiac monitoring and telemedicine (remote diagnosis) where implantable, worn or handheld devices transmit data wirelessly to medical professionals.

A number of different initiatives are attempting facilitate participatory health, including the emergence of Internet-based social networking communities together with low-cost newly available technology like genome sequencing and bio-monitoring applications and devices.

The increasing ease of capturing, storing and manipulating data has given rise to a variety of websites for sharing datasets and visualisation tools, for example IBM's ManyEyes (http://manyeyes.alphaworks.ibm.com/manyeyes.), Swivel (http://www.swivel.com), and FlowingData (http://flowingdata.com.). There is also a variety of other health monitoring websites and devices currently available focusing on the consumer self-tracking market, in addition to social network-based health self-tracking. They generally have some level of free services but are non-automated, meaning that users must input their own data. The websites may accept data via the Internet, text and instant messaging, smartphone data applications, audio messages or other mechanisms.

At least two interest groups formed in the second half of 2008 to explore, brainstorm and share their self-tracking experiences: Quantified Self (http://www.quantifiedself.com) in the San Francisco area and HomeCampInt (http://homecamp.org.uk) in London. An underlying assumption for many self-trackers is that data is an objective resource that can quickly bring visibility and information to a situation, and that psychologically it should entail an element of empowerment, control, and fun. The goal is not only to gain access to data, but also to build a motivational system that helps with removing harmful habits from daily routines. This is where gamification steps in.

The Quantified Self community is a fast-developing movement where both health enthusiasts and diagnosed patients meet in an environment of trust to share the quantified self-tracking projects they have been working on in the format of monthly show-and-tell groups.

As of July 2014, the Quantified Self community, after only six years of existence, held more than 105 worldwide group meetups with thousands of participants. The two strongest meet up groups meet on a regular basis in San Francisco and New York to test the functionality of such devices as Melon. They test applications that apply quantification and gamification to self-manage time spent on creativity and productivity, and, for instance, to monitor and upgrade achievements in sport.

Obviously enough, the way in which an individual understands himself or herself in regard to wellness, health and health research is changing. In the past, n equalled someone else, the population average, which may or may not have applied on an individual basis; now, 'n = me' and the information applies directly.

Further, there is the idea of 'n = we' developing, as self-experimenting individuals come together in health collaboration communities like Quantified Self, or DIYgenomics, PatientsLikeMe, and Genomera that make their n = 1 discoveries less anomalous, and statistically significant.

These groups gradually tend to resemble social movements, including in their claims on what it essentially means to be a citizen. They advocate data-sharing, studies of participation, and more proactive health self-management, and responsibility-taking performed in a playful manner. Quantification is here reinforced by gamification: discipline reinforced by play. This, however, seems not to suffice for the group to grow and strengthen its global presence. Thus, in order to support the group's self-identification and general claims, scientific rigour needs to be introduced.

Melon

Melon is a headband and mobile app duo that joins the family of self-tracking devices and is clearly designed for people interested in self-quantification. Melon is being advertised as a device that allows the user to gain insight into how their mind works by tracking focus during any activity of users' choice. Its very revealing motto is: Understand yourself. Learn differently. Melon tracks the users' focus in relation to their activity, environment, emotions, and "any other behavior" of their choice. The core Melon team includes Arye, Laura, and Janus (the users do not get to know their surnames), specialists in human-centered design. They inform the user in a short video on a website devoted to Melon (http://www.thinkmelon.com/) that they have combined their backgrounds in cognitive science, computer science, measurement devices, electrical engineering, and product design to create Melon.

The Melon headband uses electroencephalography to measure brain activity. From this activity, Melon's algorithms detect users' focus, and then use this data to give the users personalised feedback on how to improve. The founders also mention that they have partnered with a top producer of EEG signal processing chips to access the best available algorithms for mental state detection. The introduction into what is blackboxed in Melon begins with a fairly simplified description of what is happening in the human brain:

> The brain consists of billions of interconnected neurons. When a single neuron fires, it creates an almost imperceptible amount of electrical charge. During normal waking states, millions of neurons are firing collectively in your brain. The cumulative electrical activity that results can be measured on the forehead as brainwaves (ThinkMelon).

Melon measures this global electrical activity by placing three electrodes on the forehead, with the primary electrode on FP1. This allows Melon to monitor brainwave activity in the pre-frontal cortex. Melon is partnered with NeuroSky, one of the leaders in consumer EEG technology. The Melon system benefits from NeuroSky's experience with signal amplification (which makes raw brainwave signals stronger), filtering protocols (that eliminate known noise frequencies such as muscle movements and pulse), and notch filters (that eliminate electrical noise from the grid, which varies between 50Hz and 60Hz, depending on geographic

location). Filter technology remains at the forefront of NeuroSky R&D. The NeuroSky chip, used by Melon, filters out the ambient waves present in most uncontrolled conditions and measures neural activity in virtually any condition with 96% of the accuracy of similarly configured research grade EEGs. Information concerning the EEG's reliability is certainly important, as consumer EEG technologies have been reported as unreliable and imprecise in the past.[1]

Most certainly, Quantified Self enthusiasts will be interested in these details and in how to make use of the portable EEG that Melon provides. Nonetheless, many other end-users are mainly preoccupied in the results of Melon, not its design. Thus, the founders provide simple and concise descriptions that link the design of the product to its functionality. For instance, the Melon headband is:

> [M]onitoring your brain to teach you about your cognitive performance. Melon's brainwave monitoring headband listens to the electrical activity naturally given off by your brain. Using Bluetooth 4.0LE, Melon connects to your phone to help you track and train several mental states, including focus, meditation, and relaxation. The mobile app lets you understand how your behavior affects how you feel and teaches you how to improve.

The tracker, on the other hand,

> "tracks your focus, relaxation, or meditation during any activity you choose".

The app grabs data about your location, who you're with, and anything else possibly relevant to your mental state. You can add tags about what you ate, drank, and how you're feeling. All of this data is used to spot trends about what may be positively or negatively affecting your mental state. Real time tips alert you when you need to take breaks to maintain your focus, relaxation or meditation.

Tune is a digital expert that helps tuning "your mind to your desired mental state".

Melon gives you tips that help quickly guide you to your desired mental state. Use this section of the app to prepare for an event or performance. Tune is about giving you confidence in your ability to get focused or unwind whenever you need.

1 For instance, it is well known that noninvasive technologies for the study of human brain activity suffer from the requirement that subjects avoid gross movement during recording. Movement degrades signal quality, and this problem is commonly dealt with using one of two strategies. Firstly, signals recorded while subjects show explicit behaviour are discarded, which results in asynchronous brain and behaviour sampling (see Debener et al. 2012). Secondly, only movement-constrained behaviour is allowed. Accordingly, the validity of neurocognitive theories remains poorly understood in the context of unconstrained human behaviour.

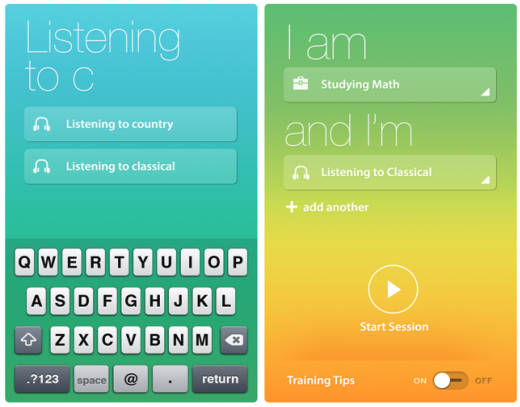
And, last but not least, train is a set of games based on the science of neurofeedback "to learn how to focus, relax, and meditate better":

> Our first game allows you to fold origami with your mind. The faster you get into your desired mental state and the longer you sustain it, the faster you can complete a fold. Each new creature you unlock will be more challenging than the last. Training your brain has never been more fun, and your friends and family will be impressed with your collection of creatures, indicative of your progress!

Now, Melon's presentation on Kickstarter[2] began with the following words:

> Daily life can be complicated, cluttered, and confusing. We at Melon believe that when people improve their focus, they feel more mindful, confident, and productive in their everyday lives. That's why we are turning to you. We need your help in order to manufacture and deliver our first large-scale run of the Melon headband. And, we are eager to listen to your feedback once you receive your Melon. If you believe in our mission, our dream, or if you just really like us, then please purchase a Melon or donate to this project!

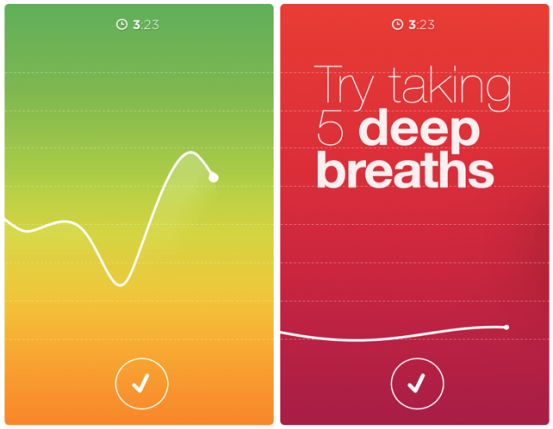
Following this, the founders of Melon ask if we (the users) could transform how we work, and then, even more intriguingly, improve the way we meditate and, ultimately, find a new way to be creative. Importantly, they point out that the Melon sensor turns focus into something measurable, understandable, and improvable. The users are encouraged to imagine the ability to see their brain as a transparent device and understand its invisible activity. Each time Melon is used, the app learns about what helps and hurts user's focus. Insights appear at the ends of sessions and are stored as trends that are easy to understand and use. This part of the output is translated into the visual layout of the app:



Copyright by Melon

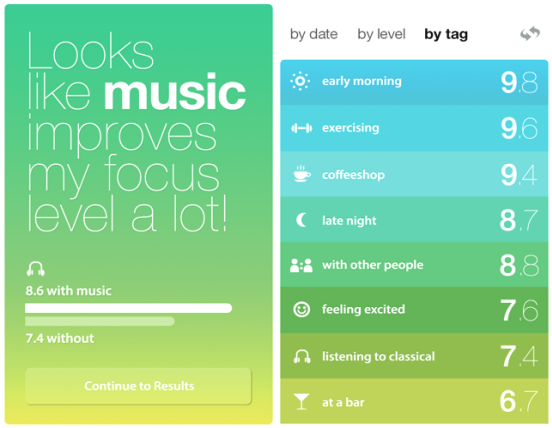
2 The project was successfully funded, raising $290,941 (pledged for $100,000) and backed by 2,723 people in June 2013. Currently the headbands are on presale for $149 each. See: https://www.kickstarter.com/projects/806146824/melon-a-headband-and-mobile-app-to-measure-your-fo.

The image above shows the input tags indicating activity, environment, behaviour, and more. Melon architects claim that health aspects that are not obviously quantitative such as mood can be recorded with qualitative words that can be stored as text or in a tag cloud, mapped to a quantitative scale, or ranked relative to other measures such as yesterday's rating.



Copyright by Melon

Melon learns about and displays the user's focus. The user is offered personalised tips when his or her focus dips too low. Below, we see a personalised tip based on monthly tracking of the user's brain activity. The app suggests music as a solution to distraction.



Copyright by Melon

Melon also proposes that the user find focus with Origami. The call to the user is to play games to challenge him- or herself and achieve longer periods of focus. They also add that "better focus lets you fold origami faster and complete more complex creatures".

Koskela, H. (2004). Webcams, TV Shows and Mobile Phones: Empowering Exhibitionism. Surveillance & Society 2 (2/3), p. 199-215.

Malaby, T. (2007). Beyond Play: A New Approach to Games. Games and Culture, 2(2), p. 95 – 113.

McGonigal, J. (2011). Reality Is Broken: Why Games Make Us Better and How They Can Change the World. London: Penguin Press.

McGrath, John Edward. (2004). Loving Big Brother: Performance, Privacy and Surveillance Space. London: Routledge.

Monahan, T. (2009). Dreams of Control at a Distance: Gender, Surveillance, and Social Control. Cultural Studies ↔ Critical Methodologies, 9(2), p. 286 –305.

Morozov, E. (2014). To Save Everything Click Here. London: Public Affairs Books.

Pantzar, M., and E. Shove (2005). Metering Everyday Life. In 17th Annual SASE Meeting. Budapest.

Popolo, M. (2013). Kickstarter Tech Project of the Week: Melon. PCMag.com. Retrieved 21 September, 2015, from: http://www.pcmag.com/article2/0,2817,2419002,00.asp.

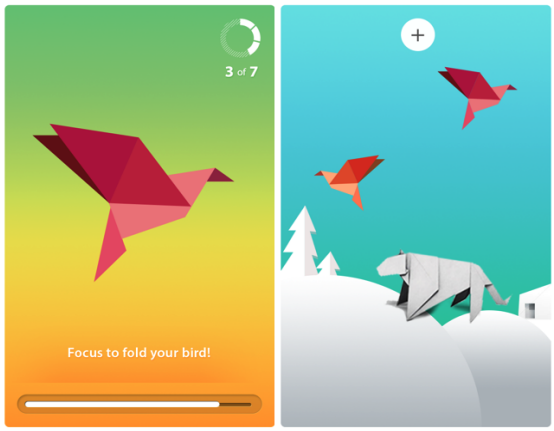
Porter, T. M. (1996). Trust in Numbers. Princeton, NJ: Princeton University Press.

Reeves, B., and J. L. Read (2009). Total Engagement: Using Games and Virtual Worlds to Change the Way People Work and Businesses Compete. Boston, MA: Harvard Business Press.

Steadman, I. (2013). Learn how to improve your brain's focus with the mind-reading Melon. Wired.co.uk. Retrieved 21 September, 2015, from: http://www.wired.co.uk/news/archive/2013-05/14/melon-headband-brain-analysis.

ThinkMelon. Video. Retrieved 10 January, 2015, from: http://www.thinkmelon.com/video.

von Ahn, L., and Dabbish, L. (2008). Designing games with a purpose. Communications of the ACM, 51(8), p. 58–67.



Copyright by Melon

Public awareness and usage of neuroscience

In order to explain Melon's case in a broader context I would like to refer to a general growing tendency in the public awareness of neuroscience. Recent developments involve the use of neuroscience in the business world, technology and education. But, like homeopathy and phrenology, many of these applications can be regarded as "quasi-neuroscience". The public has become more interested in new findings about the brain, and also finds brain-based explanations quite compelling. This public interest has led enterprising individuals to try to apply neuroscientific ideas to more everyday situations.[3]

This trend first began back in the late 1990s with "neuromarketing". For instance, the Neuroleadership Institute (http://www.neuroleadership.com/), founded in 2007 to "encourage, generate and share neuroscience research that transforms how people think, develop and perform", seeks to apply neuroscientific research in management and business. It publishes its own journal, and holds meetings around the world offered to prominent business people. The Neuroleadership Institute's published work shows why their approach needs more scrutiny. Take the example of the AGES model of learning which was published in the institute's journal (AGES stands here for attention, generation, emotions and spacing). The main idea is that effective use of these four domains in training can lead to more effective learning.

For instance, "generation" of associations and deeper, more elaborated processing of material leads to better memory retention. This means that the word "table" will be forgotten easily if it is presented briefly in a long list of other words. However, it will be easily remembered if

3 See, for example, http://www.creativitypost.com/science/how_neuroscience_is_being_used_to_spread_quackery_in_business_and_education#sthash.C8NbFajH.dpuf.

the subject is asked to imagine an elaborate scene featuring a beautifully decorated table in a restaurant where all the waiters are anthropomorphic ducks. This effect is a well-known and robust psychological effect, usually called "levels of processing", first described by Craik and Lockhart in 1972. "Spacing" is the idea that information will be better retained if it is studied for short periods, spaced out over a few days or weeks, rather than intensively studied in a single short period. The spacing effect was in fact first described by Hermann Ebbinghaus in 1885. Neither of these effects needs any reference to neuroscience to make the point.

There are also occasional, often misleading, references to neurotransmitters such as dopamine and norepinephrine. The neuroscientific content seems to be there purely to put a new, modern gloss on ideas stemming from 1970s psychology. This is not to say that it is necessarily bad advice. But these are old ideas, given a slick re-packaging and being sold as brand new.

The public seems to be easily impressed with neuroscience right now, and business leaders do not have the scientific background to adequately critique these ideas. Someone who cloaks themselves in the appearance of academic rigour and promises new thinking based on cutting-edge neuroscience must seem pretty attractive.

Another particularly witless example is a recent article from "Marketing Week", entitled "Neuroscience and marketing: what you need to know" (Bacon, 2014). In reality, the article contains discussion of results from experimental psychology, with no brain-related content at all. In this case, the term "neuroscience" is simply being used to produce a headline that people will be tempted to click on.

Such marketing tactics are not new, and it is hard to get too morally exercised over a group of business people finding a new way of scamming another group. But consider the growth of businesses that target parents, teachers, and schools, using similar language.

Educational neuroscience is a thriving field of research, and there are many excellent and doubtless well-meaning researchers doing rigorous and valuable work in the area. Unfortunately, there are also businesses that want to exploit teachers' lack of experience and middle-class parental anxieties about school attainment.

Education seems to be a fertile area for the development of "neuromyths".[4] We can observe new variants that have flourished in the recent years.

For instance, NeuroNet Learning offers an accreditation program for schools in the United States, provided that the company is allowed to train teachers, implement the system across the school, and use the program at least four days a week. Their website is awash with terms such as "motor-perceptual learning" and "research-based learning readiness". They claim

4 See, for example, http://www.senseaboutscience.org/blog.php/77/neuromyths-and-why-they-persist-in-the-classroom.

their approach is "backed by hundreds of peer-reviewed articles in the world's top scientific journals", and provide a list (http://www.neuronetlearning.com/eng/about/#research). However, the articles they cite turn out to be general papers, only indirectly related to the specific program. On closer inspection, they turn out to consist of articles only vaguely related to their claims, and the readers are left with a specific quasi-scientific discipline that we could call "gamified neuroscience", a consumer-friendly neuroscience, not only useful in offering instant measurable results and solutions, but also full of rules that are very easy to follow.

There is a growing gap between neuroscientists on the one hand, and on the other educators and business people, who are fascinated by modern research, and eager to implement brain-based practice in their work. Measurement of focus and productivity is driven by a hidden claim that people have always wanted to have an easy way to remind themselves daily of what their goals are, and also to have a rough measure of how they are progressing towards those goals. Thus, as Yukti Pro states it, the idea of reporting daily accomplishments not as "time spent", but as "efforts invested" into goals, is suddenly all around[5]. According to the designers of Melon, as well as many other designers of wearable technologies of a similar kind, people become interested in a system which can "positively motivate" them.

These ideas are again supported by positive psychology, which very often becomes the main reference point of those supporting gamified neuroscience. The so-called positivity ratio, also known as the Losada ratio or the Losada line (Losada 2005), is a largely discredited concept in positive psychology, positing an exact ratio of positive to negative emotions which distinguishes "flourishing" people from "languishing" people. A level of 2.9 or above is associated with human flourishing. "Flourishing is associated with dynamics that are nonrepetitive, innovative, highly flexible, and dynamically stable (Fredrickson & Losada 2005). Thus, the purpose of devices that link gamification with neuroscience is to come up with a system which can significantly boost productivity (for instance, as Yukti Pro mentions, by ca. 50%) (Eli, 2013).

Another major theme referred to by gamified neuroscience is "mirror neurons". A company called Yukti Pro, specialising in productivity enhancement, notes in their statement concerning mirror neurons that there are "many interesting implications [of mirror neurons] which anyone can google". For Yukti Pro however, the practical implication is (Eli, 2013) that "watching others progress makes us want to learn, move and do progress ourselves".

Now, the praise does not necessarily have to come from the employer. For instance, as Yukti Pro notes, if I publically log my achievements for the day, the "likes" I get count towards the positivity of my environment. They also suggest that "people do things more eagerly knowing that others see them being heroic". This is precisely where gamification steps in at its purest:

5 http://blog.yuktipro.com/gamification-and-neuroscience-to-boost-productivity-by-50/.

"badges for the team lead to grant". The positive power of receiving recognition is embodied by an electronic badge. "Mirror neurons" will ensure that "if I get a badge and everyone knows why, then it is just and they want badges too".

At the end, Yukti Pro also refers to a par excellence transhumanist claim in its enthusiastic article:

> I wanted to say how we love to use our unique pool of skills building user experiences to help people live better but there is a recently discovered way also to live longer (i.e. to add between 5 to 10 years to your expected life span), which all should learn.

Clearly, gamified neuroscience, they claim, may also be beneficial in lifespan extension and promoting longevity.

Neuroscience as a game?

The most interesting part of the idea behind Melon is the so-called Understood Self. "At Melon", we read:

> we are really interested in the idea of Understood Self, which we are trying to add to the movement of Quantified Self... We want people to have a great feedback system for the data we're capturing, so it can help with the activities users already do day-to-day, go beyond numbers and scores, and move towards insights and understanding (Steadman, 2013).

The backing claim here is that neuroscience helps us to understand the "Self" (a term that remained undefined by the founders), but is nonetheless too obscure and cryptic to be useful. The human-centered design offered by Melon makes it more comprehensible. Now, one needs to remember that in Melon's case neuroscience in its scientific form is actually present. The consumer portable EEG may have its deficits, but it clearly works well enough to effectively measure our brain activity. Melon uses technology that has been widely used in the field of medical research for over a century and thus has every right to establish itself in the good traditions of self-tracking, biocitizenship and DIY health care.

Nonetheless, the use made of it takes us to an entirely different level. The aspect of neuroscience that is used in the portable EEG is different from that which shows us the results. The second is a pragmatic, utilitarian method of tracking in order to alter personal behaviours. The research itself is not worth much if it is not used. Equally, the data is meaningless if it cannot be adapted to routines of discipline and play. Melon architects seem to make a claim here that quantification, gamification and neuroscience can significantly increase focus. Focus means awareness and awareness means enjoying a full experience of activities we engage

in. However, it mostly means productivity – better results in meditation, better results in sport and better results at work. Again, productivity gets linked with collaboration, positive psychology and neuroscience. What we observe here is a simplification of neural images into images that are pleasing to see and that stimulate action at the same time. Neuroscience serves gamification, but also becomes it. It is about motivation, clarification of brain activity, and serves the purpose of understanding and improvement. The designers of Melon tell us that "Melon is about taking invisible information, in this case from your brain, and turning it into something visible and helping change your behavior based on that" (Popolo, 2013).

Neuroscience is gamified here on many different levels. For instance, the user is invited to share his or her ideas about how to use Melon's technology in a new and creative way. The engineers invite the Kickstarter and hacker community at large to promote innovation using the Melon.

It is not enough to say that neuroscience is used to enforce gamification, or allow it to step in. It is actually becoming gamified itself. Pieces of it are taken out to make it a game that is easy to play. It is presented as a science that anyone can google, an activity that anyone can join in with – an activity where this:

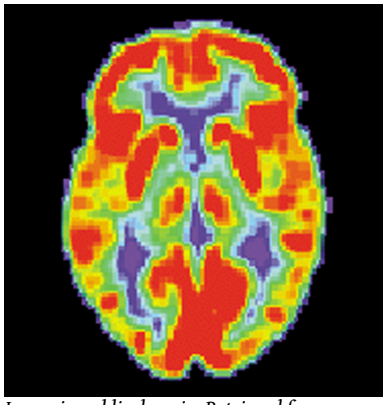


Image in public domain. Retrieved from https://en.wikipedia.org/wiki/Brain_positron_emission_tomography#/media/File:PET_Normal_brain.jpg

becomes this:

Copyright by Melon

This is a major shift in the public perception, but also in the popular scientific direction, of neuroscience. The gap between neuroscience and its public image is growing and becoming more and more frequently exploited in the manner I have just described, in the name of easy fixes and quick gains, based on "proven" research. Melon, insofar as it attempts to use neuroscience in a fruitful manner, may become another device that, instead of developing the neuroscientific scope of interests, simplifies its goals by gamifying and blackboxing it.

References

Bacon, J. (2014). Neuroscience and marketing: what you need to know. Marketing Week. Retrieved 21 September, 2015, from: http://www.marketingweek.com/2014/08/06/neuroscience-and-marketing-what-you-need-to-know/.

Bransford, J. D., Franks, J. J., Morris, C.D., & Stein, B.S. (1979). Some general constraints on learning and memory research. In L.S. Cermak & F.I.M. Craik (Eds.), Levels of processing in human memory (pp.331–354). Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Caillois, Roger. (2001) Man, play, and games. Chicago: University of Illinois Press.

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. Journal of Verbal Learning and Verbal behavior, 11, p. 671-684.

Craik, F.I.M., & Tulving, E. (1975). Depth of processing and the retention of words in episodic memory. Journal of Experimental Psychology: General, 104, p. 268-294.

Debener, et al. (2012). How about taking a low-cost, small, and wireless EEG for a walk. Psychophysiology, 48(11).

Eli. (2013). Gamification and Neuroscience to boost productivity by 50%. YuktiPro blog. Retrieved 21 September, 2015, from: http://blog.yuktipro.com/gamification-and-neuroscience-to-boost-productivity-by-50/.

Eysenck, M. W., Keane, M. T. (1990). Cognitive psychology: a student's handbook. Hove, UK: Lawrence Erlbaum Associates Ltd.

Fredrickson B. L., Losada M. F. (2005). Positive affect and the complex dynamics of human flourishing. American Psychology, 60(7), p. 678–86.

Foucault, M. (1988). The History of Sexuality: The Care of the Self. New York: Vintage Books.

Galloway, A. R. (2004). Protocol: How Control Exists After Decentralization. Cambridge, MA: The MIT Press.

Galloway, A.R. (2006). Gaming: Essays on Algorithmic Culture. Minneapolis, MN: University of Minnesota Press.

Grimes, S. M., Andrew Feenberg. (2009). Rationalizing Play: A Critical Theory of Digital Gaming. The Information Society, 25, p. 105 – 118.

Hacking, I. (1990). The Taming of Chance. Cambridge: Cambridge University Press.

Huizinga, J. (1955). Homo Ludens: A Study of the Play-Element in Culture. Boston, MA: Beacon Press.

Kline, S., N. Dyer-Witheford, and G. de Peuter (2003). Digital Play: The Interaction of Technology, Culture, and Marketing. Montréal: McGill-Queen's University Press.