Our Selves

An imaginary dialogue between brainwaves and smartphones

by Gianmaria Vernetti and Elisa Troglia

Abstract

Our Selves is an audiovisual installation that explores the relation between human brainwaves and smartphone data.

Our Selves creates an immersive visual soundscape and an imaginary conversation between thoughts and smartphone connections data.

The focus of the project is to investigate the notion of technological self, to say how our self changes through the utilization of technology, by creating an immersive digital dialogue.

How it works

All the visual and audio elements of the installation are interconnected. Horizontal lines represent brainwaves associated to excitement and frustration, measured in a lapse of time of 12 hours. Brainwaves data affect the speed (BPM) of audio samples and the amount of glitch and noise. The central sphere changes size according to the network activity of a smartphone, measured in a lapse of time of 12 hours as well. The background varies according to both parameters (brainwaves and smartphone).

On the upper left area of the screen, random phrases are generated according to brainwaves data. The same process applies to smartphone data in the lower right of the screen. Dramatic changes happen when data exceed the standard deviation.

The result is an audiovisual conversation that repeats and changes itself perpetually during a 12 hours cycle.

Conceptual framework: the technological self

Following the spread of smartphones and of the Internet as communication tools, most of all among the youngsters, several shifts emerged.

These transformations have been object of research among different academic areas: science, technology, medicine and psychology studied the consequences, the motivations and the mutations of the daily life of people.

On a psychological point of view we can speak today of real technological identities, that we can call "technological self". Here we would like to define in particular the relationship between the self and the machine, what kind of influences and dynamics happens in the everyday life with the technological tools we all have.

So, how did we arrive to a "technological self" and what kind of dynamics are generated when our identities relate with technology? Internet and smartphones allow people to be here and now everywhere and every time.

Thinking about apps like WhatsApp, the shift from verbal to written and visual communication is considerable: in this way smartphones become a sort of extension of our senses and of their communication opportunities. Smartphones allow the permanent presence of the other, a sort of third always present, the absence of waiting time, the immediacy.

All these aspects create the perception that everything can be at disposal anytime through messages, pictures and videos.

The access to symbolic production is therefore weakened as the wait between desire and realization is completely cancelled, avoiding therefore possible frustrations.

On the basis of these features we can say that contemporary society is the society of the incapability of tolerating frustrations, the society of everything and now, of the absence of the boundaries between private and public dimension.

The absence of boundaries between the self and the other involves deep changes that influence the construction of the identity. "Identity is not only a boundary, but determines at the same time a limitation" (François Ladame, 2004). It is wholesome because it offers a clear dividing line between ourselves and the others, but it represents a strong potential of frustration, because being ourselves does not allow anymore to be someone else at the same time.

Smartphones and the Internet become instead objects of immediate dependence to the other (technological dependence model) that seem to represent the psychological rescue tools against stress of isolation and solitude. "We are facing new and disconcerting mental structures and blurry forms of identity. (These are) sons our times, plunged into a liquid modernity that removes sense and stability" (Tagliagambe, Gli Argonauti, nov 2004).

By using smartphone we can virtually share our experiences with others living far from us, erasing therefore the limits of physical distance. Smartphone becomes often a subjective regulator of the distance and a moderator of separation: they can support proximity between people and instill a feeling of intimacy; on the contrary it is possible, through them, to instill a desire for rupture and refuse.

Although smartphone tends to become a replacement tool for reality that hide the awareness of distance, the uncertainty given by separation is however a tool that allows the relationship condensed in very fast times of contemporary society.

As stated by G. Marrone in his work Corpi sociali (Social bodies) in 2001, "electronic media influence human behaviour by deleting the sense of place from the shared cultural sensibility: boundaries between private and public sphere are lost, genre differences tend to blur, childhood and adulthood are confused, and most of all is assuaged the difference between the physical space and the virtual one. But are always media those who produce the opposite phenomenon: those of infinite fragmentation, of the continual invention of non controllable identities".

Let's analyse now the relationship between the Self and the use of Internet, focusing our attention on the relationship between brain/emotions/machines. In a liquid society composed

of real works and real relationships, the experiences and the emotions that are generated and lived by multimedia contents become interesting sources for psychology as well.

A study published in January 2016 on Computers in Human Behaviour (Panova & Lleras, 2016) better clarified the correlation between the utilization of Internet and mobile devices and psychological problems.

The researchers worked on two separate studies. In the first one they asked 318 students (half men and half women) to fill out a series of self-report questionnaires about the utilization of the Internet, of smartphones, the level of dependency from Internet and the emotive state (anxiety and depression).

The crucial factor seems to be the reason why we act: the tendency to use Internet and smartphone as a way to avoid emotive difficulties positively correlates with the levels of anxiety and depression, while the same cannot be told of the tendency to use these tools to escape from boredom.

In other words, the habit to surf and use the smartphone to avoid negative feelings and disturbing thoughts go with anxiety and depression (disturbing emotions, to say). By choosing to use the same tools to escape from boredom has not particular outcomes in terms of negative emotions.

In the second research, authors used an experimental procedure to evaluate if and how much using Internet and mobile devices reduces the perception of anxiety in the short and medium term.

They told themselves: " If people really rely on these tools in difficult moments to find a way of relief, maybe having the possibility to access them in situations of anxiety can give advantages in the short term, which in turn can cyclically keep the tendency of people to resort to them when they are in difficulty". To test this thesis, they recruited 84 students and submitted them to a task finalized to increase their anxiety: it was been asked them to write a short page about a specific task, telling them that this task would have been then evaluated by two professors that later would have interrogated them.

After having executed the task for five minutes, participants were left alone to wait for ten minutes. Participants had been previously divided in three groups: during these ten minutes the A group had no access to nothing, group B had the access to smartphone and group C had access to a computer but not to Internet.

Before and after the writing of the task and at the end of the ten minutes of waiting all the participants wrote a test to evaluate the anxiety perceived in that specific moment.

What data say? Participants of the group B showed a lesser increase of anxiety following the experimental condition: although there were no differences in the anxiety level perceived before the task time, the participants that had the chance to take the smartphone with them seemed to react in a lesser intense way to the experimental condition. It is like the fact that the having the smartphone with them acted as a Linus' Blanket, moderating the level of anxiety caused by the task.

We must note however that if we analyse how much the anxiety has been diminished after the ten minutes passed in the three conditions, we see that there are not differences in the three groups. To say, for all the three groups it has been noticed a superimposed trend of the

dynamics of anxiety: an increase after ten minutes of stress and a decrease after the ten minutes in the three conditions. Having the possibility to sue the smartphone did not lead to a decrease of the anxiety level compared to the other two conditions.

What can we conclude? This research is really interesting and tells us that having the smartphone at disposal had a sort of protective effect towards anxiety: it did not help participants to calm themselves once the stress had been activated, but paradoxically it decreased the stressful effect of the task.

If we analyse the research on another point of view, however, we could say as well that being deprived of the smartphone makes people more vulnerable to stress, and this explanation works well with the concept of nomophobia, that describes a real and true syndrome of anxiety separation from our smartphone.

It seems therefore that the results exonerate the use of tools such as Internet and smartphone, showing their capacity to reduce negative emotions in the short term; we must be aware however that this behaviour seems to have the same function of the avoidances of conflict.

Escaping from something that puts us in anxiety surely gives us an immediate relief, but in the long term it does not allow us to find more functional strategies to manage emotive component, as is it does not allows us to be familiar with disturbing emotions.

Starting from these premises, our research points the attention on the psychological interpretation of the relationship between humans and technology, focusing ourselves on the reactions of our brain, measured through the neural activity.

At the core of all our thoughts, emotions and feelings there is a communication between neurons inside our brain: brainwaves are in fact the outcomes of the synchronized electric impulses of neural masses communicating between them.

Brainwaves are measured by using sensors positioned on the scalp. They are divided in bandwidth to describe their functions, but are thoughts more as a continual spectrum from slow, strong and functional to fast, slim and complex.

Our brainwaves change depending on what we are doing and how we feel. When the slower brainwaves are dominant we can feel ourselves more tired, slower, lazier or dreamy; while higher frequencies are dominant when we feel vigilant and active.

The following descriptions are really simplified but are useful to understand the basis of the project we realized.

We previously outlined that the speed of the brainwaves changes according to the situation we are living: speed is measured in Hertz and divided in slots that delimitate slow, moderate and fast waves. So there are Alfa, Beta, Theta and Delta waves. Each wave reflects itself a different function of the brain.

The average vibration in wakefulness or consciousness is of about 20 vibrations or cycles per second. Brain frequencies between 14 and 21 cycles per second are called Activity of Beta brainwaves. In this states we relate ourselves with the outer world. The brain perceives and collects the information by using senses and is awake in time and space. Slower vibrations, between 7 and 14 cycles per second, are known as Alfa Brainwaves. This level is associated with creativity, imagination, intuition and daydream.

During Alfa period we think dynamically, to say the mind can asks herself, explore, deduce and create solutions to problems. Our brainwave profile and our everyday experience of the world are indivisible: when our brainwaves are in equilibrium we feel positively.

Our research identified models of brainwaves associated to all the types of emotive and neurological conditions. The overexcitement phase of some brain areas is linked to anxiety and sleep disorders, nightmares, hyper-surveillance, impulsive and aggressive behaviours and anger

The under-excitement phase of some brain areas is linked to depression, attention deficit and insomnia

As a general rule, every process that modifies perception modifies brainwaves. Chemical interventions such as medicines and recreational drugs are the most common methods to alter cerebral functions. Traditional Asian methods include meditation and yoga in order to keep brainwaves balanced.

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Technical notes

Brainwaves have been recorded through EMOTIV Epoc+, a 14-channel mobile EEG.

Data have been collected through OSC and then analysed through a custom Max/MSP patch.

Smartphone data have been collected through OS Monitor app.

The entire project has been developed in Processing (Processing.org).

The full Processing sketch is available here.

The sketch is licensed under Creative Commons 4.0 International.

A special acknowledgement to all the Processing community.

Biography:

Gianmaria Vernetti is a media and sound designer working at the edge between art and technology. He works as journalist and communication consultant.

Elisa Troglia is a certified psychologist and psychoterapist. Graduated from Universite' de la Valle'e d'Aoste (Italy) in Psychodinamic Orientation, she works as freelance psychotherapist.