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Neuroscience and change. Practical applications to promote change in the company

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1. The brain dimensions of change

Change is a structural aspect of our brain. The ability to change and to adapt to the environment is undoubtedly one of the most important attitudes for the survival and evolution of the human species, and, never as today, the daily challenges we face require different strategies of thought and alternatives to manage changes.

The brain is constantly committed to managing two antithetical programs: on the one hand, the imperative of the minimum possible effort and the maintenance of homeostasis, on the other hand, the exploration and search for the novelty and the prediction of the future (Gazzaniga, Ivry, & Magnun, 2015).

From a neurophysiological perspective, the processes of the change mainly involve two structures of the cerebral cortex: the dorsal and ventral systems (Balconi, 2013).

Individuals learn in a slow and sequential way thanks to the dorsal system (including the parietal and frontal cortex), the ground of functions such as consciousness, self-control, and self-observation, while in the ventral system (orbitofrontal cortex) all the automatic processes take place, which do not require the intervention of consciousness and that occur very quickly (although not without errors). The dynamic relationship between these two systems is maintained over time with constant oscillations between critical-analytical skills, and automatic-spontaneous processes, generating our behaviors that are often affected by these internal contradictions (Zapelli, 2020).

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Within this framework, curiosity, intentionality, and pleasure are the fuel to feed the fire for change. In particular, this activation happens thanks to dopamine, the elitist neurotransmitter that allows us to acquire new behaviours by activating the reward circuit (Balconi, 2009). The presence of dopamine makes us feel focused and positive. Severe lack of dopamine, on the contrary, causes several problems: it reduces our desire to do something meaningful and has a negative impact on our ability to think creatively (Scarlett, 2016). For this reason, to change a habit, it is essential that people are constructively included in the processes, and that they internalized those processes, in order to create novel "virtuous circuits" for themselves and the organization (Balconi & Molteni, 2016).

However, although change is a foundational behavior of survival, the brain does not appreciate it. Our mind loves to have everything under control, with the full set of information needed to prevent threats and make decisions quickly. Uncertainty generates a sort of "error message" in our brain and a state of immediate alertness and defence that makes us recall the most primitive defence mechanisms: fight, flight and freezing (Hsu, Bhatt, Adolphs, Tranel, & Camerer, 2005). When a threat is perceived, the threat circuit is activated through the stress hormones, cortisol and adrenaline, which gather the attention towards the danger, concentrates the energies for possible defence and reduces the cognitive and emotional resources available to do everything else, including the previously welcome change and innovation (Balconi, Falbo, & Conte, 2012). Uncertainty also distorts our view of threats and can make them seem worse than they are. When individuals feel insecure, they are more likely to expect the worst and this makes uncertainty even more stressful (Kahneman, 2013).

In this sense, individuals need a "container" that preserves what is known and familiar and to create routine patterns that no longer require the use of a vigilant conscience (Cocco, 2014). To reach an actual transformation of our nervous system is therefore often a burden that we are not willing to face and that requires great discipline (Becker & Cropanzano, 2010). For this reason, for example, everything that is recursive and serial becomes physiologically necessary to reassure and help the individual to build "the frame" in which to enter, that is the basis for learning and changing because this frame is constant and can reduce the need for vigilance and therefore the waste of mental energy (Slovic, Finucane, Peters, & MacGregor, 2004). This is also the reason why it is very difficult to promote change in the organizations and we learn what we are already predisposed to learn, since it is linear and consistent both with existing structures, with what we have already known and learned before.

In other words, there is an actual change at the individual and neurophysiological level only if needed, and if it does not cost too much effort; since this is the natural predisposition of our brain, unless an event contrasts it (Gazzaniga et al., 2015). If the implicit dimensions of change that generate unconscious bias and cognitive distortion are underestimated, all the rational efforts to propose a change in individuals become useless (Damasio, 2008).

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2. Promoting change in the company

2.1 Models and theory

But what can facilitate change, conceived as a necessary step to face daily challenges?

There are many theories on change promotion proposed by psychologists and neuroscientists over the years (Kotter, 2012). In particular, neuroscience offers methodologies that allow us to analyze even the implicit, automatic, and unaware dimensions of our behavior, and therefore to make significant progress in research (Deppe, Schwindt, Kugel, Plassmann, & Kenning, 2005).

If we consider, for instance, the SCARF application model proposed by David Rock (2008), it represents a series of behavioral dimensions that can help leaders promote change by supporting the ancestral needs of our brain: Status, Certainty, Autonomy, Relationship and Fairness (SCARF). In extreme synthesis, the human being tends to self-preservation (Certainty) but is also pushed to his self-realization through the achievement of objectives and goals (Status) to be achieved possibly by having control of his means (Autonomy) and staying within of a community (Relationship) that requires Equity as a basic rule of coexistence. These are the necessary conditions well-known at a theoretical level, but that we find very difficult to control in our daily working life. For example, within this framework, we usually tend to underestimate our brain's need for social connections to cope with change (Rizzolatti & Vozza, 2007).

Historically, organizations have focused on developing plans, strategies, monitoring financial data, and have given little weight to the skills of nurturing relationships. Although it was evident that the numerous failures were due precisely to non-involvement (i.e., exclusion) of human resources, that caused resistance and detachment of the guidelines.

Neuroscience and social sciences provide us with many elements to understand the logic of the social brain and the effects of exclusion from groups and decisions. Understanding the social brain is crucial to the success of organizations.

Working in a team increases collective intelligence, the propensity for change, and the capacity for resilience when facing complex challenges (Balconi, 2008). According to some studies, social exclusion even leads to a 25% decrease in Intelligent Quotient (IQ): people work more slowly, perform less in memory tests, with less persistence and control, and fewer correct responses are achieved in IQ tests (Salati & Leoni, 2015).

It can be said that change occurs much more easily through and thanks to the relationships. For instance, considering the personal change that an individual consciously chooses to face: if the intention is authentic, the comparison with the other is necessary. Humans are social animals that learn by imitation and modelling and live constantly immersed in the relationships, as the discovery of mirror neurons has shown us (Rizzolatti, Fogassi, & Gallese, 2001). In this sense, organizations are already experiencing the collateral damage caused by the lockdown period during the COVID-19 pandemic when this relational dimension was forcibly interrupted, leading to emotional distancing,

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rigidity, and selfish behaviours whose consequences have not yet been measured in the organizational environments. Before asking for change, a communitarian dimension nourished by the mutual trust should be rebuilt as a necessary premise for any transformation (Rizzolatti & Sinigaglia, 2006).

Another element that neuroscience suggests to the organizational field to consider when developing strategies to promote change is the centrality of the body.

The body is our first learning generator, it is the thermometer of our emotions and every reaction. There is no actual change except through concrete experience and active first-person experimentation. As Kolb (1984) explains "in the dynamics of learning, operational grounding is a condition and consequence of the entire cycle of knowledge acquisition". Experience and constancy in training allow an individual to create and stabilize new brain circuits that correspond to bodily changes and new synaptic connections between neurons.

Therefore, saying that the brain is plastic means that it is also possible to change our automatisms, thus modifying the synapses, the connections that bind the networks of neurons, and produce our spontaneous responses through experience.

These changes will be even more significant based on the emotional relevance they have for us. For example, living a traumatizing experience may leave an indelible trace that will influence our behaviors, determining our identity with an experiential map that is more sensitive to pain than to pleasure, albeit fundamental (Hari & Kujala, 2009). The cognitive part, in a process of change, is, therefore, the last and is the one that performs the operations of fixing knowledge, after the steps of bodily experimentation and emotional processing (Bara, 2015).

In conclusion, it seems clear that when coping with change, individuals must have a greater knowledge of these subjective and deep mechanisms in order to consequently plan a change calibrated on his/her internal resistances, that is mainly derived from previous experiences (Venturella & Crivelli, 2017). Organizations are required to face a complex challenge: to set the most appropriate change settings according to the learning methods of our brain. In the next section, some useful examples of experimental applications recently carried out to promote change in the Azienda Trasporti Milanesi (ATM) company will be briefly described.

ATM company is the municipal public transport company of the city of Milan and surrounding metropolitan municipalities. This company took part in several neuroscientific experimental protocols dedicated to the growth and enhancement of its human resources in the past few years.

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3. Experimental applications in the company

3.1 The ATM Training Gym

Here a brief description of a training experiment, known as the ATM Training Gym, will be provided. The ATM Training Gym is a five-year educational path based on the neuroscientific system of repetition, constancy, experientiality, and fun aimed at reinforcing managerial soft skills (such as negotiation, self-empowerment, feedback management). It consists of training with a total duration of 2 months, divided into micro sessions of around 2 hours each, which uses active methodologies and alternates plenary sessions with individual and peer coaching (which helps a lot to keep the focus on the goal through a sort of "social control" where the will of the individual falters).

This teaching methodology has increased of the 21% the required positive behaviors (the training courses targets) of the participants on a representative sample of the managerial population composed of 295 people. This observation was carried out through the annual performance evaluation.

3.2 The case of Storytelling

Another strategy and setting implemented to identify personal internal resistance to change and that has been developed in the training field was storytelling (Fontana, 2009). Individuals activate thinking and storing processes through stories that generate tuning (i.e., neural coupling) and mirroring between speaker-listener brains.

In our company, a storytelling protocol dedicated to managers involved the collection of made-up stories where the characters represented moments of positive, negative, and enabling factors experienced by individuals. Through the metaphorical transposition, the participants were able to understand and face the fears generated by the change and shared possible solutions with the other participants, firstly through mirroring processes developed first in pairs, and then in plenary (Rizzolatti & Fabbri-Destro, 2008).

A systemic reading of the stories also promoted the reconstruction of some distinctive features of the organization's culture and the development of additional integrated change management actions (Schein, 2000).

3.3 A neurocognitive enhancement protocol with mindfulness-based neurofeedback

A further practical application to promote change in the company regards the research conducted in partnership with the Catholic University of Milan, Italy, and adopting neuroscientific innovative methodologies. The goal was to test the potential impact of mindfulness-based interventions (MBI) supported by neurofeedback wearable devices on work performance.

Awareness based practices (MBI) were experienced daily for a significant period of

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time and were supported by a portable neurofeedback device that monitored brain activity in real-time. This system works through an electroencephalogram (EEG) connected to an App for the smartphone. The App provides mindfulness exercises and, thanks to the neurofeedback system, gives back informative feedback on brain activity status on the smartphone screen. Overall, the protocol envisaged a 2-week training consisting of short daily practice sessions of 10 to 15 minutes of psychophysical relaxation (14 sessions in all) with immediate feedback via the device.

Initial, intermediate, and final assessments were then carried out to measure the psychometric variations of the participants at logic and reactivity tests. The result of the introduction of this practice has given satisfactory results: the levels of stress, fatigue, and anger management have undergone a significant decrease with a consequent increase in the level of engagement and an increase in the ability to achieve performance.

Collateral outputs, but not less important from an organizational point of view, were the creation of a "community of practice" that shared a new language and new methodologies to deal with situations of work stress with an increased sense of membership towards the company. This relational climate lays the foundations for a multilevel individual (neurophysiological and behavioral) and collective change in the company.

3.4 Managerial training for change management

Recently, a new experimental application was carried out during the Neuroscience and Change training course, which aimed to develop the awareness of our automatic and defensive behaviors during change management.

Through dedicated sessions, the participants were able to directly verify, through neuroscientific tools (such as EEG assessment), how neurons organize themselves in synchrony while facing a task requiring cooperation or competition (Balconi, Pezard, Nandrino, & Vanutelli, 2017; Balconi & Vanutelli, 2017, 2018). This applied experience highlighted how interactions, relationships, and cooperation are fundamental to improve the performance. During the course, managers had also the chance to perform a Cyberball task experiment, which is a computerized task adopted to directly experience social exclusion effects.

Furthermore, through the experimentation of a "rigged bike", which moves the handlebar by orienting the wheel from the opposite side in a counterintuitive way, the dominance of learned automatisms was experienced, which only intention and tenacity in exercise can counter. Following the trial, the performance evaluation of the first sample of managers considered (a total of 20 managers) recorded an increase in change management skills of approximately 15%.

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3.5 Nudge

Finally, to help change in organizations, the system of nudge can be considered a valid option (Sunstein & Thaler, 2008). Nudge is an architecture of virtuous "pre-set" choices that facilitate people, without great effort, to choose positive behaviors through small stimuli, reminders, and simplifications.

An example of nudge can be seen in all the communications that were studied and applied in Italy by ATM during the COVID-19 crisis to help customers keep their distance on means of transport. This was promoted by a set of few actions: by asking the users to place themselves on some dots on the ground (horizontal signs) positioned in front of the means of transport doors, to follow pre-set entry and exit routes with easily recognizable color codes, codifiable, and which reminded to stick to their safety or that of family members (such as grandparents).

The frontier of behavioral economics, in this sense, offers great opportunities that have not yet been explored to create new effective change management scenarios.

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