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Trusting brains, rewarding brains: from trust to promise

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1. Between trust and empathy: performance and well-being

Trust is a central part of all human relationships, including romantic partnerships, family life, business, politics, and so on. But what is trust? Here are some possibilities for a preliminary definition:

1. Trust is a *set of behaviors*, such as acting in ways that is related to another.
2. Trust is a *belief* in a probability that a person will behave in certain ways.
3. Trust is an *abstract mental attitude* toward a belief that someone is dependable.
4. Trust is a *feeling* of confidence and security that a person care.
5. Trust is a *complex neural process* that binds diverse representations into a semantic pointer that includes believes and emotions.

The trusting behavior can be represented as a basic need for humans to bond, relate, and develop supportive social relationships with others. Trust affects an organization's ability to accomplish its objectives because it acts as a social lubricant, easing the social interactions necessary to meet strategic goals (Zak & Knack, 2001). It is possible to identify the constituent factors that can be used to create high trust in organizations. That is, there a need for organizations to implement management policies, procedures, and systems that enhance trust. Our data show that trust substantially boosts an organization's performance, employee engagement, retention, and well-being. Indeed, organizational culture (how a group of people transmits norms of behavior and values to others) is often thought to be fixed, but extensive research shows that it changes as people learn and their

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environment evolves (McElreath & Henrich, 2007).

The neuroscientific approach demonstrated that organizations that sustain a high level of trust have substantially greater engagement by colleagues. This indicates that organizational trust should be considered a valuable asset that can be measured and managed to sustain a competitive advantage over rivals. Thus, we may apply this knowledge to quantify how organizations and leadership practices can directly influence trust among individuals at work. Indeed, our sociality and common life in organizations require two key factors: (a) specifying a joint objective and (b) sufficient trust among group members (Barraza & Zak, 2013). Although objectives are organization-specific, designing policies to promote trust is generalizable across organizations.

We have observed that our emotions often motivate us to behave in certain ways at an unconscious level (Zajonc, 1998) and appear to actually have an impact on individuals physically, such as with changes in heart rates (Cacioppo, Berntson, Larsen, Poehlmann, & Ito, 2000). For example, if a person is angry, he/she might show aggressive behavior. A person who is fearful might try to escape a dangerous situation (Camerer, Loewenstein, & Prelec, 2005). Affective processes leading to go/no-go decisions, such as approaching or avoiding a particular situation, may be due to how the individual feels about that situation (Zajonc, 1998).

One possible unconscious affective state is trust. Research on trust suggests that venture capitalists, when reading entrepreneurial business plans, might be making investment decisions based on more than just the financial factors of the business, such as expected internal rates of return. This lack of insight and the speed in which managers make judgments about a business after reading a business plan suggests that an automatic process is occurring. Neuroscientific research would support this idea as well. The brain, in trying to increase processing efficiency, appears to automate complex processes as often as possible. If this process is automated, venture capitalists would not be aware of the heuristics they use.

Trust occurs not just among people who have known each other for a long time, but also among strangers or brief acquaintances (Zak, 2005). Travelers trust the airline pilot to get them safely to their destination despite not knowing anything about the pilot or the pilot's experience. This trust is important in many ways. It aids in economic growth by reducing transaction costs and in investment decisions. However, it is demonstrated that more homogeneous groups – ones similar in ethnicity, income, education, language and so on – are also more likely to trust one another than groups that are more heterogeneous.

However, trust could require two main behavioral constructs to be operative: prosocial behavior; the empathic concerns.

In particular, several studies have investigated the factors involved in the implementation of prosocial behavior, which are related to individual, emotional and social variables (Balconi & Terenzi, 2012; Carlo, Hausmann, Christiansen, & Randall, 2003; Neff, Turiel, & Anshel, 2002). Specifically, prosocial behavior appears to be supported by psychophysiological emotional reactivity and the ability to empathize

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(Balconi & Pozzoli, 2005; Batson, 2009; Lamm, Batson, & Decety, 2007). Prosocial behavior, indeed, is closely correlated with the ability to empathize with other people's emotions by adopting behavior in line with the latter (Balconi & Bortolotti, 2012; Balconi, Bortolotti, & Gonzaga, 2011; Spinella, 2005). The empathic reactivity, therefore, turns out to be a fundamental factor at the prosocial behavior, consisting of providing one's own help or support to another individual (Balconi & Canavesio, 2013a). Furthermore, the implementation of prosocial behavior appears to have beneficial effects on individuals by increasing social connection and strengthening interpersonal relationships (Nummenmaa et al., 2012). Furthermore, prosocial behavior appears to increase cooperation and attunement between individuals (Balconi & Canavesio, 2013b; Balconi, Fronda, & Vanutelli, 2019, 2020). Indeed, during the implementation of prosocial behavior, behavioral coordination between individuals increases through brain-to-brain coupling mechanisms (Nowak & Sigmund, 2005).

Some studies have also investigated the effects of prosocial behavior on strengthening interpersonal relationships and on tuning mechanisms. In particular, Balconi and colleagues (2019, 2020) have observed the effects of a gift exchange between two individuals involved in a cooperative interaction requiring the carrying out of an attentional task. In particular, this study aimed to observe the effects of prosocial behavior on cooperation levels and brain, peripheral, and behavioral individuals' tuning. This evidence suggests the importance of prosocial behavior in all social contexts, such as working environments. For example, in working contexts, leaders should see themselves as information aggregation devices. One can effectively manage people only if one is responsive to them behaviorally and emotionally. It allows you to 'read' people and appropriately anticipate what they will do and what they need rather than waiting until all this is laid out (which might never occur). Empathy promotes trust and efficiency because employees' needs are met and uncertainty is reduced. Employees rate empathy as one of the most important attributes in an effective leader (Macaluso, 2003).

The necessity of empathy also runs in the other direction, from employees to managers. When leaders transparently communicate the needs of the organization, then empathy and a desire to cooperate to reach the organization's goals is produced.

The ability to monitor and regulate emotional processes is a part of the functional model of empathic behavior (Chauhan, Mathias, & Critchley, 2008) including emotional resonance processes. Empathy, specifically, consists of an affective response to another individual's emotional state (Decety & Jackson, 2006; Preston & de Waal, 2002). So emotional behavior and the ability to recognize emotions are the basis of empathy (Decety & Svetlova, 2012). Several studies have observed the link between empathy and recognition of emotions through facial mimicry (Balconi et al., 2011; Balconi & Bortolotti, 2013; Balconi & Canavesio, 2013, 2016). Indeed, it has been shown that the recognition of emotions expressed through the face represents a fundamental component of empathic behavior (Balconi, Brambilla, & Falbo, 2009; Dimberg, Thunberg, & Elmehed, 2000). In most cases, indeed, individuals are able to understand others'

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emotional state by reading their facial expressions (Balconi et al., 2011; Balconi & Pozzoli, 2009). In this regard, several studies have demonstrated the existence of a direct relationship between empathy traits and the recognition of facial expressions (Balconi & Canavesio 2013, 2016). According to what emerged from these studies, individuals with high levels of empathy have a better ability to recognize facial expressions, which are processed faster (Balconi & Bortolotti 2012; Goldman & Shiripada, 2005).

2. Hormones of trust

The role of a brain chemical that produces the "prosocial attitude" effect is directly related to oxytocin (OT) (Barraza & Zak, 2013). In a more than decade's worth of human experiments it was shown that OT is the biological basis for the principle "If you treat me well, my brain will synthesize OT, and this will motivate me to reciprocate". The brain's production of OT, combined with its effects on the central and peripheral nervous systems, motivates voluntary cooperation. Furthermore, OT makes it feel good to cooperate with others. Leadership practices and organizational policies, systems, and processes affect interpersonal interactions that either facilitate or inhibit OT release.

However, it was also demonstrated that OT is the also the neurochemical substrate of empathy. More specifically neurobiological substrates of empathy and trust are associated with the synthesis of OT and activation of a brain circuit using OT receptors. By simulating how another feels, OT produces more effective cooperation among social creatures such as humans.

But how do we know this? The impact of OT on reciprocity and trust has been largely studied using sequential cooperative dilemmas such as the trust game (TG; Berg, Dickhaut, & McCabe, 1995). OT increases prosocial behaviors such as trust because it enhances the subjective experience of empathy. As we have previously underlined, there are two distinct components of empathy (Balconi & Bortolotti, 2013; Balconi & Canavesio, 2013b, 2016), that is cognitive and emotional parts, that we can summarize in this threefold perspective: empathic distress, empathic concern (compassion), and perspective-taking (the process of inferring the mental state of others). The former two are associated with affective states whereas the latter is believed to be a primarily cognitive process. Empathic distress is characterized by reactive and aversive feelings (e.g., worry, anxiety, and discomfort).

Singer and colleagues (2008) tested the effects of OT on the experience of empathy using the empathy-for-pain paradigm and subsequent behavior in the TG. Participants intranasally received either 24 IU of OT or a placebo before watching someone have pain induced or having the pain themselves and then made decisions in the TG. The authors found that OT did not affect brain activation in regions previously found to be associated with empathy (e.g., anterior insula) for self-experienced pain or for other-witnessed pain.

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The authors concluded that OT does not promote empathy; however, as we can see this result only applies to one particular kind of empathy, that is empathic distress. In contrast, empathic concern, and not empathic distress, is associated with endogenous OT release (Barraza & Zak, 2009). OT also appears to affect the perspective-taking aspect of empathy. Recently was tested if OT affected performance on the "Reading the Mind in the Eyes" (RMET), a task that measures the ability to read emotional states in others. It was found that OT appears to be dysregulated in individuals with social anxiety and borderline personality disorders as well as in those with trait aggressiveness who demonstrate in-group bias instead of cooperation (Zak, 2012).

Oxytocin release is not consciously controlled but responds to the social and organizational environment in which we find ourselves. Indeed, neuroeconomics experiments have produced a solid understanding of the situations in which oxytocin is released by the brain and its effect on peoples' behaviors. Oxytocin reduces anxiety and motivates us to engage with others to achieve win–win solutions. Our research indicates that a high-trust, high-oxytocin environment is the foundation for an effective and well-functioning organization. If one thinks of for- and non-profit organizations as simply individuals working together to achieve common goals, the crucial role of trust becomes apparent. Managers can increase the likelihood of meeting organizational goals by actively managing an organization's trust, the platform on which employees interact with each other and with clients.

3. How to increase trust in organization

The possibility of supporting and reinforcing trust behavior in organizational contexts is based on some processes that involve managers in a role of promoters of organizational well-being, development of cohesion and positive stimuli for the strengthening of individual and collective resources. A recent model (Zak, 2017) has highlighted the role of these factors (Figure 1).

In particular, *explicit recognitions* (referred to as "ovation") were emphasized, which allows for the ability to recognize individuals' successes adequately. Indeed, being recognized by others induces OT synthesis and causes the brain's reinforcement learning chemical, dopamine, to be released (Skuse & Gallagher, 2009). By itself, dopamine rewards us for attending to anything new in our environment and establishes pathways in the brain through which this new knowledge can be accessed in the future. Dopaminergic learning essentially says, "This is important, remember it, and do it in the future."

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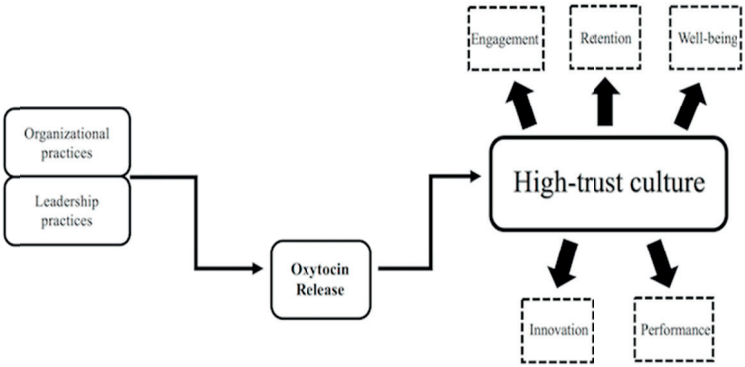

Figure 1. Representation of Zak model of high-trust culture

Expectations also play a prominent role. The latter occur when colleagues face challenges as a group. Group challenges stimulate the release of OT and build trust among team members. Neurobiology tells us why designing challenges are important. Similar to all biological systems, the brain is also an economical system: it saves energy by only producing neurochemicals such as OT when they are needed (Zak, 2014). This means without a pressing reason to work as a team, OT release is less likely to occur, thereby inhibiting effective cooperation. However, any old challenge will not do. Managers need to set hard but achievable expectations to stimulate colleagues' brains to synthesize OT. At the same time, managers should not set impossible goals. Threat stressors inhibit OT through the release of a neurochemical called epinephrine.

Challenges will devolve into chronic stress unless objectives are clear and have concrete end points. The key components of expectation are goals that are achievable with sufficient effort, concrete, and time limited. After setting expectations, leaders need to provide feedback often. If targets are not being met, then leaders should work with team members to help them reach their goals (for example, reallocating resources or developing a revised implementation plan). If the goal is met, then return to the first factor of ovation to stimulate OT release.

In addition, *yield* occurs when colleagues choose how to perform a task. Yield fundamentally comes down to accepting different methods of execution, facilitating control, and minimizing the perception of high workload demands. It enhances one's

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control at work and fosters a culture in which mistakes are viewed as learning opportunities. By providing a reason to engage with colleagues, it promotes OT release.

When colleagues have the appropriate training and experience to complete a project, it allows them to commit to goals by taking ownership of the outcome. This generates variation in business processes. As a result, yield permits business processes to be crowd-sourced for innovation.

Another relevant factor for trusting behavior is *transfer ability*, which enables self-management by permitting colleagues to choose which projects they work on. By enabling development of mastery over a set of skills, it effectively utilizes the full range of colleagues' expertise and experience. It also decreases the stress of uncertainty and provides a motivation to build teams to complete projects (Zak, 2014). In this way, it reduces chronic stress and increases the likelihood of OT release, building trust. A meta-analysis of 114 studies with more than 20,000 participants confirmed that high levels of autonomy, self-efficacy, and empowerment increase job satisfaction, customer service, job attendance, and commitment. It was also underline that openness occurs when information is broadly shared with colleagues. Open and candid communications promote trustworthiness by reducing fear and uncertainty about the organization's strategies and plans. Openness circumvents leaks by providing colleagues with timely information.

However, high levels of engagement at work require more than just professional development; one must also be growing personally. If one's personal life is dysfunctional, then the ability to bring one's full energy and passion at work will be inhibited. As a result, high-trust organizations invest in the whole person, subsidizing opportunities for professional and personal growth and measuring if these are occurring. When organizations invest in the professional growth and development of colleagues, it a powerful signal of trust. It was shown that high-invest organizations retain talented team members longer (Zak, 2017). We have also to consider that being natural demands that leaders not only talk about trust but are trustworthy themselves. Rather than dictate to others, natural leaders ask for help, solicit opinions, and when a decision is made they embrace outcomes whether the result is positive or negative. Experiments have shown that being vulnerable releases OT in observers (Zak, Kurzban, & Matzner 2004, 2005). This neurochemical response causes people to want to help (Zak, 2012). Indeed, asking for help from volunteer colleagues is the first step to being a natural leader. Trust is not earned by dictating orders to subordinates; rather, it depends on engaging volunteers for organizational success. A leader cannot force an organization to be successful, but he can set goals, nurture the culture, and provide the resources needed for success. The second aspect of natural leaders is allowing one's imperfections to show.

In addition, revealing one's imperfections generally makes leaders more likable, empathetic, and able to be forgiven when mistakes are made. However, an important caveat is that leaders who show vulnerabilities engender trust only if they are perceived as being competent. Incompetent leaders who ask for help from others undermine people's perception of their reliability and integrity. This means that, during a major crisis, leaders

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may have to demand changes, but in nearly every other situation, admitting that you do not have all of the answers is an effective way to both build trust with one's team and engage colleagues in reaching the organization's goals.

When trust is low, people focus their energy on their own protection and survival, with fear their primary motivator. Instead of focusing on innovation and excellence, scarce mental resources are spent on vigilance, safety, and survival. The human brain is resource constrained and quickly adapts to the environment we find ourselves in, creating behavioral biases that can be hard to break. In high-trust environments people can productively and respectfully discuss and resolve issues, whereas in low-trust environments conflict is arbitrated institutionally in a slow and costly manner.

For example, managers who amass critiques to unload during annual reviews create an environment of surveillance for employees who sense that their errors are being tabulated. On the other hand, managers who provide constructive on- the- spot feedback let people know where they stand and permit on- the- spot corrections.

We have also to consider that the essence of trust is the *empowerment* of others.

You can do this by distributing tasks to others that are within their realm of interest and expertise. Managers should do this personally whenever possible to maximize the impact of oxytocin release on motivation to achieve a goal. A leader cannot 'cut and run' when delegating but must provide the resources and tools needed to hit the mark.

High degrees of *autonomy* are associated with greater productivity and employee morale. In a landmark study of British civil servants those with less autonomy had a three old increase in mortality and substantially higher rates of cardiovascular disease. A lack of autonomy has been shown to raise Type I stress. The primary human stress hormone, cortisol, initiates the cascade of factors that damage the heart and other organs. Cortisol suppresses oxytocin and, you guessed it, reduces interpersonal trust.

Autonomy works because rather than being the innately selfish homo economicus research shows that human beings are more accurately described as homo reciprocans, or reciprocal creatures. You cannot get someone to trust you unless you first give them your trust. That is just the way the human brain works. People trust those who trust them, and distrust those who distrust them.

4. The role of dopamine as a reward in bonds

However, in addition to OT, the trusting behavior can be favored by reinforces, such as rewarding conditions. In that case a second type of hormones is implicated, that is *dopamine*. Specifically, in decision-making conditions, this hormone is highly relevant. In fact, the current research from neuroeconomics, psychology and neuroscience has shown that there are three interconnected but nevertheless distinct decision-making systems in the human brain: (1) an unconscious, intuitive and emotional system mediated mainly by

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midbrain regions such as the ventral striatum, the insula and the amygdala; (2) a conscious, rational system or 'executive function', mediated principally in the orbitofrontal cortex; (3) a system of habitual behavior that is either preprogrammed genetically or developed into habits over time. Dopamine is the principal neurotransmitter that is involved in these three systems, so analyzing its role in individual decision-making in the organization is critical. The reward system, which governs our valuation of expected rewards, is mediated by the neurotransmitter dopamine and has been well studied (Knutson & Cooper, 2005).

It governs the expectations as well as the pleasures of eating and drinking, investment behavior, mate seeking, the value coding of goals and the search for novelty.

From an evolutionary point of view, the reward system makes us want to acquire things or perform actions that are positive for our maintenance as organisms. More importantly, the wanting feeling is scalable according to the functional proximity of the positive action and the potential for reproduction as an example.

The second motivational circuit in the limbic system motivates us to avoid loss and is triggered by perceived threats or danger (Taylor et al., 2006). The structures in this system include the anterior insula, which registers pain and disgust; the amygdala, which processes emotions; the hippocampus, the center of memory processing and fixating; and the hypothalamus, which secretes hormones to activate physiological responses. Anxiety, fear and panic are all triggered in the loss/avoidance system. These emotions have correlating cognitive thoughts of pessimism and worry.

An adjunctive relevant aspect to be considered is also the intrinsic necessity to maintain an *homeostatic balance*, in addition to rewarding condition. Indeed, we may suppose that the entire decision-making system of individuals is a homeostatic system (Camerer et al., 2005; Oswold, 1997; Paulus, 2007; Schultz & Dickinson, 2000). It is useful in the case of the reward/loss system to view it as a homeostatic system. Studies show the simultaneous activation of both these neural networks until threshold activation is passed and the individual chooses the approach or avoidance action.

The brain's dopamine reward system is associated with motivation and drive to obtain goals. Rewards should be public and immediate but need not be large. The dopamine system is driven by novelty, so change rewards often (Schultz, 2002). Although it is important to maintain consistency with traditions, such as holiday parties and bonuses, even these are better if they vary from year to year.

However, human scale not only engages our empathy but also motivates people to voluntarily donate money to help others. This is important because all organizations have a "transcendent purpose." In other words, an organization improves the lives of its employees, customers, and society. That is, management is not culture-free. It is a social function. It is, therefore, both socially accountable and culturally embedded and business always has a transcendent purpose that is necessarily broader than its transactional purpose.

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5. Beyond oxytocin and dopamine: the value of the promises

Recent research has pointed out that trust could be founded on another important pillar of our behavior, that is *promise*. Long before complex social and legal systems came into existence, promise had become one of the most effective means to establish social contracts in the society, which orally guaranteed the occurrence of certain acts afterwards.

Generally speaking, since keeping one's word is regarded as a potent social norm, promise transfers the information of a person's trustworthiness.

Even in the early human society, some basic forms of cooperative agreements already existed to maintain prosocial connections like trust and cooperation. As one of these primitive agreements, promise is expressed orally and is non-binding in nature, which aims to convey the information that one is trustworthy and reliable to other partners in social interactions. Despite its non-enforceable nature, in the contemporary society, a large number of social exchanges still rely on such oral commitments, mainly due to its simple, valid and efficient features.

In the field of behavioral and experimental economics, trust game (TG) was designed to investigate people's trust and cooperative behaviors as well as various factors contributing to the trust of investors. Trust game is a one-shot game between two anonymous players, an investor and a trustee. The investor is firstly assigned with some tokens and can choose to keep all of them or invest some of the endowment to the trustee. The tokens invested to trustee are multiplied. Then the privilege goes to trustee who can choose to keep all the multiplied tokens or pay certain amount back to the investor. In the one-shot TG experimental setting, factors such as reputation, revenge and punishment do not come into play to affect any players' monetary payoffs in a direct manner. Thus, theoretically, there is no economical reason for a rational trustee to reciprocate. Based on such a belief, the Nash equilibrium is that the investor chooses to keep all the endowed tokens and not to invest them. However, contrary to the prediction of classical game theory, previous studies showed that, most of the investors did invest considerable amounts, and many trustees did manifest certain degree of reciprocity (Declerck, Boone, & Emonds, 2013). Therefore, we can safely conclude that social preference factors like trust and trustworthiness might play vital roles in such scenarios.

One pioneering neuroimaging study has examined the neural correlates of promise keeping and promise breaking from the perspective of trustees (Baumgartner, Fischbacher, Feierabend, Lutz, & Fehr, 2009). It is discovered that breach of promise leads to increased activation in the dorsal lateral prefrontal cortex (DLPFC), anterior cingulate cortex (ACC) and amygdala, which indicates that breaking the promise involves an emotional conflict over social norm obedience. In addition, the breach of promise can be predicted by brain activation in anterior insula, ACC and inferior frontal gyrus during promise making, suggesting that malevolence can be reflected in the brain pattern long before the action actually takes place. However, up to now, rare do we know about how sticking to the promise and violation of it would be evaluated and experienced from the perspective of

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investors. In a recent study (Ma et al., 2014), Event-related Potentials (ERPs) were adopted to track the temporal dynamics of brain activity during outcome evaluation resulted from the fulfillment of commitment and the breach of promise. Feedback-related Negativity (FRN) is the negative deflection peaking around the 250–350 ms period upon feedback presentation, which shows maximum amplitude over medial frontal cortex. Because FRN is often found to reflect various aspects of the outcome, especially outcome valence, it is adopted to examine reward processing as the result of reciprocity or nonreciprocity. Behavioral results indicated that promise could effectively increase the investment frequency of investors and EEG results showed that, promise induced larger differentiated-FRN responses to the reward and non-reward discrepancy.

Taken together, these results suggested that promise would promote cooperative behavior and that trusting brains need to believe in reciprocal cooperation.

To become rewarded brains.

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