

INFORMATION, TECHNOLOGY, AND TRUST: STUDYING DIGITAL NATIVES WITH A COGNITIVE PERSPECTIVE

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1 Introduction and Motivation

Some studies suggest that the intense use of information and communication technologies (ICTs) in the early years of a person's life could contribute to the development of peculiar behavioral habits and cognitive structures (Braccini & Federici, 2013; McMahon & Pospisil, 2005; Prensky, 2001; Tapscott, 1998). Those who are in such condition are usually named *digital natives* (Prensky, 2001), and separated from the *digital immigrants* who on the contrary started to use ICT later in their lives. Vodanovich et al. (2010, p. 712) argue that digital natives by the age of 20 have spent on average about 20,000 hours online using different kinds of transactional and decision support systems, to collect information, to establish social relationships, and to cooperate with peers. Given the influence that ICT was found to have on organizational norms, values, and behavior (Orlikowski & Robey, 1992), investigating consequences of ICT adoption on the individual dimension in an organizational context is important both for information systems (Vodanovich et al., 2010) and for organizational behavior (Brivot et al., 2014).

The digital native phenomenon promoted an intense debate in the literature, though mainly within the boundaries of education studies (Bennett et al., 2008). This characteristic of the digital native discourse is at the same time its main limitation: the investigation of potential consequences of ICT usage by digital natives, other than those related to teaching and learning, are currently neglected by the literature. This paper describes a research in progress effort where we study the digital natives from an organizational behavior perspective, with a cognitive approach, to shed light on the trust and control dynamics that underpin their cooperation behavior in teams.

2 Theoretical Background

2.1 Digital Natives and ICT Usage Intensity: issues and research gap

A keystone in the debate on digital natives is the influence that the abundant presence of ICT have produced on their skills, behaviors, habits, and principles, in relation to the way they use the technology, and the way they interact and cooperate with peers (Vodanovich et al., 2010; Zimmerman, 2012). This statement is based on two assumptions: (i) digital natives were born and grew up in a world where ICT was profusely available (fixing this way their birthdate in a period around the year 2000, when ICTs were supposedly available for everyone), and (ii) they had the chance to interact with these

technologies since their birth. Though several factors (like census, education level, technological level etc.) (Braccini & Federici, 2013) contribute to alter the interaction capabilities with ICT, the birthdate alone was not found as a consistent way to identify digital natives. Nevertheless literature discusses several consequences of ICT usage intensity.

As reported by some sources (Cahill & Sedrak, 2011; Smith, 2010) digital natives are accustomed to the habit of receiving immediate feedback for their actions and their behaviour. Such desire of immediateness of feedback could create issues when delayed motivation is instead necessary for specific organizational actions (Braccini, 2013; Goleman, 2004). Moreover intense ICT usage could have produced in digital natives the need to be in control of the environment (Smith, 2010) like they usually are in control with the ICT tools. At the same time being able to control such complex software systems also induced in digital natives a sense of self confidence (Schewe et al., 2013) that might also go beyond the technological aspects. In some cases this self confidence becomes a sense of trust (Zimmerman, 2012) that influences both their relation with technology and people.

Such mixed and sometimes conflicting set of behavioural traits calls for an empirical investigation of how digital natives actually behave in teams and organizations. In particular the balance/conflict between control and trust seems an important conflicting dichotomy that is worth further empirical investigations.

2.2 Socio-Cognitive Model of Trust and Control

Different fields in social science address the problem of trust to understand social dynamics (Castaldo et al., 2010). In organization studies trust is a concept usually related either to organizational performance (Cummings & Bromiley, 1996) or to individuals' behaviour (Mayer et al., 1995). In both the interpretation some fundamental analytic presuppositions of trust shall be taken into account: risk, uncertainty, and ambiguity (Das & Teng, 2004). Trust has been defined as "*the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other party will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party*" (Mayer et al., 1995). Together with these important points of the decision and action of trust, some important psychological aspects must be included in the analysis in order to correctly model organizational trust. In particular, we need to integrate (i) considerations about what the trustor believes about the internal attitudes of the trustee, and (ii) a measure of subjective propensity of the trustor to accept uncertainty, risk and ambiguity (Castelfranchi & Falcone, 2010).

2.2.1 Dispositional aspects of trust and risk taking

In order to address dispositional aspects of trust, and to take into account behavioral consequences of it, it is important to disentangle the set of beliefs and evaluations supporting expectations about other's behavior. Moreover both trust as a mental attitude and trust as a decision are intrinsically situated and must be inevitably tied to the context in which the interaction occurs (Marzo & Castelfranchi, 2013).

Since any act of trusting and relying implies some bet and some risk (Luhmann, 2000), we need to take into account belief about the vulnerable position the trustee puts herself on. Let's for example consider two individuals, Eliza and Nick. Supposing Eliza has a trust relationship with Nick, she might eventually be disappointed, deceived, and betrayed by him, should her evaluations be wrong. At the same time Eliza bets something on Nick. First, Eliza renounced to possible alternatives (i.e. other partners): thus she is risking on Nick the utility of her goal (and of her whole plan). Second, Eliza wasted her own time and resources in evaluating Nick. Third, perhaps Eliza had some cost to induce Nick to do what she wants or to have him at her disposal: Eliza can pay for Nick's service and this investment is a real bet on him (Castelfranchi & Falcone, 2010). Thus, we can say that when Eliza trusts Nick there are two risks: a) the risk of failure, and b) the risk of wasting efforts and investments.

2.2.2 Attribution of Trust and the Concept of Control

Subjective probabilities of a given behaviour successful performance can be implied (either implicitly or explicitly) by trust. The final probability of the realization of some goals should be decomposed into the probability that the trustee can perform required actions, related to internal attribution (such as willingness, persistence, engagement, competence), and the probability of having appropriate environmental conditions (external attribution) (Castelfranchi & Falcone, 2010).

When the environment and the specific circumstances are safe and reliable, less trust is necessary for delegation. Conversely, the stronger is the trust relationship, the smaller is the need of a safe and reliable environment and, then, of external monitoring and authority (Castelfranchi, 2001). Therefore, we can account for a 'complementarity' between internal and external components of trust. Without trust other aspects can replace it. From this perspective an important role is played by control, a meta-action aimed both at ascertaining whether a given state of the world has been realized or maintained (feedback, checking), and at dealing with the possible deviations and unforeseen events in order to positively cope with them (intervention).

From the socio-cognitive perspective trust and control are antagonists: if there is trust there is no need for control. Instead, when we consider the broad form of trust, that include both internal and external

attribution, control can contribute to create and increase trust, as well as it can complete and complement it (Castelfranchi & Falcone, 2010).

3 Investigating Digital Natives Behavioural Dynamics

3.1 Preliminary findings

In the first steps of the research described here we collected empirical data on a sample case of digital natives. Three different data collection efforts were run involving respectively 20, 58, and 489 observations from digital natives. Results contributed to confirm the high heterogeneity in the composition of the digital natives. Both level of knowledge and interaction were measured and were found to be unevenly distributed among the different samples, especially with regard to advanced knowledge of ICTs (measured through the knowledge/usage of database tools and programming languages).

A review of the literature confirmed by the analysis of 489 observations of digital natives contributed to identify six main behavioural traits of digital natives (Braccini & Federici, 2013): multitasking, ICT-tools mediated relationships, speed in information processing, critical thinking, peer-to-peer collaboration, learning in action.

An investigation of the digital native behaviour in teams, in relationship to their leadership potential, contributed to show that the absence of three characteristics usually ascribed to digital natives (multitasking, intense technology usage, and intense use of ICT for social networking) are linked with the leadership potential (Braccini, 2013).

Finally a fsQCA analysis of a sample of 58 observations allowed to identify¹, among other results, the following relationship between digital natives behaviour and two traits: the predisposition to delay motivation (the inverse of immediate reward, equation 1), and the preference to cooperate with peers (the inverse of being selfish, equation 2).

In particular the delayed motivation (equation 1) was found to have a cause-relationship connection with the non intense usage of apps, of office automation tools and games (together), and with the intense advanced use of ICT. Considering the capabilities of QCA of including in the analysis both what is observed and what is implied by what is observed, these results leave the door open for the hypotheses of the need of immediate feedback by digital natives.

¹ All the analysis reported here were performed using fsQCA, with a frequency cut-off of 2 cases minimum, and a consistency cut-off of 0,90.

The predisposition to cooperate with peers instead (equation 2) was found to have a cause-relationship connection with several factors: lack of intensity of tablet, games, and apps usage. This again leaves the door open for the hypotheses that ICT usage intensity might be associated to the lack of predisposition to cooperate by digital natives.

$$(1) delmot = \frac{\sim f_{app}}{f_{dblankprog} \sim f_{officeaut} * \sim f_{games}} \quad (2) collab = \frac{\sim f_{tablet} \left[\begin{array}{c} f_{officeaut} * f_{games} \\ f_{dblankprog} \end{array} \right]}{\sim f_{games} \left[\begin{array}{c} f_{officeaut} \\ f_{dblankprog} \\ f_{tablet} \end{array} \right] \sim f_{app}}$$

3.2 Experimental design

To further investigate these findings our research project aims at testing if the trust and control predisposition of digital native differs from those of the immigrants. A possible way to study the willingness to trust is to understand how people act when the possibility of controlling others' actions is represented by the possibility of punishing them (Brandts & Fernanda Rivas, 2009). Another process that can easily increase trust pre-disposition is the possibility of introducing some form of insurance, so that the loss deriving from betrayal is significantly reduced (Bohnet et al., 2012). We aim at testing both mechanisms in order to find out potential patterns in digital natives needs of control, on one side, and to discover possible differences in which form of control they prefer to use. We approach the investigation of this behavior through an experimental strategy. The experiments we will run consist in a modified trust game (Berg et al., 1995). In the trust game two different players, *I* the investor, and *R* the recipient are involved. The investor *I* is endowed with a sum of money, which she can keep or invest with the recipient *R*. The decision to invest implies the existence of trust between the two. The amount *I* decides to invest is tripled and sent to the trustee *R* who then decides what fraction to return to the investor. Both players have different strategies to execute and associated to each combination of strategies there are different payoffs π . Figure 1 shows the structure of the experiment. If *R* decides not to trust *I* (is_2) they will both receive a moderate (m) payoff. If *R* decides to trust *I* (is_1) the amount of money is tripled and according to their subsequent choices, *I* and *R* are assigned two different sets of payoff: they both get a better (b) payoff if *R* does not betray *I* (rt_1). In the opposite situation the investor receives a lower (l) payoff (being betrayed), and the recipient (having betrayed) receives a higher payoff (h). In the modified version of the trust game we are running the payoffs are modified as follows: $l = l^+$; $h = h^-$. It consists in the fact that the first mover's expected value from trusting can be affected by decreasing the highest payoff the counterpart receives if he is a betrayer, and/or by increasing the lowest payoff she receives if her trust is betrayed. The former consists in the case of a punish-

ment (that can be referred to as “securing revenge”), the latter the case of an insurance (which we can consider as "securing protection"). Such choice shall be taken at the beginning of the game.

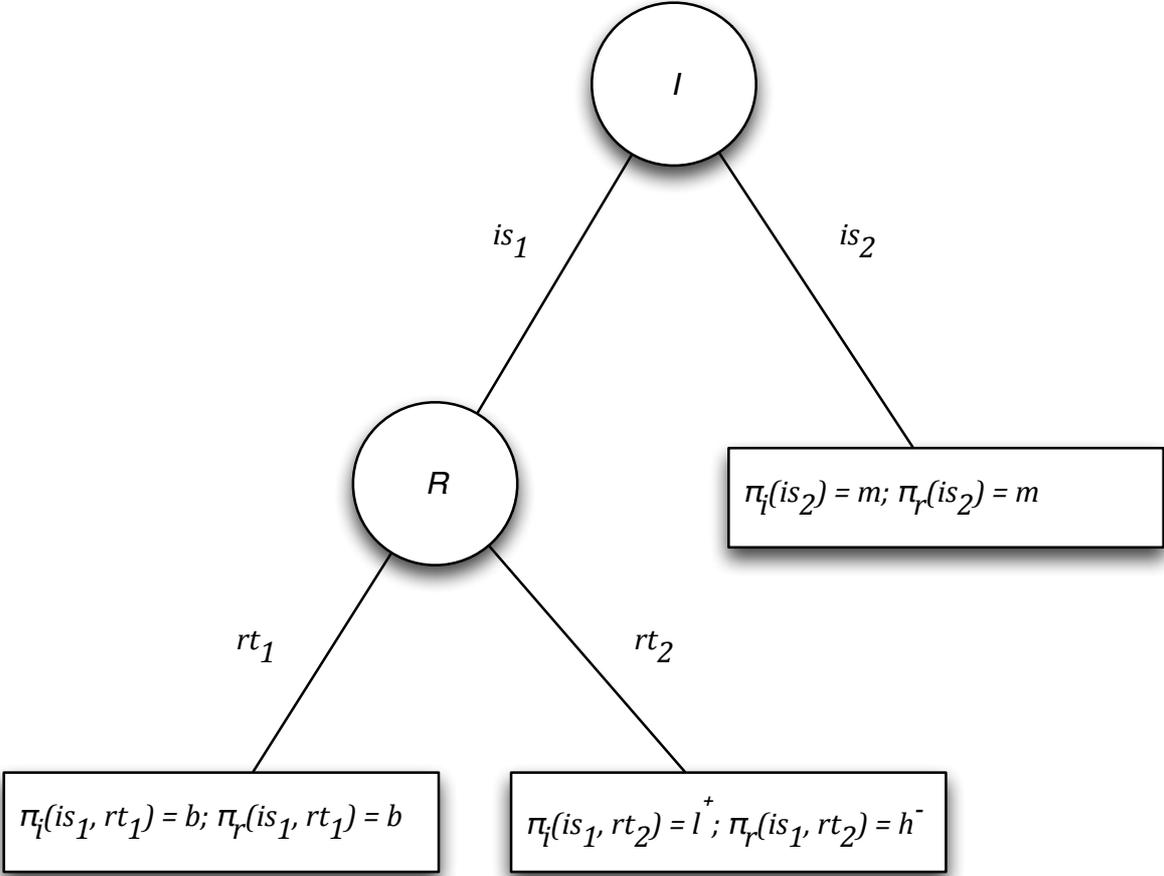


Figure 1. Tree of the game

4 Discussion and conclusion

The experimental research strategy is based on a twofold motivation. First of all, the inadequateness of the birthdate to identify the digital natives as a cohort makes the identification of a population difficult and poses threats to the adoption of any research methodology that involves the definition of a sample (excluding the incidental one). Secondly we expect self-reported measures to be biased in this situation since subjects have to report on behaviors and skills that might be perceived differently from the outside. Finally it would have been necessary to identify an empirical setting trust and control behavioral traits could be observed detached from other contextual factors to exclude potential confounds (i.e. previous acquaintance or experience of trustor and the trustee) that might influence trust and control related decisions.

We will ensure, through anonymous and random team member selections and team formation, to avoid bias from contextual factors. We will run experiments with all the four possible combinations of situations, combining *I* and *R* respectively, and in turn, native and immigrant. A control group will be used to disentangle the roles of different characteristics in decisions related to our main experimental condition. Differences among the different groups will emerge from studying the different results of the experiments round. To ensure enough variability in the experiment results, we plan to collect a large sample of about 1,000 observations.

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