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**Socio-cognitive Systems of Organizational Culture
and Communication. An Investigation into
Implicit Cognitive Processes**

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Abstract

Social systems can be seen as complex adaptive systems. They organize themselves through social action, while culture creates the structure in which social action takes place. Cognitive schemas of interpretation are the fundament on which people classify, integrate and store cultural relevant information. Although they are mostly automated and not directly observable, they are the building blocks of culture and influence our social and communicative behavior. Implicit processes are intuitive, spontaneous, unintentional and mostly unconscious. They include attitudes, stereotypes, motives and the underlying tenor. The Implicit Association Test (IAT) is a social psychological method based on reaction time originally developed for measuring unconscious social perception (e.g. stereotypes). Compared to more explicit methods such as interviews or questionnaires, implicit methods are less susceptible to social desirability issues and well suited to analyze topics and attitudes the participants are not aware of. This paper presents a case study on the use of the IAT in an organizational setting.

Keywords: cognitive schemata, Implicit Association Test, organizational culture, role of communication, social systems

Introduction

Complex adaptive systems have been described as the primary way in which order is created out of disorder (Gell-Mann, 1994). Although their physical attributes differ widely, they are based on similar systemic principles. Amongst others, they consist of simple components or agents (in relation to the whole system) that interact with each other in a nonlinear manner without any central controlling entity. Complex systems exhibit emergent behavior which is characterized by information processing, dynamic interactions, evolution and learning, as well as a hierarchical organization (Mitchel, 2008).

Just as ant societies, fish swarms or neuronal networks, human social systems can likewise be perceived as complex adaptive systems. They come into existence through social self-organization in a dynamic interplay of structure and agency (Giddens, 1984). In this process of structuralization, structure enables (social) action and action creates structure (Fuchs, 2003). The central operation of social systems is communication (Luhmann, 1984), which recursively reproduces more communication. These localized interactions between actors or components then create the social system with its dynamics as the result of social self-organization.

Against this background, the question arises how individual behavior creates emergent patterns of "collective" behavior, like culture in organizations, and, vice versa, how those patterns influence the behavior of an individual person.

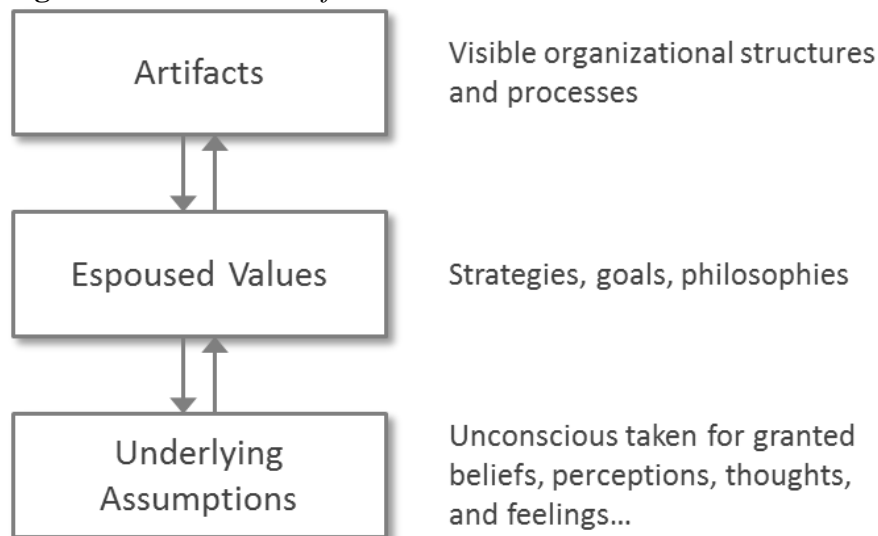
Socio-cognitive Systems - Culture and Cognition in Organizations

To understand the dynamics of any system, it is crucial to investigate the way it handles information as all systems are information processing systems (Gell-Mann, 1994). All systems take in information about their environment as well as the interdependencies and interactions among themselves. Information is derived through multiple redundancies of incoming stimuli and is processed through the sharing of meaning (Leydendorff et al., 2016). Sharing of meaning happens through communication between the agents of the social system whereas this communication is always reflexive as a result of double contingency (Vanderstraeten, 2002). It cannot be observed directly because it is volatile by nature and undergoes selection and decision making processes. As a result of these processes more redundancies are generated. For Leydendorff et al. (2016) redundancy generation is a crucial operation for the advancement of any social system, because it provides new options for development.

As the continuation of successful action (Baecker, 1999), culture shows the materialized "information processing" of a social system. Culture provides the structure in which action is possible, and as such reduces complexity to a degree that is manageable for the system (Luhmann, 1984; Baecker, 1999). But structure is virtual (Giddens, 1984) and only becomes visible through social norms and actions.

According to Schein (2010, 2015), organizations consist of three levels of culture: artifacts, espoused beliefs and values and basic underlying assumptions (Figure 1). The first level, artifacts, constitutes the visible structures and processes as well as observed behavior. The second level, espoused beliefs and values, includes amongst others ideals, ideologies and rationalizations. The third level, basic underlying assumptions, comprises of *unconscious* beliefs and values. This level is more difficult to analyze, but essential to understand the emergence of organizational culture: "In other words, the essence of a culture lies in the pattern of basic underlying assumptions, and after you understand those, you can easily understand the other more surface levels and deal appropriately with them" (Schein, 2010, p. 32).

Figure 1. *Three Levels of Culture*



Source: Schein, 2009.

In accordance with Weick (1979), Harris (1994, p. 310) theorizes how to combine the *macro perspective* of organizational culture as a collective phenomenon of shared values with the *micro perspective* of individual mental structures for information processing.

"I propose that the individual-level manifestations and experiences of organizational culture are revealed in the operation of a patterned system of organization-specific schemas held by organizational members. Specifically, I suggest that individuals' organization-specific schemas are the repository of cultural knowledge and meanings and the source of the consensual sensemaking characteristic of culture. In addition, I suggest that the activation and interaction of these schemas in the social context of the organization creates the cultural experience for individuals."

From a cognitive perspective, culture can be understood as the dynamic interplay between systems of external symbols and internal mental structures (D'Andrade, 1995; Shepherd, 2011). Those mental structures,

also called cognitive schemas, are developed by repeated exposure to the social norms and actions, which are successively created and reproduced by behavior. Using the example of an organization, employees condense their environment and transform their perceived information into a cognitive schema to represent their subjective reality and act accordingly to it. DiMaggio (1997) describes these mental structures of culture as "schematic representations of complex social phenomena, which shape the way we attend to, interpret, remember, and respond emotionally to the information we encounter and possess" (p. 273f).

Cognitive Schemas

Schemas are simplified representations of our (cultural) environment as well as complex mechanisms for processing new information which are based on previous experiences and stored associations and concepts (Berger & Luckmann, 1967; Fiske & Linville, 1980; Mandler, 1984; Markus, 1977; Vaisey, 2009). A key feature of schemas is their high level of automation and their fast cognitive activation (Abelson, 1981; Rumelhart, 1980). Therefore, schemas belong to the domain of implicit cognition (Shepherd, 2011; Vaisey, 2009). Although the extent of conscious access to them (Gawronski & Bodenhausen, 2006; Gawronski, Hofmann, & Wilbur, 2006; Oyserman & Lee, 2008) is disputed, various empirical studies demonstrated that relevant schemas for a situation are activated automatically and significantly affect our perception, attitude and behavior (Kahneman, 2003; Lieberman, Gaunt, Gilbert, & Trope, 2002).

According to Harris (1994) schemas in organizational culture can be classified into five different categories: (1) self schemas which correspond to the perceptions members have of themselves, (2) person schemas which include the expectations and knowledge of the attributes, goals and behaviors of other people in the organization, (3) organization schemas which define how employees perceive and interpret organizational units and groups, (4) object and concept schemas which contain knowledge of different kind of artefacts (e.g. tools or software) and (5) action schemas which contain implicit knowledge about everyday organizational activities and behaviors.

Measurement of Implicit Cognition - The Implicit Association Test (IAT)

The implicit association test (IAT) is the most frequently applied instrument in social psychology to measure unconscious social perception, i.e. schemas (Greenwald, McGhee, & Schwartz, 1998; Greenwald, Nosek, & Banaji, 2003; Jost et al., 2009). It provides a specific measurement of automated, implicit cognition based on the reaction time of test persons (Greenwald & Banaji, 1995; Greenwald et al., 1998; Jost et al., 2009; Karpinski & Hilton, 2001; Olson & Fazio, 2004). The aim of the test is to analyze to what extent categories (e.g. man vs woman) are implicitly

associated with other categories (e.g. career vs family, good vs bad). It is assumed that an implicit preference exists if two categories are associated faster with one another.

As an example, two categories (e.g. man and woman) are tested together with two other categories (e.g. career and family) (Figure 2). During the test, different words for different categories are displayed. The test person has to decide very quickly if a displayed word (e.g. "Susan") fits to a specific category (e.g. "man" or "woman"). During the computer-based test the placements of the categories change to distinguish between hypothesized congruent ("Man and Career" and "Woman and Family") and incongruent ("Man and Family" and "Woman and Career") concepts. The test person has to answer several hundred times which words fit to which category and the reaction time is measured in milliseconds. If the test person assigns words during the congruent phase (Figure 2a) faster than during the incongruent phase (Figure 2b), the data is interpreted as an implicit preference to associate men with career and women with family (Greenwald et al., 1998).

Figure 2. *Examples of an Implicit Association Test, to Test an Implicit Preference of "Man and Career" and "Woman and Family"*

a) Stereotype-congruent Phase (40 random stimuli)

Man Career	Woman Family	Man Career	Woman Family	Man Career	Woman Family	Man Career	Woman Family
Susan		Money		Children		Steve	

b) Stereotype-incongruent Phase (40 random stimuli)

Woman Career	Man Family	Woman Career	Man Family	Woman Career	Man Family	Woman Career	Man Family
Susan		Money		Children		Steve	

The significance of implicit attitudes for the explanation of observable behavior is widely supported through empirical studies. For example, von Hippel et al. (2008) could show that nurses in an alcohol and drug rehabilitation center who demonstrate higher implicit prejudice towards drug addicts (tested with the IAT) complain about higher stress levels, have a lower job satisfaction and report more often to think about quitting their jobs. Another study by Green et al. (2007) demonstrated the effect of implicit biases against Afro-American patients on physician's recommendation behavior. Physicians with a higher implicit racial bias gave fewer recommendations for thrombolysis for Black than White myocardial infarct patients. The predictive power and real world validity of implicit attitudes on behavior measured with IAT has been confirmed in other domains such as voting behavior (Galdi, Arcuri, & Gawronski, 2008), employee recruitment (Rooth, 2010) or mental health (Rüsch et al., 2007). Compared

to explicit measurements, e.g. surveys, the implicit tests are very difficult or even impossible to fake. Multiple studies demonstrated that a test person can fake explicit measurements, like surveys, but were not able to fake these implicit tests, even if they were instructed to do so (Egloff & Schmukle, 2002; Kim, 2003; Asendorpf, Banse, & Mücke, 2002).

Based on the advantages of the IAT mentioned in this section and the focus of the paper on the unconscious level of organizational culture, the underlying assumptions, the aim of the following case study lies in the application of the IAT to measure selected cognitive schemas of organizational members. Compared to more traditional methods of investigating organizational culture, like questionnaires, focus groups or interviews, which often suffer from social desirability issues and having certain shortcomings in detecting implicit attitudes and beliefs, using the IAT should provide new insights on the deeper levels of organizational culture.

For that, a special IAT was developed that focus on innovation culture. It allows measuring the implicit attitude of employees toward the innovativeness of themselves as well as the innovation culture of the whole company. We assumed, that the companies` strong leadership practices in promoting and communicating values of innovation should be reflected in the implicit beliefs of organizational members.

In applying the IAT to an organizational setting, theories and methods of social systems were integrated with a cognitive schema-based approach to test the applicability and usefulness of a potentially promising, underused tool in and for organizational research.

In the following section the key parameters of a case study conducted at an Austrian start-up and present key findings will be demonstrated and described.

Case Study

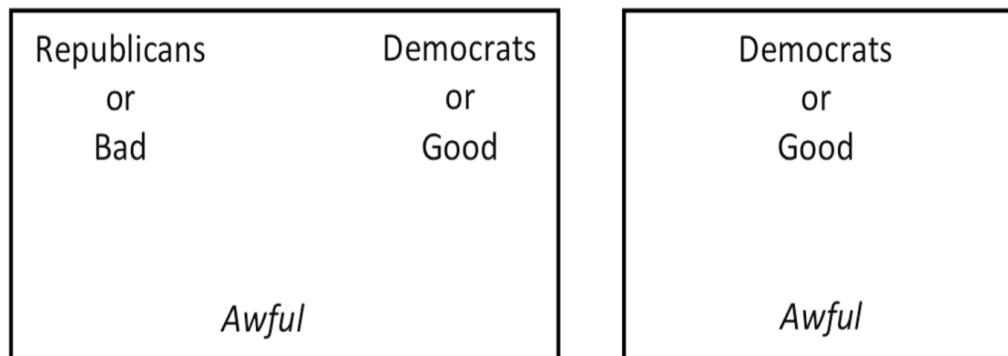
Research Question

The two founders and chief executives of an Austrian start-up agreed to take part in a case study with the aim to shed light on one specific aspect of the organizational culture in their firm. The startup had been launched as a web-based alternative to traditional insurance firms. They established their company as a service provider and grew to 32 employees. Due to this development, the founders were interested to know whether their employees still see their firm as an innovative start-up or rather as conservatively and traditionally functioning companies like the established insurance companies. The case study is based on the assumption that the typical organizational culture of startup businesses is strongly associated with innovation. Moreover, an innovative culture is assumed to be characterized by social norms that encourage individuals to invent, to contribute ideas and to perceive themselves as innovative.

Method

To investigate this aspect of organizational culture an IAT for innovation was developed, that was specifically adjusted for this research project and this company. In contrast to the standard IAT, in which two categories are listed on each side of the monitor, a so called Brief IAT (BIAT) was used (Figure 3) for this purpose. The advantage of the brief IAT is that it takes less time and therefore allows to conduct multiple test without overstrain the cognitive load of employees.

Figure 3. *An Example of a Standard IAT on the Left and a Brief IAT (BIAT) on the Right*



Source: Nosek, Bar-Anan, Sriram, Axt, & Greenwald, 2014.

Two BIATs were designed: the first aimed at the level of organization schemata (see above schema type 3, Harris, 1994) by measuring the perceived innovativeness of the company, i.e. how strong the organization is associated with the participants’ concept of innovation in comparison with other insurance firms. The second BIAT aimed at participants’ self-schemata (type 1) and measured the strength of association between the concept innovation and themselves in comparison to other people. To identify suitable stimuli, four interviews and two pretests were conducted. Words that were used by the interviewees to describe innovation and their firm were selected and unclear stimuli - as identified during the pretests - were removed. The resulting stimuli that were used in the study can be seen in Figure 4. Items describing the firm and other insurance companies are subject to nondisclosure.

Figure 4. *Items Used for Brief IAT 1 + 2*

innovative	conservative	I	other persons
innovative	conservative	my	others
modern	traditional	I	theirs
progressive	old-fashioned	self	he
dynamic	bureaucratic	mine	those
flexible	rigid	me	she

In the study a web-based tool was developed and all participants received an invitation via email and had to complete both IATs in random order. Each IAT took approximately 4 to 6 minutes, and afterwards participants received a short questionnaire to collect additional information about the sample.

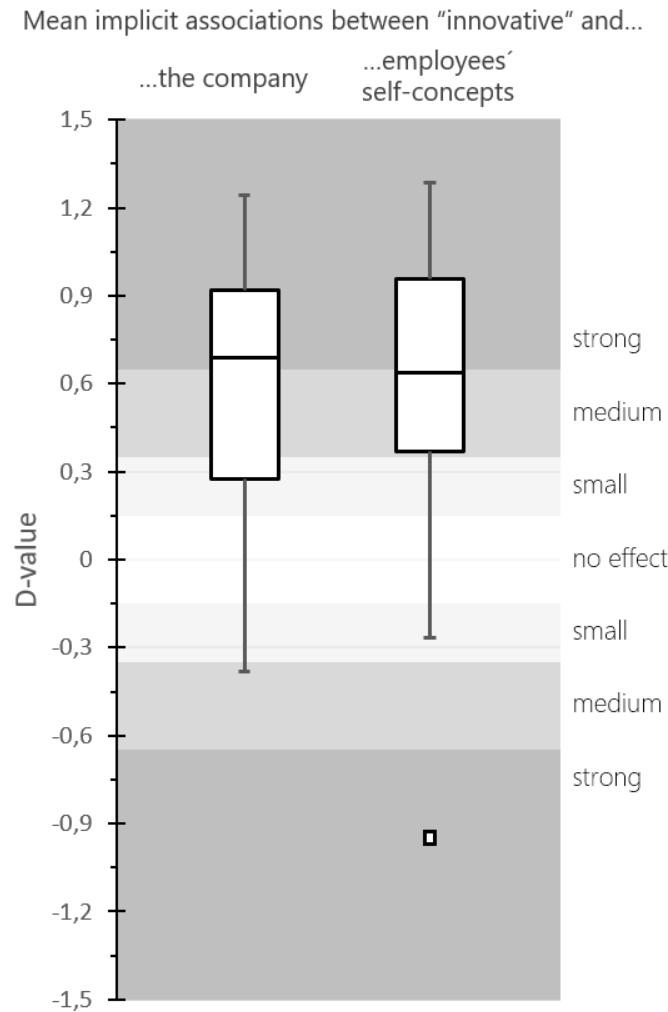
Participants

For the analysis of the innovation culture of the start-up we aimed at a complete investigation and were successful with a response rate of 87.5% participation: a total of 28 out of 32 employees of the studied start-up completed the IAT and the survey, only four employees could not be reached due to illnesses or vacation. Three participants had to be excluded from the analysis due to incomplete data, leading to a total of 25 valid test results. Participants' mean age was 28.2 years (SD=6.0); 9 were females and 16 were males.

Results

For the IATs, we calculated D-values according to the procedure described by Nosek et al. (2014). In our design, high scores in the first IAT indicate a high associative strength between the company and the concept "innovative," and low scores indicate a high associative strength between the company and the concept "conservative." In the first IAT an average D-value of 0.69 (median) was found, with 50% of participants ranging from 0.27 to 0.92, and all participants ranging from -0.38 to 1.24 (Figure 4, left). The second IAT manifests an average D-value of 0.64, 50% of the participants are within 0.37 and 0.96, with a minimum of -0.27 and a maximum of 1.32; a single outlier strongly deviating from the rest was identified (Figure 5). As D-values can be interpreted similarly to Cohen's D (Cohen, 1992; Greenwald et al., 2003), we can use the IAT's D-value to estimate the strength of the effect. The spectrum of possible effect sizes is depicted in the background in Figure 5. Accordingly, the results indicate the employee's moderate-to-strong association of the company and the concept "innovative." On average, the employee's self-concept is similarly associated with the concept "innovative."

Figure 5. Box-Plot of IAT Result (D-Score)



Note: The White Boxes Visualizes the Range of 50% of the Data Points as well as the Median; the Antennae Indicate the Minima and Maxima. A Single Outlier Was Detected in the Second Test. The Shaded Areas Show the Effect Size according to Cohen'S D.

Discussion and Conclusion

Organizational culture is the implicit base of all decisions made within the social system "organization" (Baecker, 1999). However, its formulation and mechanisms themselves are subject to selection and decision making processes of its members (Leydesdorff et al., 2016). In order to investigate mechanisms and dynamics of a social system it is therefore crucial to understand these processes and their functionality, which happen within the individual actor and are sparked by the interactions between them. If we manage to make them "visible" we could gain a deeper understanding on the mechanisms of organizational culture specifically and the operating mode of culture as a whole.

Many studies have shown, that the inclusion of implicit measures of cognition, especially the IAT, can add new perspectives in the research of human thought, emotion and behavior (Greenwald, Poehlman, Uhlmann, &

Banaji, 2009; Fazio & Olson, 2003). Primarily used in social psychology research, the IAT has been and still is underused in organizational research. Nevertheless, the relevance of the IAT for organizational settings, seems to be rather high. In a particularly revealing study, Rooth (2010) sent fake applications to several thousand companies only differing in the name of the applicant (Swedish vs. Arab). Moreover, the implicit racial stereotypes of the job recruiters responsible for selecting the most promising candidates, were measured with the IAT. Rooth (2010) could demonstrate, that those job recruiters with high implicit racial stereotypes towards Arab applicants invited less Arab and more Swedish candidates to interview for the position. By contrast, explicit attitudes had no influence on their decisions.

Based on these and other results, organizational research scholars have recognized the potential of the IAT for digging deeper into cultural and other phenomena of organizations. This is, amongst others, reflected in several recent overview reviews focusing on the potential use cases and applied settings of implicit measures for organizational research (Haines & Sumner, 2013; Uhlmann et al., 2012). One of the major messages of these reviews is the emphasis on the usefulness of implicit measures, especially the IAT, above and beyond the existing arsenal of explicit research instruments, not least in predicting the behavior of organizational members (Uhlmann et al., 2012).

Sticking to the interpretation framework of Greenwald et al. (2003), the results of the present case study indicate moderate-to-strong effects for the measured implicit associations. It can be assumed that the employees construct a schema of their organizational environment that shapes their perception of the firm as a highly innovative workplace. Furthermore, we speculate that this organizational value is systematically reproduced, as the founders directly propagate their core values by communication or by leading by example and also recruit persons who share these values.

Though the present case study can be seen as a proof of concept, that implicit aspects of organizational culture can be measured, up to this point comparisons with other organizations are not possible. We do not know yet whether similar results could be found when analyzing other start-ups or if lower values prevail in more traditional corporate environments. Similarly, the effects of the measured implicit associations on other variables like job satisfaction or actual behavior of the employees are not known. Both will be examined in follow up studies.

With regards to the objectives of the present study, their results and findings could demonstrate the usefulness of applying implicit measures to organizational settings. With the IAT, organizational (culture) research has a new, promising tool which can be used to measure the, according to Schein (2010), deepest layer of organizational culture, the underlying assumptions more directly than with maybe other more explicit methods.

Just as any social system, organizations can be perceived as complex adaptive systems. Culture provides the structure for the continuation of successful action. Cultural schemata as "invisible" representations of beliefs and attitudes are an important part of culture. They get activated in social interactions such as communication and can be interpreted as the "underlying assumptions" related to organizational artifacts or values, but

they cannot be observed directly. However, the Implicit Association Test (IAT) offers the possibility to measure them and thus gives a new perspective on the "unconscious" and mostly automated implicit processes. The presented case study supports the concept that implicit schemata of organizational culture can be measured. As the results presented in this paper are based on the findings of a single case study, no general conclusions can be drawn yet. However, the use of IAT to measure organizational culture offers wide possibilities for future research: for example, the IAT could be used for tests in different companies and industries in order to identify whether similar cultural structures exist. Additionally, the effectiveness of communication and interventions could be investigated in long term studies. The validation itself could be tested to develop a benchmarking system. Furthermore, the difference between explicit and implicit measures needs to be analyzed in order to gain a deeper understanding of organizational culture and its implications on the organization and the individual. Finally, the measurement tool itself could be further developed to include applications for mobile devices for an easier and more effective use of the IAT in organizational settings.

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