The ALBO project - Virtual Working Environments for the Detection of Organizational Well-Being

Eva Venturini*, Valeria Faralla*, Alessandro Innocenti*

*Department of Social, Political and Cognitive Sciences, University of Siena, Italy

Abstract

Substantial evidence from social and cognitive psychology suggests that a lot of behaviors are driven by processes operating outside of awareness. Many implicit or indirect measures to capture such processes have been proposed. The aim of the Albo Project is verify, both theoretically and experimentally, if the traditional instruments for assessing work-related stress (questionnaires, check-lists and interviews) are inappropriate to detect the individual perception of psycho-social risk factors in work environments. It is also claimed that Virtual Reality simulations permits a better assessment of the potential factors of stress in workplaces. Game simulations based on the techniques of Virtual Reality are potent tools to provide a substantial improvement in the quality and quantity of information and awareness on the safety and psycho-social risks existing inside organizations.

Also, the Virtual Reality exposure (virtual movies) can facilitate the objectivity in judgment of audience. Alternation between compact learning units and practical application of knowledge deepens the acquired know-how and creates a long lasting experience. The final product has been administered in some companies to test it. The result of the first step of the project is the demo version including scenarios of virtual work environments.

The final product will be used for assessing job stress and for designing training experiences in workplaces on online platforms.

Key Words: Virtual reality, job stress, risk perception, workplaces, heuristics
1. THEORETICAL BACKGROUND

1.1. Work-related stress and the limits of evaluation tools

The examination on the scientific literature shows that the production of a stress reaction is not due to the nature of the stimulus, but rather to its cognitive-emotional evaluation, in terms of subjective past (Sutherland & Cooper, 2001; Cox et al., 2000; Karasek, 1979; French et al., 1982; Dollard et al., 2000; Schmidt-Diestel, 2011; Ferrario et al., 2008).

In our field of work it could be defined as the individual evaluation of balance between the environmental requests and the resources to answer them. In this sense, the subject is an active element in the relation person-environment, a dynamic interaction based on a causal reciprocity, a continuous process of assessment of stimulus and reactions of adjustment. These theoretical premises direct the attention toward the individual response to stimulus, therefore toward the importance of personal characteristics and coping strategies in the process of stress perception. In the perspective of comprehension of this process’ result, it is fundamental to consider the characteristics of both the work environment and the subject who works there.

This view contrasts with the ways of survey of work-related stress commonly used. At present, the measurement of work-related stress is done through the use of checklists and questionnaires both for the valuation of objective aspects of work and subjective aspects of workers’ perception (INAIL, 2011).

The questionnaires are self-report tools organized in a series of questions expressed in open of close form, which request the subject to report his own experience (thoughts, judgments, motivations, etc.). Some of these tools request to point out the presence or absence of a specific behavior, while some others imply the evaluation of the frequency of the event. These tools are still widely used in psychological research on the behaviour in working and managerial fields. Their use is based on the prerequisite that the subject who replies deeply knows his own mental processes. Furthermore, these
tools (Luccio, 2005) can be influenced by some sources of distortion. The main factors individuated are: the expectations of the subject who replies, the search for coherence, the social desirability, the perception of personal risk (unrealistic optimism), the sources of distortion due to the context and to the situation in which the subjects replies, and the order of questions. Several studies on implicit associations (Sriram, et al., 2010; Nosek, 2007; Greenwald & Krieger, 2006; Fan, et al., 2002; Greenwald et al., 2002; Greenwald et al., 1998) call into question the effective reliability of these evaluation tools. In particular, the debate concerns the idea that the subject can have an aware control of his own thoughts and behaviours. On the contrary, it is considered as correct the assumption that not always the subject can have a full awareness of these processes. In fact, while self-report tools highlight the intentional and conscious aspect of behaviours, implicit measures point out an implicit and scarcely consciously controllable level of elaboration (Nosek, 2007). Self-report tools exclude from the evaluation all those mental processes automatically and instinctively activated, which escape from both awareness and introspection, “loosing” these information and not representing correctly the perception of risk factors. Moreover, some authors (Bargh et al., 1996; Hassin et al., 2009a; Hassin et al., 2009b; Morsella et al., 2009) consider that thoughts, emotions, actions, can be defined as automatic processes, since they are led by characteristics present in the environment (for instance people, objects, behaviors, environments, roles, rules, etc.) and by conscious automatic processes not mediated by aware choices or reflections.

Some studies on pre-attentive activation have showed a dissociation between pre-attentive elaboration and conscious elaboration, so that emotional processes are elaborated immediately and not consciously by a separate brain circuit (Murphy & Zajonc, 1993).
1.2. The influence of heuristics in risk perception

A key assumption on how people perceive risk and take decisions in risky settings, such as insurance and financial markets, is that information processing is generally affected by a number of cognitive biases. The criticisms addressed by Kahneman and Tversky’s (1979) heuristic approach and by Slovic’s (2002) psychometric paradigm to revealed preference theory, according to which individuals are rational in processing valuable information in decision-making, inform recent empirical research.

A first result is that individuals are generally myopic in assessing risks. They tend to be over-concerned with minor risks having an immediate impact on their daily life, while practically neglect the long-term effects of unfamiliar risks. This attitude explains why non experts tend to rank certain risks as more severe than did experts and to overestimate the magnitude of the same risks. Slovic (1987) identifies two sources of lay people’s risk misperception: the degree to which risk is dread, defined as the combination of having a catastrophic potential, perceived lack of control, the unequal distribution of risks and benefits, and the degree to which it is unknown, that is the condition of being unobservable, novel, and with a long latency period.

Another well known fact is that individuals perceive benefits and costs associated to risky events as negatively correlated, which is in contrast with empirical evidence. If individuals exhibit a positive attitude to a risky prospect, they overvalue the associated benefits while under-assess the associated costs. Similarly, when their attitude is negative, the related costs are systematically overvalued.

Finally, it is generally acknowledged that reactions to risks are triggered emotionally and not determined by rational scrutiny. The concept of somatic marker proposed by Damasio (1994) supposes the existence of automatic and unaware affective reactions, discerning what is risky or not independently on the careful weighing of pros and cons.

Since it has been demonstrated that risk perception is influenced by several components among which the background context,
Schonberg et al. (2011) propose to study the decisional processes in risk conditions in more realistic environments, where motivational, positive and negative aspects linked to decisional processes can be considered. In these environments it will be possible to analyze the emotional dimension in its elementary aspects keeping the requisite of external validity. The virtual simulation is suitable for this kind of analysis, because it can produce real situations while having the control of environment where subjects interact (for the first studies see Hoffman et al., 2003; Rey and Alcaniz, 2011; Wiederhold and Wiederhold, 2008). Moreover, it is believed that the methods of indirect scientific survey, such as laboratory experiments and tools of virtual risk simulation, also combined with the use of neuroscientific techniques (brain imaging, as it was specified in the previous paragraph), are more appropriate for the study and description of decisional processes related to risk perception. These techniques in fact allow to consider the complexity of decisional processes and to monitor at the same time emotional reactions and cognitive system, in analytic and experiential modality, of the subjects involved. More specifically, it is believed that the application of virtual simulation techniques can be particularly useful in relation to work environments, a context in which it is relatively more difficult to carry out surveys on risk perception and analysis, if not a posteriori, that is, after the damaging event.

1.3. Using Virtual Reality to improve objectivity in judgment

Virtual reality is a powerful tool to simulate events and tasks by allowing an accurate control of the setting experienced by the decision-maker. This technique can be usefully applied to the investigation of risk perception and management.

Virtual reality is different from real life because it applies a sort of “filter” to the contradictions due to the conflict of individual perspectives. As a consequence, it is not important to bridge the gap between reality and virtual reality, but rather to select what information in virtual reality is important for scientific or practical purpose. (Lauria, 1997; Sanchez-Vives & Slater, 2005)
The technical set-up of virtual reality affords detailed control of the simulated environment in which individual users process information, decide and interact. The plasticity of virtual reality allows the detection and the handling of various problems: the problem of information overload by making users’ attention focused on a subset of factors, the saliency of external factors otherwise neglected, the assessment of the effect of cognitive biases, the lack of awareness, the temporal latency of the consequences of present choices.

To these arguments Riva’s observations (2000) are added. They underline the usefulness of the use of avatars, since this modality allows the creation of a simulated agent with essential requisites (Bonda et al., 1996), such as for instance the body schema, so that the user can identify himself, but not totally, with the situation, as if he could effectively see himself acting. Furthermore, there are differences in the activation of both levels of physiology and cerebral areas, for what concerns the observation of actions made by an avatar or a real person. In a survey carried out by Perani (2001) and his collaborators, it is hypothesized that actions made by virtual agents are not understood through the typical human body schemas, since their action seems not to have the feature of intentionality. The same study also gives importance to the activation of specific brain areas in the vision of 3 D or 2 D actions (Riva et al., 2009). Recent studies (Bailenson et al., 2006; Biocca et al., 2003; Schroeder, 2002) highlight the positive effects of the use of hybrid realism, obtained by means of the use of avatars instead of physical subjects; it gives a high sense of co-presence, and it does not inhibit the self’s openness toward the interlocutor.

In the recent years virtual reality has been very useful in treating anxiety, thanks to the possibility provided by this tool to express a marked sense of presence; at the same time it provides to diminish the sense of fear during experiments (Price et al., 2011; Riva, 2005; Brinkman et al., 2010; Price & Anderson, 2007; Guadagno et al., 2011).
Finally, virtual reality allows the simulation of social interaction by creating virtual scenarios that are networked, computer-simulated environments, in which human participants interact by means of virtual identities called avatars. A virtual world may reproduce realistic features of the physical world or be simply fictional, but in both cases users can communicate, interact and make exchanges among them.

2. AIM OF THE PROJECT

The present project aims to explore the emergence and the dynamics of psychosocial risks among the employees of these organisations, as well as to develop innovative tools for the assessment and management of those risks according to the provisions of country-specific laws and regulations.

The project focuses on the actions and behaviors of individuals working in the organisations, at any level of the hierarchy, and on the particular mechanisms through which they interact with one another and within the contextual and structural aspects of their workplaces (e.g. including the means of production used, the particular conformation of the personal working space, the rules and routines adopted, the command and control chain etc.).

We suggest that the reproduction of those interaction mechanisms by means of "immersive workplaces", or VR-like scenarios reflecting the actual experience of the individuals in their own working spaces, can offer deeper insights and better knowledge of the main risk factors than the current practice of distributing anonymous survey questionnaires in a company or conducting face-to-face interviews with selected workers.

3. RESEARCH METHOD

Firstly: how the tool was made. The ALBO project adopts a multiple case-study approach. This methodology enables the researchers to maintain the complexities and contextual contingencies in which the firms and the phenomena under study are embedded.
For each case study, the following data collection procedure will be set up in accordance with the top management of the selected organisation: identification of a suitable number and quality of production processes and working spaces where these processes develop; video recording of real-life instantiations of the selected interactive scenarios, with the aim to identify the most common “misinterpretations” and “misbehaviours”.

The material collected as described above should be turned into short “VR-like scenarios” tailored on the real-life processes, workspaces, interaction mechanisms, and psychosocial risks examined in the previous phase, and where the real-life actors will be modelled by the use of avatars.

These scenarios will be returned to the people involved and technically refined in close collaboration with them. It is foreseen to create simulated sessions of usage, either with different people belonging to the same organisation, or with different organisations active in the same business sectors.

In association with each of these scenarios, a set of performance indicators will be defined and a number of evaluative questions, points of decision, proposed action items will be introduced in alternance with the storyboard developments. Individual performance will be measured by the set of indicators and in accordance with the “score” achieved at the end of the “game”.

Secondly: laboratory research method.

The team is carrying out 2 experiments: the first is into physiological responses in the viewer of the videos and the second into social influences on decision making, most pertinently, the effect of being observed during the experimental task. The preliminary findings suggest that people watching the “virtual scenarios” have a physiological response lower than those who watch “real scenarios”; the personal characteristics and to be observed influence decision making. This findings will be developed in detail in the research project.
4. PRELIMINARY RESULTS

The main result of this research project is a prototype of a tool to assess job stress in workplaces. This tool is composed of 3 steps. In the first step the employee has to watch a video about a stressful job situation.

We decided to use videos featuring avatars because they can allow a third point of view. This facilitates a greater objectivity in participants’ assessment. After watching the video, the virtual coach asks the employee to answer some questions about what is happening during the work situation shown. An example of a question is: “does the worker in the video feel mental fatigue?” and there is a multiple choice “not at all; to a small degree; quite a bit; to a great degree;”.

In the second stage, the viewer is encouraged to adapt what he/she has observed in the video to their own professional experiences and environment. Then the virtual coach asks the participant to answer the same questions their own professional experience. An example of a question is: “in your job experience, do you feel mental fatigue?” and there is a multiple choice “not at all; to a small degree; quite a bit; to a great degree;”.

In the third step the participant viewers brief extracts from the video. These are typically 10 to 20 seconds in duration. After this the participant responds to a single pertinent question, usually phrased as: “What was wrong….?”; this standar question is multiple choice. Finally the programme gives an evaluation of subject’s performance.

The analysis of the first set of data shows that conspicuously those who have viewed the avatar videos are more attuned to negative behaviour than those who watched similar scenarios played out by human actors. Our explanation of this result is that people watching virtual scenarios are more able to focus on
behaviours than those who watched the scenarios played by actors. They get a better awareness of their work activities by partially removing the biases and heuristics activated in their daily work life.

5. CONCLUSION

According to the literature reviewed for this study, it is evident that the most commonly used instruments in the assessment of work-related stress are largely inaccurate. As such, the ALBO project aims to create a new tool for work-related stress assessment. The first finding show that in order to facilitate a more impersonal evaluation of their own work experience, it is useful to show subjects stimulus from virtual scenarios. Virtual scenario allows the subject to evaluate the scenario more objectively and partially remove the effect of heuristics and biases commonly activated in daily work life.

REFERENCES


