UNIVERSITY OF LIMERICK
OLLSCOIL LUIMNIGH

KBS RESEARCH BULLETIN

May 2023
Issue 113

The Kemmy Business School empowers, enlightens and enriches through education, research and public engagement in order to sustainably transform the lives of individuals, communities and society.

Named after Jim Kemmy, former parliamentarian and Mayor of the City of Limerick, the School draws inspiration from his lifetime commitment to the common good, to widening education access, and to building a society characterised by fairness and dignity.

Today, as a triple accredited research led business school with a global mandate, we champion action-oriented interdisciplinary research which gives expression to our mission and values. We place a premium on tackling the challenges of our time and addressing key UN Sustainable Development Goals through conducting excellent research that has impact within and beyond academia.

EQUIS ACCREDITED · ASSOCIATION AMBA · AACSB ACCREDITED

Different types of trust violations and their impact on brain activity

Van der Werff, L., O'Shea, D., Healy, G., Buckley, F., Real, C., Lynn, T. & Keane, M.

Synopsis

Trust is widely regarded as being foundational in workplace relationships. The violation of interpersonal trust results in a range of negative emotional, cognitive and behavioural consequences for the injured party. To date, we do not know if these consequences can be observed in brain activity and if so, what part of the brain. Using EEGs with 68 participants, we identified the effects of three different types of trust violation – ability violation, integrity violation and benevolence violation - on electrical brain activity. Our results demonstrated that trust violations are processed in a similar way and in similar areas to the processing of social information. Violations of integrity trust showed the greatest reaction, in comparison to benevolence or ability trust violations.

Introduction and Background

The ability to build, maintain and repair trust in workplace relationships has been critical to effective social exchange in organisations. The willingness to be vulnerable defines trust and is based on positive expectations of the trustworthiness of the other party (Mayer et al., 1995). Violations of trust, where the other party commits an act that lowers expectations of trustworthiness are common and undermine trustor perceptions of both the trustee and their relationship (Lewicki & Brinsfield, 2017). Trustworthiness is an aggregate evaluation of the ability, benevolence and integrity of another party (Mayer et al., 1995). Violations of ability include information about the lack of competence of the trustee; violations of benevolence include information that the trustee is unlikely to act in the interests of the trustor; and violations of integrity relate to the values and principles of the trustee, such as a lack of honesty (Mayer et al., 1995).

Neuroimaging data can be useful for exploring the mechanisms underlying particular perceptions and behaviours (Dimoka, 2010; Haesevoets et al., 2018). Our research investigated these theorised distinctions between the categories of trust violation using a neuroscientific approach, examining changes in brain activity as indicators of responses to experienced ability, benevolence and integrity violations using electroencephalogram (EEG).

Authors


Lisa Van der Werff
DCU Business School
Dublin City University


Deirdre O'Shea
Kemmy Business School
University of Limerick


Graham Healy
School of Computing,
Dublin City University


Finian Buckley
DCU Business School,
Dublin City University


Colette Real
DCU Business School
Dublin City University


Michael Keane
Actualise Neurofeedback
Clinic, Dublin


Theo Lynn
DCU Business School
Dublin City University

UNIVERSITY OF LIMERICK
OLLSCOIL LUIMNIGH

Kemmy Business School

Issues and Questions Considered

Although neuroscientific work on trust is relatively sparse, progress has been made in the wider area of social cognition, which includes the range of processes involved in understanding and interacting with others. An important aspect of social cognition is that it enables us to make inferences about people's internal states, including their emotions and motives, from their social behaviour (Adolphs, 2009). Trust is a process defined by forming perceptions and understanding of others, and trustworthiness perceptions are formed through the consideration of the attributes of another individual. Thus, social cognition is central to the formation of trust and its violation.

In terms of the brain, social information has been found to be processed in the prefrontal cortex and has been particularly associated with a brain system called the default mode network (DMN), which is involved in the social understanding of others, including emotion perception and empathy (Li et al., 2014). We expected that evaluations of trustworthiness, and violations of such, would be likely to involve the default mode network (DMN). Past research has shown that the DMN activates in tasks requiring individuals to understand and interact with others, including perceiving and interpreting others emotion status, and inferring others beliefs and intensions (Li et al., 2014). We also wanted to examine whether the three different types of trust violations would have different reactions in brain activity (indicated through activation of the DMN).

Methodology

This study adopted an experimental design, whereby participants were randomly assigned to an ability trust violation (20 participants), benevolence trust violation (24 participants) or an integrity trust violation (24 participants). Participants were first asked to complete a survey and following this, came to an EEG lab. Here, they were met by an EEG technician, who informed them that the purpose of the study was to evaluate brain activity during a test of cognition. As the technician connected the EEG to the participant, she aimed to have as little interaction with the participant as possible, and used a standardised script so that necessary interactions were the same for all participants. The EEG technician then left the room, explaining to participants that this was important for the experiment, but that she would be able to communicate with them via a one-way microphone to give them instructions. During the time period that the technician was out of the room, the participants were presented with one of three pre-recorded scripts (representing an ability, integrity or benevolence trust breach, respectively) of the EEG technician interacting via a one-way microphone. During the session, the participants heard the EEG technician being interrupted by a knock on the door of the room she was in, and overhead the conversation, as though the technician had forgotten to turn off the microphone. At the end of the session, participants were fully debriefed.

Brain activity was measured using EEG, which is a non-invasive method of measuring electrical activity generated by the brain by placing electrodes on the scalp. Changes in the characteristics of electrical activity provide a way to measure changes related to ongoing cognitive processes. We were particularly interested in frontal EEG activity, and specifically, frontal theta wave activity as an indicator of DMN activity.

Outcomes and Findings

We found that the integrity trust violation condition showed the greatest impact on brain activity (specifically on theta activity as indicating DMN activity), compared to benevolence or competence trust violation. As such, our results confirm that trust violation is processed in social cognitive-related brain areas. We also found some evidence that different types of trust violations have different effects in terms of brain activity and are processed to varying degrees. The major contribution of this research is that the involvement of the DMN suggests this difference is related specifically to how individuals understand and interpret the emotions and intentions of others.

Integrity violations generated the greatest response in DMN activity, which supports previous interpretations that this brain system helps individuals to navigate social interactions (Buckner et al., 2008). Practically speaking, an integrity trust violation results in the trustor being less likely to take risks with such an individual (Mayer et al., 1995) and to verify any information that may originate from this individual (Lewicki et al., 1998). As such, our research provides insights into the types of violations that might be most damaging to workplaces relationships. Armed with this understanding, organisations and managers can play a proactive role in helping employees through the sensemaking process that surrounds potential trust violations. Post-violation communication efforts that highlight integrity and benevolence might help frame trust violations in a less damaging manner.

The underlying paper was published in Applied Psychology: An International Review The neuroscience of trust violation: Differential activation of the default mode network in ability, benevolence, and integrity breaches. A full copy can be obtained at:
https://doi.org/10.1111/apps.124371

Authors:
Van der Werff, L., O'Shea, D., Healy, G., Buckley, F., Real, C., Lynn, T. & Keane, M.

For further information and comments, please contact:
Prof Michael Morley
Assistant Dean, Research
Kemmy Business School
University of Limerick, Ireland
T: +353 61 212273
E: Michael.Morley@ul.ie

Forthcoming Research Bulletin
Title: Single-sex schooling, gender and educational performance: Evidence using PISA data

Authors:
Jose G. Clavel, Darragh Flannery

About the KBS Research Bulletin
The purpose of the KBS Research Bulletin series is to make our research more readily accessible to a wide range of interested stakeholders, and so to allow our work to have a useful impact on the society in which we operate. We regard this as an important part of our stakeholder engagement. The dissemination of these bulletins aligns with both the UL focus on excellence and impact in research, and on the KBS strategic goals of cultivating excellence in research while contributing to our community of stakeholders in a responsible and sustainable manner.

UNIVERSITY OF LIMERICK OLLSCOIL LUIMNIGH | Kemmy Business School