The big data of social dynamics at work: A technology-based application

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ABSTRACT

Organisational behaviour entails the study of team and individual dynamic activities within an organisation. As dynamic activities can quickly unfold over time when they occur between individuals, they present a big data challenge for organisational researchers. Furthermore, there is a lack of technologically advanced field-based research methods to capture behavioral dynamics and provide immediate feedback to organisational stakeholders. The present research project seeks to advance research on emergent social processes by introducing a technological application that allows behavioural measurement of social dynamics in the workplace. We provide an illustrative research example of the application with respect to leadership ambidexterity. We discuss how a social dynamics measuring application can improve organisational process research as well as the translation of research for practitioners.

Keywords:

Social dynamics, leadership ambidexterity, technology, feedback

Most work that happens in organizations requires interactive processes between individuals: Leaders communicate specific tasks and responsibilities with their followers, teams closely coordinate with each other to exchange knowledge and solve work-related problems, and employees engage with external clients to sell a product. A core characteristic of these interpersonal behavioural processes is that they are dynamic, unfold over time, and can sometimes change quickly. For example, if we want to understand what drives innovative processes, we need to investigate how teams engage in creative problem-solving, explore and build on each others ideas, and how they switch towards exploitative actions. In a similar vein, to understand how leaders manage the innovation process, we need to study how they dynamically cycle between opposing behavioural activities that regulate the tension between exploratory and exploitative activities of their followers (e.g., Rosing & Zacher, 2017). Unfortunately, these micro-social dynamics at work are still under-investigated (Cronin, Weingart, & Todorova, 2011; Meinecke & Lehmann-Willenbrock, 2015). From a methodological point of view, the focal problem is that these processes are often fast and cannot be interrupted, that is, we cannot simply ask participants over the course of a social interaction to repeatedly rate their behaviours.

A possible solution to approach the above-mentioned questions on social dynamics in and interactions is the use of observational methods.. However, the use of observational methods to study social dynamics at work has been faced with major challenges (Meinecke & Lehmann-Willenbrock, 2015): First, observational research is extremely labour intensive. Second, commercial software solutions that mitigate data collection efforts come at unreasonable costs and often do not meet research requirements (Klonek, Quera, & Kauffeld, 2015; Lehmann-Willenbrock & Allen, 2017). Furthermore, existing technological solutions do not provide direct feedback to practitioners and, hence, cannot provide immediate actionable insights. Finally, the development of technological applications requires sustained

interdisciplinary collaboration within the digital humanities, between social researchers, and computer scientists (Büngeler, Klonek, Lehmann-Willenbrock, Morency, & Poppe, 2017).

To summarize, some of the most interesting social processes occurring in organisations remain under-investigated due to lack of technology. Indeed, scholars have pointed out the urgency to develop "innovative measurement techniques that are unobtrusive and have the potential to provide continuous or near continuous assessments—not snapshots, but movies" (Kozlowski, 2015, p. 285) of conversational dynamics in organisations.

To the best of our knowledge, there exists no technological solution addressing these challenges. Therefore, this research project introduces a technological application that fulfils these technological requirements. Specifically, this project contributes a tool that is user-friendly for both researchers and practitioners by enhancing data quality (i.e. automatizing collection of temporal data features by saving time-stamps for recorded events), data analysis (i.e. digitising data recording and automatization of data aggregation), and reducing the time and effort required to provide immediate feedback to research participants in a digestible way.

To illustrate this "digital computational application" within a research question of management and organisational behaviour, we present how this application can be used to understand the role of ambidextrous leadership within real work team meetings. This example satisfies an increasing call from different literature streams, such as research on ambidextrous leadership scholars who seek to understand its within-person temporal variations (Rosing et al., 2011) and scholars interested in workplace meeting (Lehmann-Willenbrock & Allen, 2017) who aim to understand the process dynamics that are occurring during work place meetings.

METHODOLOGY

We have developed a customisable, multi-function mobile application (*IWI – Insight Work Interactions*) to address the above-mentioned research questions. IWI has a generic

interface and includes a digital database with the larger aim to incorporate digital theory-based observational measures from different research labs. These measures can be shared within and across research labs and implemented by organisational stakeholders for developing organisational interventions and programs (e.g., within trainings or behavioural feedback).

Overall, the app collects digital footprints of timed-event social interaction data. This allows answering novel research questions about the role of temporal, sequential, or cyclical behavioural processes occurring at work. To illustrate the exemplary application of the app, we incoporated an observational measure on leadership ambidexterity and used the app for a 90 minute workplace meeting within a research centre from a large public sector organization.

Technological application

The digital app runs on an online platform and can be used with a portable handheld device (e.g. tablet or laptop) to record social dynamics as they unfold within specific research contexts. The app collects both systematic quantitative as well as text-based information (transcriptions) on dynamic interactive processes and has three central functions.

Measurement. Researchers can build a customised digital coding scheme. In the current example, we built a digital coding scheme to capture ambidextrous leadership within workplace meetings.

Analysis. The application analyses behavioural data "on the fly", that is, as it is being recorded, based on pre-specified data structures and internal algorithms.

Visualisation. A feedback function provides tailored, visual feedback to study participants through a data visualisation function (e.g. gantt charts, graphs, diagrams). This facilitates engagement with industry partners and provides actionable insights right after the data collection and contributes to organisational value creation.

Ambidextrous Leadership. Leadership ambidexterity has been proposed as a relatively novel leadership construct to explain innovation in the workplace (Rosing et al.,

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2011). On the one hand, ambidextrous leaders are supposed to engage in opening behaviours: These are behaviours that increase behavioral variance in their followers "by encouraging them to do things differently and to experiment, giving followers' room for independent thinking and acting" (Zacher & Rosing, 2015, p. 55). On the other hand, ambidextrous leaders engage in closing behaviours: These are behaviours that "reduce variance in follower behaviors by taking corrective actions, setting specific guidelines, and monitoring goal achievement" (Zacher & Rosing, 2015, p. 55). We used the behavioral descriptions provided by Rosing, Frese and Bausch (2011) on leadership ambidexterity to create behavioral micro-categories of leader behaviours. We added an additional "neutral category" to capture behaviours that could neither be described as opening or closing.

RESULTS

For demonstration purposes, we piloted the application within a typical workplace meeting. All behaviours exhibited during this meeting were coded into one of the pre-defined categories of ambidextrous leadership. Based on the sequential order in combination with the onset and offset times of the annotated behaviours, the app immediately plotted a gantt chart visualising when participants were active throughout the meeting. Figure 1 shows a selection of the feedback function with the current research example: Separate speakers are presented by separate lines on the y-axis, while meeting time is provided on the x-axis. We can see that the meeting took place between 13:10 until 14:55. The team leader is depicted in the upper line. Based on the gantt chart, the researcher can immediately see how participation (i.e., floor time) distributes over the entire meeting time. Meeting participants also directly receive behavioural summary statistics on their workplace behaviour.

Furthermore, the app summarized the data based on the coding for the team leader. In the current example, the team leader showed slightly more opening behaviours (e.g., monitoring, sticking to a plan, adherence to rules and regulations; *Frequency* = 26) in

compairson to closing behaviours (e.g., giving possibilities for indendenpant thinking, encourages experimentation; *Frequency* = 20).

Insert Figure 1 about here

DISCUSSION

Due to technological advancements, the possibilities of digital technology to analyse social dynamics in organizations have increased extensively. Computer-supported applications allow an easy collection of time-sensitive data of organizational processes. Unfortunately, the majority of research in our field relies on self-report, cross-sectional data. For the first time ever, technology-based observational approaches allow to comprehensively address calls for research that zooms into the social dynamics of organizations (Büngeler et al., 2017). The current research project and application followed these calls for action. The use of digital applications to capture social dynamics at work can improve reliability of observational measures across research labs, gives greater capacity for tracking the dynamic evolution of a system via feedback loops (Cronin et al., 2011), and provides rich empirical data that can validate computational models.
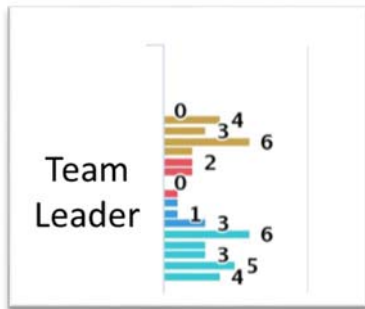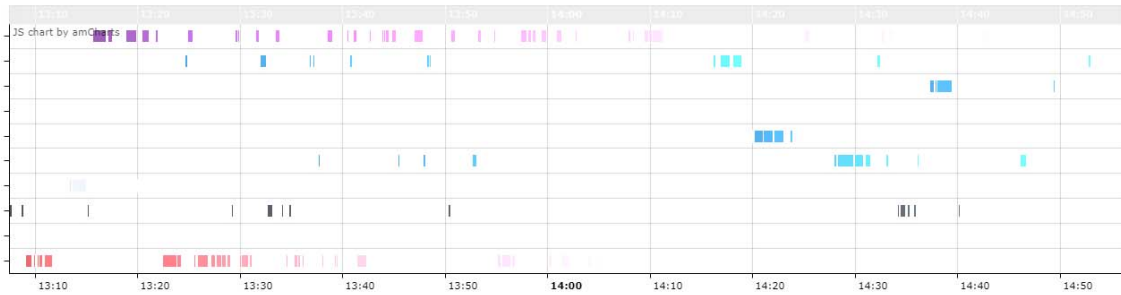
With respect to research on ambidextrous leadership, our study contributes towards understanding how temporal within-person variations of opening and closing behaviours that leaders exhibit towards their followers may contribute to team innovation (cf., Zacher & Rosing, 2015).

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FIGURE 1

Selection of automated summary of social dynamics and leadership ambidexterity* during a workplace meeting

Note: * Lower Figure: orange and red = leader closing behaviours; blue and turquoise = leader opening behaviours.